DOES TIME MATTER?

A SEARCH FOR MEANINGFUL MEDICAL SCHOOL FACULTY COHORTS

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DEDICATION

I dedicate this work to the memory of my grandmother, who—with my parents—inspired me to believe that I can do anything I set my mind to do. I miss and thank you.

Catherine Jochum Papania

1916 – 2009

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Gerard Majella Guillot III

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Background. Traditionally, departmental appointment type (basic science or clinical) and/or degree earned (PhD, MD, or MD-PhD) have served as proxies for how we conceptualize clinical and basic science faculty. However, the landscape in which faculty work has considerably changed and now challenges the meaning of these cohorts. Within this context I introduce a behavior-based role variable that is defined by how faculty spend their time in four academic activities: teaching, research, patient care, and administrative duties.

Methods. Two approaches to role were compared to department type and degree earned in terms of their effects on how faculty report their perceptions and experiences of faculty vitality and its related constructs. One approach included the percent of time faculty spent engaged in each of the four academic activities. The second approach included role groups described by a time allocation rubric. This study included faculty from four U.S. medical schools (*N* = 1,497) and data from the 2011 Indiana University School of Medicine Faculty Vitality Survey. Observed variable path analysis evaluated models that included traditional demographic variables, the role variable, and faculty vitality constructs (e.g., productivity, professional engagement, and career satisfaction).

Results. Role group effects on faculty vitality constructs were much stronger than those of percent time variables, suggesting that patterns of how faculty distribute their time are more important than exactly how much time they allocate to single activities. Role group effects were generally similar to, and sometimes stronger than, those of department type and degree earned. Further, the number of activities that faculty participate in is as important a predictor of how faculty experience vitality constructs as their role groups.

Conclusions. How faculty spend their time is a valuable and significant addition to vitality models and offers several advantages over traditional cohort variables. Insights into faculty behavior can also show how institutional missions are (or are not) being served. These data can inform hiring practices, development of academic tracks, and faculty development interventions. As institutions continue to unbundle faculty roles and faculty become increasingly differentiated, the role variable can offer a simple way to study faculty, especially across multiple institutions.

Megan M. Palmer, PhD, Chair

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LIST OF ABBREVIATIONS

A	Administrators
AAMC	Association of American Medical Colleges
AIC	Akaike information criterion
AMC	academic medical center
BSD	basic science department
BSF	basic science faculty
C	Clinicians
CA	Clinician-Administrators
CD	clinical department
CF	clinical faculty
CFI	comparative fit index
CJ	Clinician-Jugglers
CLM	career life management
CR	Clinician-Researchers
CSR	Indiana University Center for Survey Research
CT	Clinician-Teachers
DO	Doctor of Osteopathy
EFA	exploratory factor analysis
ENG	professional engagement
FV	faculty vitality
GNS	growth need strength
IUSM	Indiana University School of Medicine
J	Jugglers (nonclinician)
KMO	Kaiser-Meyer-Olkin
LVPA	latent variable path analysis
MD	Doctor of Medicine
ML	maximum likelihood
NCT	nonclinical time
NIH	National Institutes of Health
OFAPD	Office of Faculty Affairs and Professional Development
OVPA	observed variable path analysis
PAF	principal axis factoring
PCA	principal components analysis
PD	professional development
Penn State	Penn State College of Medicine
PhD	Doctor of Philosophy
PNFI	parsimony normed fit index
PRO	productivity
PUCL	primary unit climate and leadership (scale)
R	Researchers
RMSEA	root mean square error of approximation
RVU	relative value unit

SAT	career satisfaction
SCCT	social cognitive career theory
SEM	structural equation modeling
SRMR	standardized root mean square residual
T	Teachers
TWA	theory of work adjustment
UAMS	University of Arkansas for Medical Sciences
UIC	University of Illinois College of Medicine at Chicago
WWII	World War II

Chapter 1: Introduction

Why should we care about the success of faculty? In addition to fellow feeling, one answer is linked to caring about the success of the institutions in which they serve, as well as the stated missions of those institutions. If you believe that the success of an institution is grounded in the success of the people who comprise it, improved understanding and support of those individuals will contribute to improved individual and institutional performance outcomes. Since the 1960s, this assertion has not only been widely embraced as true but also led to a movement that considers support of the individual to be an institution's societal responsibility (Bergquist & Phillips, 1977, citing Likert, 1967; Lovett, 1984). Gardner's book, *Self-renewal: The Individual and the Innovative Society*, first published in 1964, focused attention on renewal, motivation, and vitality and emphasized the relationships between society, institutions, and the individuals who comprise them. Gardner (1981) asserted the following:

> [T]oo often in the past we have designed systems to meet all kinds of exacting requirements except the requirement that they contribute to the fulfillment and growth of the participants… It is essential that in the years ahead we undertake intensive analysis of the impact of the organization on the individual…We must discover how to design organizations…in such a way that individual talents are used to the maximum and human satisfaction and dignity preserved. (pp. 63–64)

Under Gardner's institutional lens, examination of an academic medical center (AMC) reveals a wide array of individuals, all playing key roles; however, its most essential group of individuals is its faculty. Thus, it can be argued that when medical schools endeavor to better understand and support their faculty, these institutions not only serve their best interests but also their societal obligations.

According to Smith (1978), "Among the durable truisms about universities are 'A university is its faculty,' or 'The excellence of a university is the excellence of its faculty'…" (p. 1). This concept of academic institutions *equaling* their faculty is a widely addressed topic among researchers of faculty (Bunton et al., 2012; Clark, Boyer, & Corcoran, 1985; Gappa, Austin, & Trice, 2007; Lovett, 1984; Palmer, Dankoski, Smith, Brutkiewicz, & Bogdewic, 2011). According to the model from Gappa et al. (2007), one of the outcomes of supporting faculty is enhancing "the intellectual capital that each faculty member brings to his or her institution" (p. 132). They define intellectual capital as "the most valuable resource that institutions have for achieving their goals" (p. 132). The overall excellence of the institution is dependent upon the aggregate of intellectual capital and contributions of its individual faculty members. Therefore, the institution benefits from efforts to maximize this capital through the creation of environments that foster the fullest realization of its faculty's talents and potential. Research that improves the understanding of how faculty experience their professional lives can improve not only those experiences but also a wide array of outcomes. For AMCs, these outcomes include the domains of science and medicine as well as faculty, students, and ultimately patients.

Beckerle et al. (2011) define AMCs in terms of their function: AMCs "conduct biomedical research; educate tomorrow's health care providers and pioneers in clinical and translational science; serve as models for delivery of state-of-the-art health care; and contribute to policy development, peer review, and community education" (para. 1). In general, allopathic medical schools share this tripartite institutional mission, which is often reduced to simply research, teaching, and service. Within this dissertation, all references to medical schools and AMCs are allopathic, not osteopathic. Although much of the educational curriculum of osteopathic physicians (DOs) is shared with that of allopathic physicians (MDs), the distribution of emphasis regarding the allopathic tripartite mission is not (American Association of Colleges of Osteopathic Medicine, 2012). Education is the primary emphasis of osteopathic colleges of medicine; however, biomedical research is a growing area of focus. Today, AMCs are faced with a number of challenges and stressors—both internal and external—as they struggle to balance the demands of their multiple missions. Within this context, understanding and supporting faculty is especially important.

As the baby boomers approach retirement age, AMCs face the same challenging generational shift occurring across higher education. This shift is characterized by the aging and exodus of a "graying professoriate" and the influx of a younger one (Schuster & Finkelstein, 2006). This new generation of faculty brings new expectations for balance between their professional and personal lives (Austin, 2002; Liu & Mallon, 2004; Menges, 1999). Further, younger faculty, defined as 27–35 years old, are more depressed and anxious than older faculty (Schindler et al., 2006). They, more than their senior faculty colleagues, suffer stress from an ever increasing set of professional demands and responsibilities that often threaten the elusive work-life balance they seek to maintain (Austin, 2002). Many report feeling isolated and disillusioned as a result of realizing that their expectations for collegiality are not being met (Austin, 2002; Menges, 1999; Tierney & Rhoads, 1994). Some schools, such as the University of Rochester School of Medicine, recently formally recognized that faculty have different needs at different stages of their academic career by launching faculty development programs for their junior, midcareer, and senior faculty (Schor, Guillet, & McAnarney, 2011). Using the principle of anticipatory guidance, these programs have attempted to predict the challenging transitions that occur throughout the academic career and provide targeted support and mentoring. Not only do faculty needs change over the career span but so do their roles, which is discussed in Chapter 2.

In addition to the challenge of this generational shift in faculty composition, the AMC is a complex and stressful environment that widely impacts all faculty (Dankoski, Palmer, Nelson Laird, Ribera, & Bogdewic, 2011; Goodrich, Cole, & Gritz, 2009; Magill, Catinella, Haas, & Hughes, 1998; Sanfilippo, Bendapudi, & Rucci, 2008; Viggiano & Strobel, 2009). Schindler et al. (2006) found that one in five faculty members had significant depressive symptoms and concluded that their study "raises the concern that current medical students are being taught by faculty who are increasingly stressed and dispirited" (p. 32). Kirch's 2007 presidential address to the American Association of Medical Colleges (AAMC) highlighted that faculty were increasingly expressing "concern or even deep disillusionment" regarding the ability of academic medicine to advance its core missions. Kirch also noted that many of those in academic medicine were lamenting the ways in which their professional lives were changing and how these changes seemed to be at the core of why overall institutional morale, and especially personal morale, is "lower than ever."

Goodrich et al. (2009) described how faculty burnout, demoralization, and compromised physical and psychological health have resulted from the sometimes "onerous conditions" in AMCs (p. 3). According to Pololi and Frankel (2005), medical faculty "increasingly ask themselves why they should remain in systems that promote only individual performance and essentially penalise them for doing what drew them to academic medicine in the first place—teaching and scholarship" (p. 155). The interview data from Pololi, Conrad, Knight, and Carr (2009) also revealed a fiercely competitive and stressful environment in AMCs. Recognition of these stressors can inform strategies to remedy or at least mitigate them. Informed strategies require an understanding of the faculty who comprise AMCs, who may be as complex as the institutions themselves.

Basic Science Faculty versus Clinical Faculty: What Do These Terms *Really* Mean?

Medical school faculty are a heterogeneous collection of diverse individuals who provide unique services according to the role or roles they play within their AMCs. Researchers who study these faculty members commonly separate the population into clinical faculty (CF) and basic science faculty (BSF) cohorts. Broadly, the former are MD faculty who treat patients while the latter are PhD faculty who are scientists engaged in research. The two groups emerged as modern medical education developed with corresponding curricular components, which is discussed further in Chapter 2. This historically made distinction highlights the following assumption: Some qualitative difference exists between these two groups—sufficiently influential upon their professional lives—that warrants its inclusion as a variable of analysis. However, despite its firmly established historical precedence, questions regarding how this distinction is made, what it means, and how useful is it when studying faculty are often unasked and remain relatively unaddressed. For both investigators and consumers of faculty research, it is critical to understand how this distinction is made.

The broadly stated difference between clinical and basic science faculty attempts to separate faculty into scientists and clinicians; however, upon closer examination, assumptions become evident, and challenging questions arise. The first assumption is that a meaningful difference exists between scientists and clinicians. Researchers further assume that they can use proxies to represent this difference and separate faculty into meaningfully different cohorts. The two most commonly used proxies are a faculty member's departmental affiliation and type of degree earned. Most AMCs are part of a school and/or university and organized into departments, their primary structural and functional unit. In the vast majority of cases, these departments are designated *basic science* or *clinical,* and these labels are accordingly applied to faculty in those departments. The other proxy, degree earned, divides faculty into those with PhDs or MDs, who are then conceptualized as BSF or CF respectively. These proxies have reinforced two additional assumptions. First, use of the departmental affiliation proxy assumes that AMCs assign designations in ways that are both meaningful and consistent. Second, use of the degree proxy assumes little overlap between the attributes of faculty with each degree type. The terminology further implies that the research of BSF is "basic science" in nature and that of CF is "clinical," if they engage in research at all. However, challenging questions quickly arise when trying to determine the most meaningful way to divide faculty into BSF (scientists) and CF (clinicians): Don't BSF engage in translational research? …Are all BSF engaged in scientific research? …Are all CF engaged in patient care? …Aren't some CF researchers or scientists? …Don't some CF engage in basic science research? The distinctions that initially seemed intuitively clear quickly become blurred.

As the above questions highlight, the BSF/CF distinction is sometimes challenging to discern clearly. This is because, aside from the obvious difference that with few exceptions (e.g., psychologists) only MDs can see and treat patients, a number of important faculty attributes are shared between the groups. For example, in a commentary based on a lecture given at the Clinician Leadership in Research

Symposium, Chong (2009) addressed the issue of how clinician-scientists think. Chong quoted Mary-Claire-King who said, "people do science for 3 reasons—curiosity, altruism and ambition" (p. 263). One can easily argue that all medical school faculty are curious, altruistic, and ambitious. Further, one could argue that most medical school faculty have the capacity to be analytical, achievement-oriented, and academically gifted. Both PhDs and MDs may engage in research and sometimes with equal commitment. Those medical students with a firm commitment to research may choose to join the small but growing cohort of MD-PhD physician-scientists and undergo significant and formal scientific training during medical school. These clinicians tend to engage in basic science research at levels that equal PhDs and demonstrate that the categories of scientist and clinician are not exclusive. Their commitment to basic science research is so strong that some faculty investigators have suggested that the order of degrees perhaps should be reversed to PhD-MD (Sutton & Killian, 1996). However, this proclivity for basic science research appears to be changing as MD-PhDs' interests are becoming increasingly diverse (Ahn, Watt, Man, Greeley, & Shea, 2007; Watt, Greeley, Shea, & Ahn, 2005). The larger cohort of clinician-researchers (the "late-bloomers") undergoes scientific training after medical school and engages in research to varying degrees (Rosenberg & Ley, 2004). Their research is mostly clinical in nature but can also be lab-based (Goldhamer et al., 2009). Descriptions of various types of faculty research are provided later in this chapter.

Distinguishing between basic science and clinical faculty cohorts is sometimes challenging also because although the two groups share many qualities, substantial heterogeneity exists within each group. For example, not all PhD faculty are active researchers or scientists. Some decide to focus on other areas of academic life, such as teaching or administrative duties. Similarly, not all MDs are fully engaged in patient care. Some focus more on research while others assume more leadership responsibilities. Further differentiation can be found among MD researchers regarding the amount and kinds of research they perform. The amount of research that MDs engage in ranges from none to their primary academic activity, and the kind of research ranges from basic science to clinical. Thus, both PhD and MD faculty cohorts contain considerable diversity.

Addressing the difference between MDs who engage in research and those who do not, Chong (2009), citing Guilford (1967), asserts that “studies have found that productive scientists have a distinctive creative capacity that is a mixture of exceptional cognition and personality, and that they perceive and think differently from less creative people when confronted with the same event” (p. 261). Simonton (2003) describes the long history of philosophical and psychological debates concerning what makes some scientists creative and productive while others less so. These debates are beyond the scope of this paper; however, they validate the inquiry into the unique characteristics of scientists—whether PhD or MD—that may justify making such a distinction when studying faculty. Simonton (2003) asserts that creative people have a “flat hierarchy of associations” and generate many possible associations to any given stimulus, are not bound by preconceptions, and are not generally predictable (p. 483). In contrast, those with less creativity have a “steep hierarchy of associations” and think of only a few associations and do so in a predictable manner (p. 483). Creative people are characterized by a “capacity for divergent thinking which is very flexible and prolific in generating multiple answers or ideas in response to a question in contrast to the convergent thinking of less creative people who would generate one or two responses" (Chong, 2009, p. 261). Chong suggests that this ability may be hardwired and that creative people are less likely to censor stimuli, both internal and external.

However, all good physicians—those engaged in research and those who are not—have to be divergent thinkers, at least initially, to consider a wide array of possible diagnoses and then converge on a working list of differential diagnoses. Miller and Rosenstein (2003) describe routine evidence-based medical care and clinical trial research as two sides of the same coin. Routine evidence-based medical care occurs when a physician "makes observations, investigates, tests hypotheses, and experiments with different treatments" (p. 1383). Further, "the exemplary physician is always learning how to improve treatment for future patients on the basis of clinical experience with current patients and familiarity with the medical literature" (p. 1383). Thus, in a way, all physicians are engaged in informal clinical trials; however, some are motivated to engage in formalized clinical research. Nonetheless, Miller and Rosenstein assert that "both clinical trials and medical care are conceived as scientifically guided, therapeutically oriented activities conducted within the context of the physician–patient relationship" (p. 1383). This perspective aligns with Flexner's landmark report of 1910, which is further explored in Chapter 2.

From a different perspective, that of the interest of the patient, Miller and Rosenstein (2003) describe a difference between these clinician cohorts. The interests of MDs who primarily see patients *converge* with those of their individual patients (i.e., to restore or maintain individual patient health). For clinician-researchers, however, their interests may *diverge* from those of their patients. Miller and Rosenstein assert that “investigators are primarily interested in answering scientific questions about groups of patients, although they also have an interest in providing patients with benefits from their participation [in clinical trials]” (p. 1384). For example, when caring for a patient with any given disease, the clinician-researcher balances two goals or interests: the goal of best treating the individual patient and the goal of advancing science and the treatment of all patients with that disease. These physicians struggle with a different set of moral and ethical concerns than nonresearching physicians.

Is this motivation significant enough to align researching physicians with all research scientists? If so, perhaps quantifying time dedicated to research may be a valuable distinguishing variable when studying faculty. On the other hand, perhaps quantifying time dedicated to patient care may reveal different faculty cohorts. Shanafelt et al. (2009) provide some evidence that physicians are not homogenous regarding their motivations and interests. These researchers surveyed all MD faculty from the Department of Medicine at the Mayo Clinic (Rochester) to investigate burnout and the concept of career fit. Participants were asked to identify the professional activity that was most meaningful for them; among the 465 clinicians (response rate of 84%), 68% identified patient care as the most meaningful aspect of their work. Thus, almost a third identified another activity as being most meaningful (research, 19%; education, 9%; other, 3%), supporting the concept of heterogeneity within academic physicians.

In addition to their use in faculty research, the concepts of basic science and clinical faculty—in spite of their ambiguity—are currently used in a variety ways within AMCs. As mentioned, the vast majority of AMCs designate their academic departments as either basic science or clinical. The distinction between the two is clear for many departments (e.g., Department of Family Medicine as a clinical department and the Department of Biochemistry and Molecular Biology as a basic science department). However, the distinction is less clear for genetics, pharmacology, and pathology departments because faculty from these departments often engage in both basic science and clinical research and work in both lab bench and patient care environments. The AAMC provides a list of departmental designations (see Appendix A); however, departments, both in name and structure, vary among medical schools. Each institution chooses a designation for each department that then serves a structural and/or organizational function. For example, basic science and clinical departments may operate under different budgetary and administrative models. Also, basic science department (BSD) chairs may meet to discuss a set of needs that may not be shared by clinical department (CD) chairs and vice versa. In addition to its departmental use, the BSF/CF designation can serve to guide faculty development programs to target specific needs (e.g., teaching, grant writing, and leadership programs). Further, it is used to organize other aspects of AMCs such as components of the curriculum and faculty teaching awards. The focus in this dissertation, however, is on how researchers have conceptualized basic science and clinical faculty and represented them in the literature.

According to Creswell (2008), an independent variable is a *characteristic* or *attribute* expected to have some influence on a dependent variable. Creswell distinguishes between characteristics as personal traits (e.g., age, gender, and academic rank) and attributes as describing "how an individual or individuals in an organization feel, behave, or think" (p. 124). Because researchers typically make the distinction between basic science and clinical faculty with simple proxies of departmental appointment or degree earned, they treat this distinction as a characteristic. However, these simple proxies that focus on characteristics rather than attributes may not adequately capture the qualitative difference between basic science and clinical faculty, if it exists. Thus, perhaps it is time to question the ability of a dichotomous BSF/CF variable to capture qualitative differences among the complex composition of today's medical school faculty. To do so entails an examination of faculty behaviors or the roles they play within AMCs. It is time to consider representing faculty cohorts with a more complex variable, one that focuses on behavior and explores what faculty do and how they spend their time.

Statement of the Problem: Conceptualizing Basic Science versus Clincical Faculty and Current Grouping Methods

In faculty research to date, conceptualizations of basic science and clinical faculty have been represented by the department type of a faculty member's primary appointment (hence referred to simply as "department") and/or the highest degree that a faculty member has earned (hence referred to simply as "degree"). These approaches are associated with three major challenges that can obscure rather than advance our understanding of faculty. First, the choice of proxy variable(s) has been inconsistent and led to conflicting conclusions. Second, the multiple assumptions associated with BSF/CF terminology, including that all faculty fit into one of these two groups, have overly simplified our descriptions of today's complex medical faculty. Third, both approaches are tethered to events that occurred in the faculty member's past and fail to represent changes that can occur after a degree has been earned or a departmental assignment has been made. The careers of medical faculty can be dynamic and characterized by different activities and behaviors over the career span.

The department and degree proxies offer many advantages as grouping variables; however, it is important to recognize their limitations as well. The choice of department proxy focuses on the institution and stands in contrast to degree and its focus on the individual. Inconsistent use of these proxies among researchers has led to challenges when comparing findings across investigators because the composition of faculty groups differ—sometimes drastically—depending on which proxy is chosen. Thus, our understanding of faculty is clouded when one researcher shares data about basic science or clinical faculty based on one grouping method, and the next researcher, using a different method, shares conflicting findings. Examples of such inconsistent findings are reviewed in Chapter 2. The predominant grouping method within faculty literature is the department proxy, although some researchers use both.

Most medical school departments engage in some level of research, and the department proxy is most likely to capture the type of this research, however broadly, as basic science or clinical in nature. However, the lines between types of research (basic, translational, disease, clinical, and patient) are blurring, as are the lines between the types of faculty and departments engaging in them. Further, departmental boundaries are inconsistent across institutions and undergoing significant reforms (Bunton & Mallon, 2006; Ludmerer, 2005b). Also, as mentioned, classifying genetics, pharmacology, and pathology departments as basic science or clinical is not always a clear or consistently made decision. Another limitation of the department proxy is its creation of very diverse cohorts. For example, a CD may include (a) PhD scientists engaged in lab and/or clinical research; (b) MD (and MD-PhD) scientists engaged in lab and/or clinical research; and (c) MDs who primarily see patients. This diversity can pose interpretability challenges for research that defines CF using only the department method and can lead to conclusions that medical school faculty are more homogenized than they really are. Finally, the department to which a faculty member is appointed may represent budgetary or other institutional factors more than those of the individual. For example, a PhD scientist investigating oncogenes could be hired either by a clinical department in a cancer center or a biochemistry (basic science) department. In both cases, the same faculty member would engage in the same research though could be assigned to either cohort. In spite of the diversity of faculty within a department, its members are contextually situated to share the same culture of their primary academic unit and a similar experience of its leadership.

In contrast to the institutional focus of the department proxy, the degree proxy focuses more on the individual; however, it too has both strengths and weaknesses. Its primary strength lies in its ability to separate those who can medically treat patients (MDs) from those who cannot (PhDs). However, there are some MDs and MD-PhDs who have chosen to dramatically reduce their patient load—or may no longer see patients at all—in favor of other academic pursuits, such as research. Thus, these MDs behave more like scientists than clinicians. A related strength of the degree proxy is that is captures the shared experience of an individual's educational socialization. Socialization begins in graduate or medical school where expectations and values are perhaps established and developed and is arguably the first stage of an academic career (Austin, 2002, p. 95; Corcoran & Clark, 1984; Tierney & Rhoads, 1994). Perhaps it is during the extended educational process of each group that shared goals and values are codified; however, Ahn et al. (2007) suggest that predilections for research begin prior to graduate or medical school.

A brief review of the trends related to departmental and degree distributions also highlights how these proxies can be challenging in faculty research. According to Fang and Meyer (2003), who reviewed AAMC faculty rosters from 1981 to 1999, the number of PhD faculty in CDs surpassed the number of those in BSDs in the mid-1990s. In 2011, the distribution of PhDs among clinical and basic science departments was 57% and 41% respectively (Rowe & Wisniewski, 2012). However, the distribution of MD faculty is far more one-sided with the vast majority (98%) holding appointments in CDs (see Figure 1–1). Still, when examining the degree distributions of each department type, the cohorts are mixed (see Figure 1–2). Faculty with MDs represent 18% of BSDs (10% MD only, 8% MD-PhD), and faculty with PhDs represent 16% of CDs.

In theory, it is not clear—given these complexities—if either the department or degree proxy alone can adequately capture a unique qualitative difference between basic science and clinical faculty, despite their long-standing use in faculty research. In practice, the BSF/CF dichotomous categorical independent variable has been of limited value in advancing our understanding of the professional lives of medical faculty. In Chapter 2, I review how unclear cohort definitions and inconsistent use of proxies have served to obfuscate rather than clarify our understanding of faculty. The first step in addressing the BSF/CF challenge is to recognize that department and degree should function as variables unto themselves and not as proxies for BSF/CF. The second step is to recognize both the strengths and weaknesses of these variables, especially how arbitrary the department variable can be. The third step is to take a broader perspective regarding potential independent variables that influence the lives of faculty.

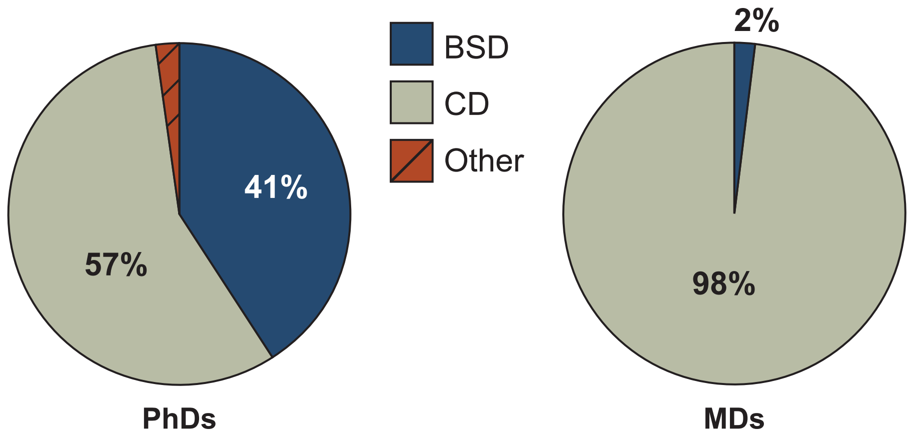


Figure 1–1. AAMC 2012 U.S. medical school faculty distribution by degree and depart-ment type (Rowe & Wisniewski, 2012). BSD = basic science department; CD = clinical department.

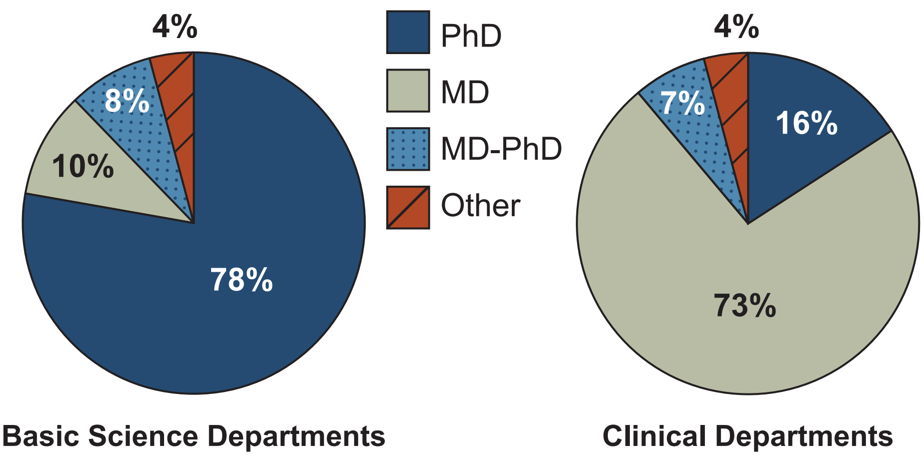


Figure 1–2. AAMC 2012 U.S. medical school faculty distribution by department and degree type (Rowe & Wisniewski, 2012).

A Broader Faculty Perspective: The Role Variable

The narrow approach of dividing faculty into two groups based on what degree they earned or the type of department serves as their academic home can be broadened by exploring what faculty actually do and how they spend their time. In medicals schools, four primary academic activities dominate faculty's time: teaching, research, patient care, and administrative duties. How faculty spend their time can serve both as an expression of faculty role and an independent variable in faculty research. Using Creswell's terminology regarding variables, a faculty member's role acts as an attribute and captures behaviors in contrast to a characteristic that captures traits. I chose two approaches to defining the role variable: one continuous and one categorical. For the continuous variables, the percent of time faculty spend in each of the four academic activities serves as independent variables. For the categorical—and more nuanced—approach, I defined nine faculty role groups based on how time is allocated among all four academic activities. The role groups are Teachers, Researchers, Administrators, Jugglers, Clinicians, Clinician-Teachers, Clinician-Researchers, Clinician-Administrators, and Clinician-Jugglers. Each role group is generally defined by the relative proportion of time spent in each of the academic activities; Chapter 3 contains more information about how role groups are specifically defined.

Role groups are a flexible tool to study faculty because they can be studied separately or combined into groups that share a common attribute. For example, all nine groups (levels) can be included in a model to study how individual roles compare to each other. Alternatively, two levels can be used to compare clinicians (collapse of Clinicians, Clinician-Teachers, Clinician-Researchers, Clinician-Administrators, and Clinician Jugglers) to nonclinicians (collapse of Teachers, Researchers, Administrators, and Jugglers). It should be noted that when the term *Clinicians* is capitalized, it refers to the specific role group defined in this study. Some faculty role groups focus on a single activity (i.e., Teachers, Researchers, Administrators, and Clinicians), while others focus on multiple activities (i.e., Jugglers, Clinician-Teachers, Clinician-Researchers, Clinician-Administrators, and Clinician-Jugglers). Alone or combined with others, behavior-based role variable offers a broader perspective when investigating influencers of faculty experiences.

The role variable may also offer a temporal advantage over department and degree variables. Although a departmental affiliation can change, it is generally grounded to the past, when the faculty member was hired. Similarly, the type of degree earned represents a choice that a faculty member made in the past—sometimes distant past—and may not represent important career choices made since that time, such as an MD's decision to no longer see patients or a PhD's transition from the role of researcher to teacher or administrator. Even for faculty hired directly upon graduation, the choice to enter graduate or medical school may have happened 5 to 10 years earlier. In contrast, the role variable is grounded in how faculty are actually spending their time today, or, in the case of this study, the previous year.

A conceptual framework to understand the role variable. Social Cognitive Career Theory (SCCT) offers a conceptual framework to examine how faculty—whether considered "clinical" or "basic science"—make decisions that shape their careers in academic medicine. These decisions begin with early academic and initial career choices, are followed by career entry decisions, and subsequently adjusted and refined over the career span. Faculty make all choices situated within a context of multiple influencers, which can take the form of barriers or opportunities that further shape their professional paths. SSCT was first described by Lent, Brown, and Hackett (1994) and has been applied to a number of careers, including academic medicine (Bakken, Byars-Winston, & Wang, 2006; Lent, 2013; O'Sullivan, Niehaus, Lockspeiser, & Irby, 2009).

Social Cognitive Career Theory is based on the theoretical work of Bandura (1986) and a triadic reciprocal causation model, which are described in more detail in Chapter 2. Briefly, the model describes bidirectional interactions between individuals, their behaviors, and their environments. The view that behavior is a co-determinant of the transactions of daily life rather than merely an outcome of a single bidirectional person-environment interaction is the aspect of this model that is especially relevant for this study. The model acknowledges that a person's behaviors influence the situations in which transactions occur and thus influence the environment, the individual's cognitive and affective states, and subsequent behaviors (Lent et al., 1994). Both approaches to the role variable, which are reflections of how faculty spend their time, represent faculty behavior. Thus, according to SCCT, they should influence other aspects of how faculty experience their professional lives.

Academic tracks and the role variable. A broader perspective of faculty is also becoming evident in the increasing variety of academic tracks as they adapt to evolving and less traditional faculty roles (Bunton & Mallon, 2007; Chung et al., 2010; Liu & Mallon, 2004; Schuster & Finkelstein, 2006). For example, the introduction of nontenure clinician-scholar and clinical tracks demonstrated a shift in role expectation that emphasized patient care over research and teaching (Ludmerer, 2005d). This new track benefits the institution in that it increases the number of faculty hours dedicated to generating clinical revenue. Simultaneously, it benefits faculty seeking an academic medical career without feeling overly burdened by the demands of research. These newer approaches to academic tracks allow more diversity in how faculty spend their time and are further discussed in Chapter 2. Tracks were considered as another potential variable to address the challenge of representing different faculty cohorts; however, its use as a descriptive variable across institutions is challenging because of the diversity of institutional approaches to the topic. In contrast, role, as defined by time spent in major academic activities, can be readily assessed and compared across institutions.

Faculty vitality as a context to explore the role variable. Dankoski et al. (2011) define faculty vitality (FV) as a function of the synergistic effects of a faculty member's productivity, career satisfaction, and level of professional engagement. Further, both institutional and individual factors predict FV (see Figure 1–3). Institutional factors relate to work climate and perceptions of leadership. Individual factors include the degree of agency and autonomy held by faculty as well as their ability to manage the demands of their personal and professional lives. Because FV and its latent constructs include these broad domains of faculty experience they provided an exceptionally rich context to evaluate the role variable. This study's evaluation compared the predictive effects of role, department, and degree on FV and its latent constructs. The evolution of how FV has been defined is reviewed in the next section.

Definitions and Key Concepts

Faculty vitality. FV continues to evolve as a construct that emerged from the faculty development movement in the 1960s. Many cite an early—and vague—definition from Clark et al. (1985), "*Vitality*…is widely used but infrequently defined…[and] refers to those essential, yet intangible, positive qualities of individuals and institutions that

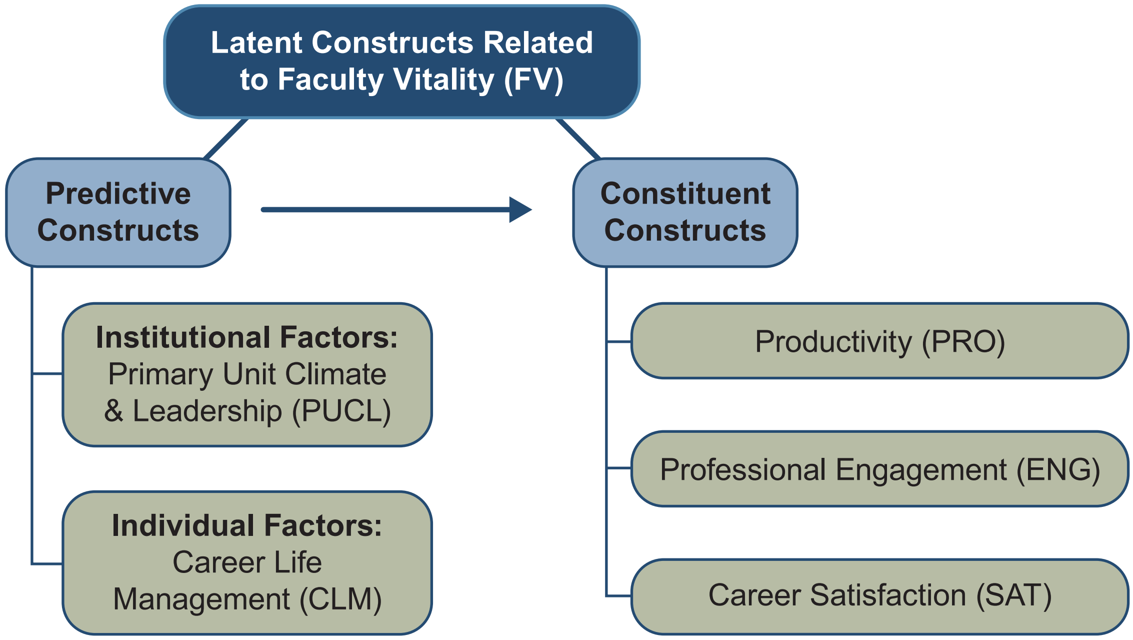


Figure 1–3. Relationship between predictive and constituent FV constructs. According to the Dankoski et al. vitality model (2011), faculty's experiences related to their primary unit climate and leadership as well as their ability to manage the demands of their careers and personal lives are predictive FV constructs. These researchers also operationally defined vitality in terms of its constituent constructs of productivity, professional engagement, and career satisfaction.

enable purposeful production" (emphasis in original, p. 3). Others used the term synonymously with productivity, which tended to narrow its focus (Bland & Schmitz, 1986, 1990). The construct then broadened to include the interactional relationship between the individual and institution as well as a dependence upon an alignment of the values and goals of each (Bland & Schmitz, 1990; Bland, Seaquist, Pacala, Center, & Finstad, 2002). It is the broad nature of FV combined with the operational definition from Dankoski et al. (2011) that made it an ideal context for this study. Vitality's related constructs are explored in more detail in Chapter 2.

Types of faculty research. The following terms are often used to describe faculty research; however, their meanings are not always consistent, and considerable areas of overlap are found in the literature. In general, ambiguity lies primarily with research that is considered nonbasic.

Basic/Lab-based/Bench: This research occurs in a laboratory setting and is usually the source of advances in biomedical science. These advances are typically at the level of biological mechanisms related to health or, more commonly, disease. This research typically occurs in animal models and then requires application in human tissues and systems.

Translational: In an editorial asking "What's in a Name?," Reece and Murillo (2007) lament the rampant ambiguity regarding this type of research. They use the term nearly synonymously with clinical research and to indicate all nonbasic research. Sung et al. (2003) used this term to describe two translational blocks or hurdles in the application of science to improved human health. The first translational block occurs at "the transfer of new understandings of disease mechanisms gained in the laboratory into the development of new methods for diagnosis, therapy, and prevention and their first testing in humans" (p. 1279). The second block affects "the translations of results from clinical studies into everyday clinical practice and health decision making" (p. 1279). Zinner and Campbell (2009) also used this definition when they examined types of research occurring in AMCs. The definition from the National Institutes of Health (NIH) aligns with these two areas of translation (National Institutes of Health, 2013).

Clinical: Dickler, Fang, Heinig, Johnson, and Korn (2007) defined clinical research using NIH criteria, which includes research that involves humans or human tissues, provided that specimens are not de-identified. Both criteria are check boxes on NIH grant applications; however, Dickler et al. admit that this definition is more inclusive than traditional definitions and thus tends to exaggerate the amount of clinical research being done. Fang and Meyer (2003) used the same criteria and noted that more than three times as many PhD faculty in CDs were engaged in research involving humans or human tissues than their counterparts in BSDs. According to the NIH website, clinical research also includes the following areas of investigation: mechanisms of human disease, therapeutic interventions, clinical trials, development of new technologies, epidemiological and behavioral studies, outcomes research, and health services research (National Institutes of Health, 2013).

Purpose of This Study

The general aim of this study was to explore how a new faculty cohort, one based on role, would compare to two traditional cohorts: one based on department type and the other on degree earned. Historically, these traditional grouping methods have been used with the assumption that they can act as proxies for our conceptualizations of basic science versus clinical faculty. Given the many changes in academic medicine and AMCs over recent decades, such distinctions may have outlived their usefulness. Although potentially useful unto themselves, department and degree have become less successful proxies with time. The role variable groups faculty by their behaviors and—using Creswell's terminology—represents a shift in focus from *traits* to *attributes* (2008).

To explore this aim, both approaches to the role variable were evaluated for their usefulness of in terms of the following:

- relatedness to department and degree variables in terms of their ability to influence or predict FV and its related constructs;

- insights they provide regarding how faculty spend their time, which could serve to improve, support, and inform development opportunities for faculty; and
- potential for reconceptualizing our notions of basic science and clinical faculty.

In the first approach to the role variable, role was composed of four continuous variables, representing the percent of time faculty spent in each of four academic activities: teaching, research, patient care, and administrative duties. In the second approach, role was composed of nine categorical role groups defined by a time allocation rubric, which is described in Chapter 3. These approaches to faculty role were compared to the traditional variables of department (basic science or clinical) and degree (MD, PhD, or MD-PhD). Comparisons examined each variable's ability to create meaningful cohorts within the models that were analyzed. Meaningful cohorts not only discern differences in how faculty experience the vitality constructs but also improve those experiences through institutional applications (e.g., policy reform, leadership, and faculty development).

Research Questions

This study aims to answer the following research questions:

1. Over and above the effects of department and degree, how do four variables that represent the percent of time spent by faculty engaged in teaching, research, patient care, and administrative duties relate to FV and its related constructs?
2. Over and above the effects of department and degree, how does the role variable, with nine levels, compare to percent time spent engaged in teaching, research, patient care, and administrative duties in terms of predicting the variance of FV and its related constructs?

3. If the categorical role variable proves to be as valuable as the percent time variables, department, or degree in terms of predicting the variance of FV and its related constructs, are there more parsimonious groupings of role groups that retain this value and improve our understanding of faculty experiences?

Overview of Study Design

This study included a retrospective analysis of the data generated by the 2011 Indiana University School of Medicine (IUSM) Faculty Vitality Survey. Analyzed data were from the following four U.S. medical schools: IUSM (all regional campuses), University of Illinois College of Medicine at Chicago (UIC), Penn State College of Medicine (Penn State), and University of Arkansas for Medical Sciences (UAMS). Part- and full-time faculty with MD, PhD, and MD-PhD degrees were included in the analyses. The survey instrument, through scale scores, provided measures of FV and its latent constructs, and a variety of statistical analyses were used to answer the proposed research questions. Further description of the survey instrument and details of these analyses can be found in Chapter 3.

Significance and Rationale

In addition to the aforementioned general benefits of faculty support, this study can improve understanding of how faculty spend their time and the roles they play in service to institutional missions. Ideally, this improved understanding will inform the following groups within AMCs to make decisions that support faculty and thus advance both individual and institutional goals:

- Policy leaders: to align academic tracks and reward structures appropriately with evolving faculty roles (i.e., with how faculty spend their time).

- Leadership/administrators: to manage expectations to help retain existing and recruit new faculty, which is especially important as today's faculty are becoming increasingly diverse and adopting nontraditional roles (Bunton & Mallon, 2007; Liu & Mallon, 2004). Financially and personally, faculty turnover is costly for both CF (Lowenstein, Fernandez, & Crane, 2007; Schloss, Flanagan, Culler, & Wright, 2009) and BSF (Dorsey, Van Wuyckhuyse, Beck, Passalacqua, & Guzick, 2009).
- Faculty development professionals: to improve tailored supportive interventions for faculty needs based on their role(s).

Dissertation Overview

In the next chapter, I review SCCT in more detail as the conceptual framework for this study. Chapter 2 also contains a review of the historical and institutional contexts for medical faculty and of the FV-related literature that has included department and/or degree among its independent variables. In Chapter 3, I describe the development of the 2011 IUSM Faculty Vitality Survey, how the nine role groups were developed, sample demographics, and the analyses that addressed the research questions posed in this chapter. Chapter 4 contains a review of the key findings related to each of the research questions as well as the limitations of this study. Finally, in Chapter 5, I interpret the findings, discuss their implications, and make recommendations for future research.

Chapter 2: Literature Review

In this chapter, I position SCCT as a conceptual framework to understand a wide range of faculty choices and how the role variable can be viewed as an expression of these choices. The framework includes contextual influencers, and thus a number of these that affect AMCs and faculty are discussed. These contextual influencers are dynamic and have changed over time, making their history important to understand. As AMCs are complex, the influencers are many; however, the following are explored: (a) medical education, (b) science and the molecular revolution, (c) changing roles of research and patient care in AMCs, (d) structural organization of departments, (e) evolving academic tracks, and (f) climate and culture of AMCs. The chapter closes with a review of the literature that has related the department and degree variables with FV measures (primarily career satisfaction). This review concludes that the findings across a number of studies are inconsistent and questions the usefulness of these independent variables in creating meaningful faculty cohorts. Thus, a current gap in our understanding of faculty is highlighted, and the role variable is positioned as a new candidate in the repertoire of faculty researchers.

Social Cognitive Career Theory as a Conceptual Framework

Those who have earned MDs and PhDs have a made a series of choices that required an extended period of education and training. In this study, I focused on those MDs, PhDs, and MD-PhDs who have also made the choice to pursue a career in academic medicine. About 12% of medical school graduates remain in academic medicine (O'Sullivan et al., 2009); no recent data was found for PhDs who choose academic medicine over government, industry, or nonmedical university careers. The role variable can be viewed as a refinement or extension of this career choice, whether as a scientist, clinician, or both. As briefly described in Chapter 1, both approaches to the role variable describe faculty in terms of how they currently allocate their time. As such, the role variable represents choices of which academic activity or group of activities faculty engage in most and reflects their primary behaviors (i.e., what they do). As a conceptual framework, SCCT helps explain the complex process in which faculty chose their initial academic and career paths. Importantly, it can also explain how they currently allocate their time, choose their role(s), and continue to shape their professional lives. The theory was first described by Lent et al. (1994) and is based on the social cognitive theoretical work of Bandura (1986). In general, career theories provide a systems approach for understanding how many factors directly and indirectly effect occupational choice and development over a lifetime (Lent, 2013). The abundance of competing career development theories over the last 40 years indicates that the subject is complex; however, SCCT has survived the test of time and has been applied to career choices across many disciplines (Bakken et al., 2006; O'Sullivan et al., 2009).

A major difference between a social cognitive model for career behaviors and others (e.g., Krumboltz and colleagues) is that it views self-efficacy and agency as explaining some of the relationship between past and future behavior (Lent et al., 1994). According to Lent et al., Krumboltz takes a more rationalistic and mechanistic perspective and an operant conditioning view of human behavior. Within SCCT, one's career choices are more than the result of one's reinforcement history. Another significant differentiator of SCCT is its focus on behavior as a determinant within the model and the model's dynamic rather than global or trait-driven nature. According to Lent (2013):

> By focusing on cognitions, behavior, and other factors that, theoretically, are relatively malleable and responsive to particular situations and performance domains, SCCT offers an agenda that…asks, for example, how are people able to change, develop, and regulate their own behavior? How do interests differentiate and intensify, or shift, over time? What factors, other than traits, promote career choice and change? How can career skills be nurtured and work performances improved? How can work lives be made more satisfying? (p. 117)

Lent (2013) further contrasts the dynamic quality and domain-specificity of SCCT to the relatively stable and global nature of Holland's person-fit model of career development. However, both share an emphasis on a person's interests, abilities, and values. Lent et al. (1994) also position Dawis and Lofquist's theory of work adjustment (TWA) as a compliment to SCCT and describe TWA as focusing on the degree of congruence between the abilities of the individual and the demands of the work setting. According to TWA, individuals have a number of "adjustment styles" that attempt to continuously "promote or restore an adequate state of P–E [person–environment] fit" (Lent et al., 1994, p. 116). These styles vary in emphasis on either tolerance of poor fit ("flexibility") or behavior to change the environment to improve fit ("activeness"). Given SCCT's emphasis on behavior, choice, context, and malleability, it is an especially well-suited conceptual framework to explore the role variable within academic medicine.

Another benefit of SCCT is its applicability to academic as well as career choices, both initially and over the lifespan. While Lent et al. (1994) use the term *career* in the traditional sense of the term, they "intend for [their] analysis to subsume academic development phenomena as well" and thus view SCCT as applicable to the academic choices required for career entry (p. 81). Although the original work of Lent et al. (1994)

was intentionally limited to the choices made at the career entry point, they believed that the same sociocognitive factors that were influential at career entry would continue to influence daily life's transactions and subsequent career choices, adjustments, and refinements. O'Sullivan et al. (2009) also found SCCT an appropriate framework to study medical faculty and labeled it "a powerful lens for exploring the issues associated with career development in academic medicine" (p. 340). They interviewed 40 participants (medical students, residents, and faculty) and reported that their findings "were congruent with … [and] touch every component of socio-cognitive career theory" (p. 338).

Social cognitive theory as SCCT's foundation. The foundation of SCCT is the social cognitive theoretical work of Bandura (1986), which is grounded in a transactional view of the self and society. This triadic reciprocal causation model describes bidirectional interactions between individuals, their behaviors, and their environments (Figure 2–1). Bandura describes internal personal factors or determinants as taking the "form of cognitive, affective, and biological events" (Bandura, 1997, p. 6). This model, which views behavior as a co-determinant of daily life's transactions, contrasts with those that view behavior as merely an outcome of a single bidirectional person-environment interaction. Thus, this model acknowledges that a person's behaviors influence the situations in which transactions occur and thus also influence the environment, the individual's cognitive and affective states, and subsequent behaviors (Lent et al., 1994). According to this model, the role variable—as a component of faculty behavior—should influence other aspects of how faculty experience their professional lives. Specifically, this study examined the influence of role on FV and its related constructs.

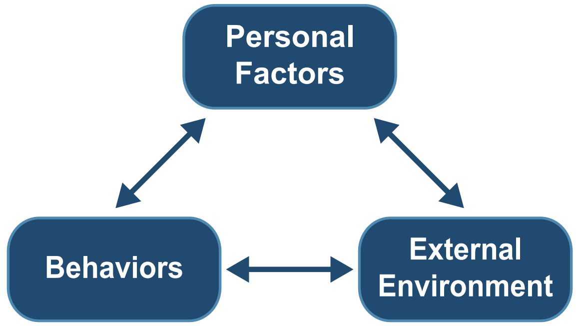


Figure 2–1. Bandura's triadic reciprocal causation model describes the interactions between individuals, their behaviors, and their environments. Adapted from *Self-efficacy: The Exercise of Control*, by A. Bandura, 1997, p. 6. Copyright 1997 by W. H. Freeman and Company.

The three major sociocognitive mechanisms involved in SCCT are self-efficacy, outcome expectations, and goals (Lent et al., 1994). It is the "interplay among [these] three cognitive-person variables that partly enable the exercise of agency in career development" (Lent, 2013, p. 118). According to Bandura (1997), "perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" and as such is the foundation of a sense of agency (p. 3). Lent et al. proposed that one's perception of self-efficacy helped "to determine one's choice of activities and environments, as well as one's effort expenditure, persistence, thought patterns, and emotional reactions when confronted by obstacles" (p. 83). Outcome expectations can be classified into several categories: physical (e.g., salary), social (e.g., approval or praise), and self-evaluative (e.g., a sense of self-satisfaction). Lent et al., discuss self-efficacy and outcome expectations in terms of two questions: "Can I do this?" and "If I do this, what will happen?" (p. 83). For Bandura, "self-efficacy and outcome expectations both help to determine a number of important aspects of human behavior, such as the activities that people choose to pursue and the ones they avoid" (Lent, 2013, p. 118). Goals, the final mechanism, capture a person's "determination to engage in a particular activity or to effect a particular future outcome" (Lent et al., 1994, p. 85). The motivating power of goals is derived from the sense of self-satisfaction that is experienced when they are achieved. Further, goals are seen as "reflections of self-efficacy, outcome expectations, and interests, and as self-regulators of motivation" (p. 86). The theory differentiates between *choice goals* that relate to an activity or pursuit of a given career and *performance goals* that relate to the desired level or quality of performance within a chosen activity or career path (Lent, 2013). Thus, the interplay between self-efficacy, outcome expectations, and goals, which is the underpinning of SCCT, offers an explanation of how faculty choose which activities to engage in. In this study, these choices define role groups; in the lives of faculty, these choices ultimately shape career paths.

For Bandura, one's thoughts and actions are most guided by beliefs in self-efficacy. Social cognitive theory posits that such self-efficacy beliefs are acquired and modified through the following informational sources: enactive mastery experiences, vicarious learning, social persuasion, and physiological reactions and affective states (Bandura, 1997). Those who experience repeated successful outcomes that are reinforced and executed under challenging conditions are likely to increase their perception of self-efficacy. These mastery experiences are the most influential of the four sources and exemplify the notion that "success begets success" (Driscoll, 2005, p. 318). Observing someone else experience this process can also similarly affect one's self-efficacy through vicarious learning, especially if the other person is perceived to be a role model. O'Sullivan et al. (2009) reported that the importance of role models emerged as a theme in their interviews. Importantly, the lack of mentors can be equally influential, as seen in this comment from a fourth-year medical student referring to a career as a clinician-researcher, "What is the point in committing as much time and energy to a career where we haven't found a lot of inspirational people?" (p. 337). The initial choice to engage in a career and/or maintain it can also be influenced by social persuasion from others. Lastly, physiological states such as anxiety, fatigue, or depression may decrease task performance and notions of self-efficacy, whereas feelings of equanimity, exhilaration, and vitality may enhance them. Bakken et al. (2006) have suggested that these sources of self-efficacy should guide interventions aimed at supporting more MDs to engage in clinical research, with particular attention placed on vicarious learning through role models for females and underrepresented minorities.

Today's SCCT and academic medicine. Currently, SCCT consists of "four conceptually distinct yet overlapping models focusing on (1) the development of interests, (2) the making of choices, (3) the influences on and results of performance, and (4) the experience of satisfaction, or well-being, in educational and occupational spheres" (Lent, 2013, p. 120). The first two models are most relevant to this study and are thus briefly reviewed.

The first of these models, the development of basic career interests, is shown in Figure 2–2. According to Lent et al. (1994), a person's career interests begin to be shaped in childhood and early adolescence, as behaviors, observations, modeling, and feedback develop both a sense of efficacy relative to certain tasks and expectations regarding performance outcomes. As self-efficacy and outcome expectations develop, they shape interests in those activities that promote a sense of self-satisfaction and anticipated positive outcomes (see paths 1 and 2). The authors continue to describe the model:

> Although many different (potentially career-relevant) activities are tried out and pursued for a time during one's formative years, people generally come to develop characteristic patterns of career interests (Holland, 1985). Bandura's (1986) general hypotheses about how intrinsic interests develop may help explain why certain activities generate differential interest over time. Elaborating somewhat upon Bandura's general model, we posit that emergent interests lead to intentions or goals for further activity exposure (path 3), which increase the likelihood of subsequent task selection and practice (path 4). Activity involvement or practice, in turn, produces particular performance attainments (path 5) (e.g., successes and failures), resulting in the revision of self-efficacy and outcome expectancy estimates (path 6). (p. 89)

Although the authors believe that this model is iterative and spans a lifetime, they propose it is most dynamic in late adolescence and early adulthood when key academic and career decisions are made.

As mentioned, SCCT is especially useful as a framework to examine the role variable because it also offers a way to understand changes in role that occur after an initial career commitment has been made. According to Lent (2013):

> SCCT assumes that interest stability is largely a function of crystallizing self-efficacy beliefs and outcome expectations, yet that adult interests are not set in stone. Whether interests change or solidify is determined by such factors as whether initially preferred activities become restricted and whether people are exposed (or expose themselves) to compelling learning experiences (e.g., through volunteering, engaging in leadership roles, child rearing, using technological tools) that enable them to rethink or expand their sense of their capabilities and the outcomes offered by different work activities. Thus, SCCT assumes that, when they occur, shifts in interests are largely due to changing self-efficacy beliefs and outcome expectations. (p. 121)

Thus, the model's dynamic quality accounts for changes that occur in both individuals and AMCs. These changes may take the form of barriers or new learning experiences; however, these changes ultimately affect role choice and behavior through their effects on self-efficacy and outcome expectations. In order to address how these changes operate, contextual factors must be added to the model.

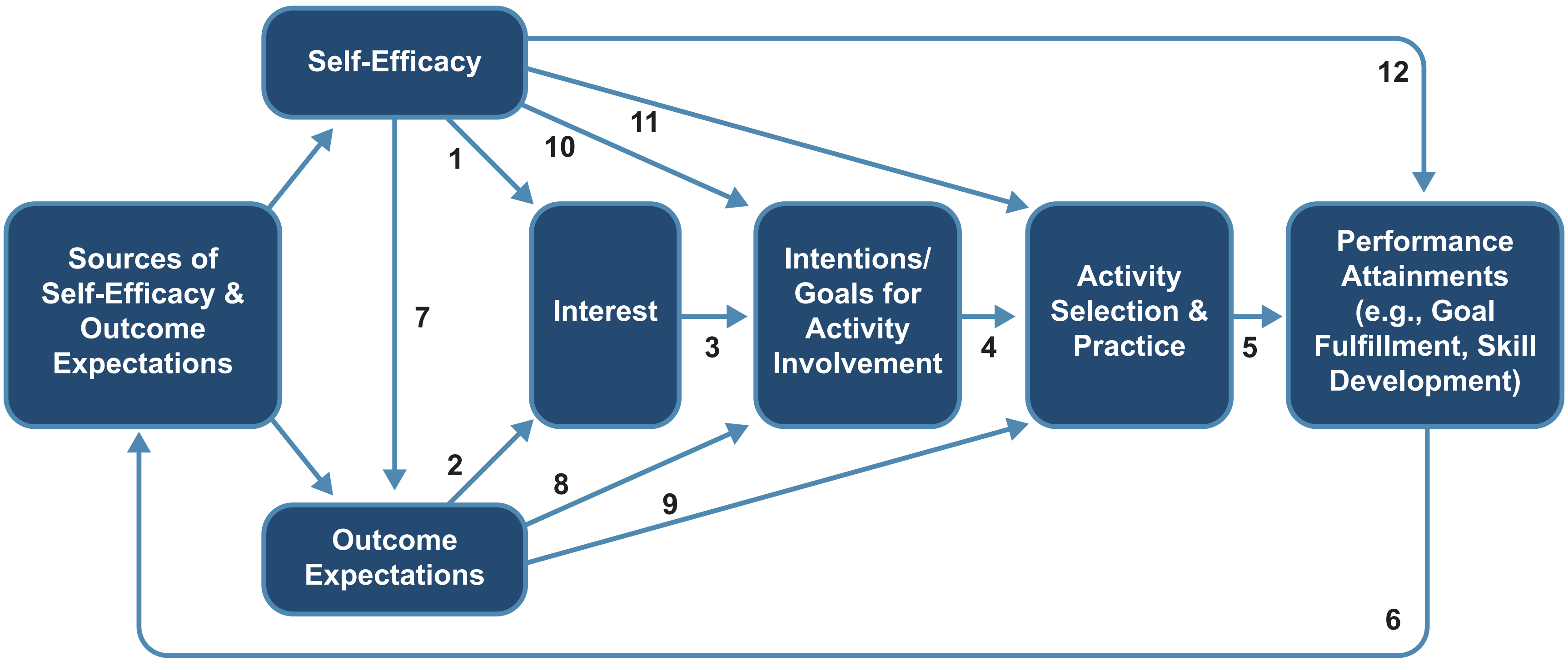


Figure 2–2. Model depicting how basic career interests develop over time as proposed by Lent, Brown, and Hackett (1994). The model demonstrates hypothesized sociocognitive determinants of choices and behaviors and the relationships between them. The authors note that directional arrows represent predominant causal pathways but retain the reciprocal nature of the relationships of Bandura's social cognitive triadic. From "Toward a Unifying Social Cognitive Theory of Career and Academic Interest, Choice, and Performance," by T. R. Lent, S. D. Brown, and G. Hackett, 1994, *Journal of Vocational Behavior*, 45, p. 88. Copyright 1994 by Academic Press, Inc. Reproduced with permission.

Figure 2–3 shows SCCT's choice model, which is an extension of the basic interest development model and situated in both individual and environmental contexts. In this model, interest, self-efficacy, outcome expectations, and contextual influencers affect initial career choice (choice goal). For example, a high school or college student makes the choice to be physician or scientist. These choices lead to actions intended to implement or actualize these goals, such as applying to and attending medical or graduate school. These actions result in performance outcomes and responses that are both external (e.g., grades, test scores, acceptance or rejection, commentary from significant mentors and peers) and internal (e.g., sense of self-satisfaction). These performance domains and attainments then create a feedback loop that shapes future career decisions and behaviors. As the career advances, self-efficacy and outcome expectations evolve, as do performance domains. For example, goal choice may evolve from the choice of becoming a scientist to accepting a faculty position that requires a new set of performance domains to achieve promotion and tenure.

As the model indicates, these choices do not occur in a vacuum and are influenced by personal and environmental contexts. Lent et al. (1994) chose to focus on gender and race/ethnicity and clarified that the influence of these factors in the model is not relative to their biological implications but "from the characteristic reactions they may evoke from the social/cultural environment—as well as from their relation to the structure of opportunity within which academic and career behavior is enacted" (p. 104). Lent et al. adapted the constructs of "structure of opportunity" from Astin (1984) and "contextual affordance" from Vondracek et al. (1986) and emphasize two important modalities at work: the objective structure of the environmental context and the individual's perception

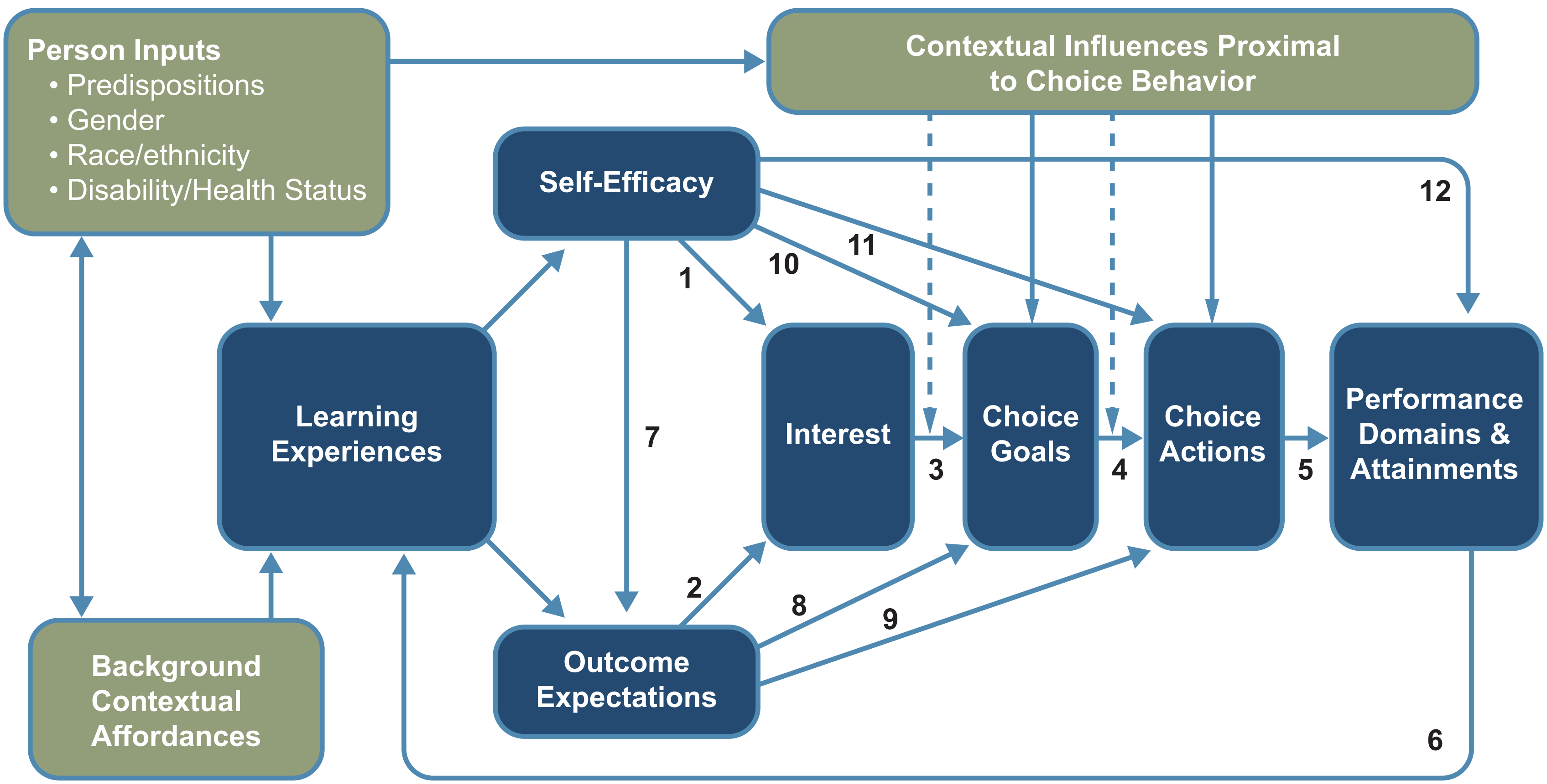


Figure 2–3. Model depicting the person, contextual, and experiential background factors that affect career-related choices as proposed by Lent, Brown, and Hackett (1994). This is an extension of the model depicting how general interests are developed and shape choices and behavior. Specifically, it is applied to the interests, choices, and behaviors related to academic and career paths. The dotted lines indicate a moderating (versus direct) effect on choice goals and actions. From "Toward a Unifying Social Cognitive Theory of Career and Academic Interest, Choice, and Performance," by T. R. Lent, S. D. Brown, and G. Hackett, 1994, *Journal of Vocational Behavior*, 45, p. 88. Copyright 1994 by Academic Press, Inc. Reproduced with permission.

of that experience. Their view highlights a person's "active, phenomenological role as the interpreter of contextual inputs" (p. 106) and thus both aspects of context are important in the model. Further, they differentiate between distal and proximal factors that shape the formation of interests and choices. Distal or background contextual factors include access to opportunities and role models, support and encouragement to engage in certain careers, and gender/racial socialization. For example, O'Sullivan et al. (2009) described that early exposure to research and interactions with role models were key needs for MDs considering a career in academic medicine. Proximal contextual factors influence choices directly at decision points and include having career network contacts, discrimination barriers, and specific institutional support (Lent et al., 1994).

These proximal forces can be used to understand the shortage of clinician-scientists, which is further discussed later in this chapter. In order for MDs to engage in clinical research they require significant support from their institution and leadership (Bland, Center, Finstad, Risbey, & Staples, 2005; Bland, Weber-Main, Lund, & Finstad, 2005). The lack of this support along with demands for increased clinical revenues are examples of proximal barriers for a clinician who is interested in a dual career as a clinician-researcher. Bakken et al. (2006) also cite other barriers that include financial debt, lack of role models, personal-professional conflicts, and overly burdensome regulatory requirements. Thus, SCCT can help explain why some MDs who may have the "passion" or "fire in the belly" for research instead choose a path of primarily patient care (Bakken et al., 2006, p. 102).

Proximal factors are also important when using this framework to examine how a faculty member's role could change over time. Lent (2013) previously referred to how role adjustments could be related to either restrictions or new learning experiences. In this model, a proximal barrier for a researcher might be the loss of grant support. This faculty member may have had previous experiences with teaching or administration and thus also has perceptions of self-efficacy and expected outcomes related to each behavior. These perceptions and expectations will shape choices of how to shift one's role. Again, according Lent (2013):

> New paths (or branches from old paths) may open up; barriers (e.g., glass ceilings) or calamities (e.g., job loss) may arise; value and interest priorities may shift over the course of one's work life. Thus, it seems prudent to think of career selection as an unfolding process with multiple influences and choice points…Throughout the choice process, people do not choose careers unilaterally; environments also choose people. Thus, career choice (and choice stability) is a two-way street that is conditioned, in part, by the environment's receptivity to the individual and judgments about his or her ability to meet training and occupational requirements, both initially and over time. In other words, environmental agents play a "potent role in helping to determine who gets to do what and where, for how long, and with what sorts of rewards" (Lent & Sheu, 2010, p. 692). (p. 123–124)

In summary, the unfortunate reality is that career and role choices may not always be aligned to a person's interests. Economic, cultural, institutional, or personal factors sometimes require compromise of personal interests. According to Lent (2013):

> In such instances, choices are determined by what options are available to the individual, the nature of his or her self-efficacy beliefs and outcome expectations, available choice-relevant resources, and the sorts of messages the individual receives from his or her support system. Environmental factors (supports and barriers) may also facilitate or hinder the choice implementation process, regardless of whether people are pursuing preferred or interest-consistent options. (p. 126)

Thus, SCCT offers a conceptual framework to examine the development of early interests, initial academic and career choices, and subsequent adjustments or role transitions over the span of academic medical careers. Some distal and proximal contextual influencers have already been described; however, broadening these influencers to include the historical context of medical education, how AMCs have adapted to various internal and external pressures, and the evolution of faculty tracks will help to improve our understanding of how faculty make decisions related to the roles they play.

Changing Historical Contexts, Changing Roles

Medical education, science, research, and medicine. Modern medicine in the United States began at the turn of the 20th century, as the first professional organizations formed and began to formalize medical education (Barr, 2011). The American Medical College Association, now the AAMC, and American Medical Association emerged as leading organizations that, by 1905, established the four-year curriculum as the medical school standard. The AAMC model devoted the first two years to the study of laboratory-based sciences and the latter two years to clinical study. This model was then firmly codified by Flexner's landmark 1910 report that was supported by the newly founded Carnegie Foundation for the Advancement of Teaching (Flexner, 1910; Irby, Cooke, & O'Brien, 2010). Thus, since the beginning of modern medical education, faculty have been viewed as *basic science* or *clinical*, depending on the curricular component with which they were aligned.

The complex relationship between the basic science and clinical components of medical education has been the subject of much debate since their creation and continues today (Ludmerer, 2005b, 2005d). For Flexner (1910), their full integration was necessary because he believed that good medicine and good science were both grounded in the scientific method and that the emphasis of medical education should be less on the transmission of knowledge and more on developing skills of inquiry and related mental habits. According to Flexner (1910):

> The progress of science and the scientific or intelligent practice of medicine employ, therefore, exactly the same technique. To use it, whether in investigation or in practice, the student must be trained to the positive exercise of his faculties; and if so trained, the medical school begins rather than completes his medical education. It cannot in any event transmit to him more than a fraction of the actual treasures of the science; but it can at least put him in the way of steadily increasing his holdings. A professional habit definitely formed upon scientific method will convert every detail of his practising [*sic*] experience into an additional factor in his effective education. (p. 56)

Flexner believed it impossible to teach all the scientific content necessary for the practice of medicine during medical school but thought it critical to teach the scientific method of inquiry as a foundation for physicians to continue to learn and improve their practice. However, instead of integration and interdependence, separation and competition have sometimes characterized the relationship between the basic science and clinical components of medical education (Ludmerer, 2005d).

The post-World War II (WWII) massive influx of federal dollars into AMCs and major universities transformed them into major research centers and “prime instrument[s] of national purpose” (Ludmerer, 2005c, p. 2). For many AMCs, this increase in spending through the 1950s and 1960s led to the dominance of research and its supremacy over teaching and clinical practice. According to Ludmerer, “To educate most effectively, to determine the standards of patient care, and to improve the level of practice for future patients, it was necessary for medical schools to be staffed by creative faculties actively engaged in scholarly inquiry, or so it was firmly believed” (p. 1). This expansion of research in AMCs occurred within a broader expansion of science and higher education across the United States.

During the WWII era, the U.S. citizenry began not only to accept a much larger role of the federal government but also to expect it (Ludmerer, 2005c). This was especially true in terms of fighting chronic diseases, with research universities and AMCs playing a major role in these new wars for the public good: the public health. Such was the context for the expansion of the laboratory that would become the National Institute of Health in 1930, the creation of the National Cancer Institute in 1937, the National Heart Institute in 1948, and their ultimate name change to National Institutes of Health (NIH) to incorporate them all. By the early 1960s, the number of PhD graduate students surpassed the number of undergraduate medical students at some schools (e.g., Yale and University of California, San Francisco). By 1968, federal funds supplied 58% of all medical school income, and support was increasing from state, corporate, and philanthropic sources as well. Arias (2004) credits much of the growth of basic science at NIH and medical schools to Shannon who served as director of NIH from 1955 to 1968. Arias describes the Shannon model, which was heavily influenced by Flexner, as “based on the concept that diseases will be cured only when science produces fundamental understanding of physiology and pathophysiology” (p. 47).

The early 20th century leaders in biochemistry (e.g., Krebs, Lipman, the Coris) were first trained as physicians and later became scientists because, prior to WWII, European medical institutions did not offer PhDs (Arias, 2004). Thus, their knowledge of medicine informed their scientific pursuits. However, the graduate student training within BSDs in post-WWII medical schools did not emphasize pathobiology. Although PhDs lacked this training, they worked synergistically with MDs to advance both science and medicine. They typically held joint appointments in both clinical and basic science departments and were included in grand rounds to discuss patient cases. Arias asserts that the major gap between medicine and science began in the 1970s due to the increasing complexity of biomedical science, which quickly outpaced many physicians. This left cutting-edge scientific inquiry to those with little to no training in pathobiology or clinical medicine. Kuehn (2006) reports that a number of graduate schools (13 in 2006) have begun to revamp their PhD graduate programs to include medical school coursework, clinical rotations, and an additional clinical mentor. The aim of these initiatives is to provide clinical training for PhD students to facilitate translational research as well as to foster collaborations between graduate and medical faculties.

By the 1990s, the molecular revolution was changing the nature of research in AMCs in both content and organization. Content focus shifted to the molecular level, and institutions experienced a "coalescence of the once separate 'preclinical sciences' into a single field speaking a single molecular language" (Ludmerer, 2005b, p. 3). Although molecular science was still biomedical in nature, "the research interests of most faculty no longer directly related to much of the subject matter still taught to medical students" (Ludmerer, 2005b, p. 6). The emergence of the "bench-bedside gap" emerged and is described by Ludmerer (2005b) as follows:

> [M]edical faculties discovered that the molecular revolution created new educational dilemmas. For all the theoretical and practical power of molecular medicine, physicians dealing with real patients still had to think in terms of symptoms, physical signs, organ physiology, and classical pharmacology and surgery—that is, they had to respond to illness as traditional doctors.… In earlier eras, a distinctive feature of medical education had been the integration of medical research with education and patient care—that is, teachers taught students what they themselves were investigating. Now, biomedical research was far more removed from clinical teaching and care…[I]n the era of molecular medicine the separation of research from education and practice (that is, the "bench-bedside gap") became more pronounced than ever before. (p. 6)

To keep pace with biomedical scientific advances, medical school leadership sought to expand the influx of research grant funding and began to consider a split between teaching and research PhD faculty.

A similar faculty split occurred among MDs. Growing demands for clinical revenue led to a dramatic increase in the number of CF whose primary role was patient care. According to Ludmerer (2005d):

> From 1965 to 1990, … [w]ithin the clinical departments, the majority of new faculty were appointed to the clinician-scholar track rather than the traditional physician-scientist track. Although many clinician-scholars had research agendas, their patient duties were large, and many were hired to do primarily clinical work. In some departments, a third faculty track, the "clinical track," was established to formalize the fact that many full time faculty were hired to take care of patients, not to engage in academic activities. (p. 3)

As medical schools grew in size, so did internal competition between the basic science and clinical departments for institutional resources (Ludmerer, 2005d). These tensions escalated as the CDs grew in both size and influence. By the 1980s, clinical revenue had eclipsed research dollars as the major source of income for AMCs and was used to cross-subsidize many of its functions (Ludmerer, 2005a).

In summary, the modern medical education curriculum, molecular revolution, and shifting sources of AMC revenue have been powerful contextual influencers on faculty. The result is that today's faculty can be described along three dimensions. The teacher–practitioner dimension describes the degree to which faculty activity is devoted to being a teacher or practitioner (e.g., of medicine or research). The curricular dimension describes the degree of alignment with either the clinical or basic science curricular components. Lastly, the researcher–nonresearcher dimension describes the degree faculty engage in research, whether basic science or clinical in nature. Flexner (1910) described an ideal in which the ends of each dimension were close to each other, balanced, and interdependent (see Figure 2–4A). Thus, faculty would simultaneously engage in teaching and practice, whether at bench or bedside, and medical and scientific curricular components would be interdependent. Further, he believed that faculty should be involved in scholarly inquiry in the form of research. However, as described, a number of historical contextual influences over the previous century have widened all dimensions (see Figure 2–4B) and unbundled faculty roles. These dimensions served as the foundation for the creation of the nine role groups that were used in this study.

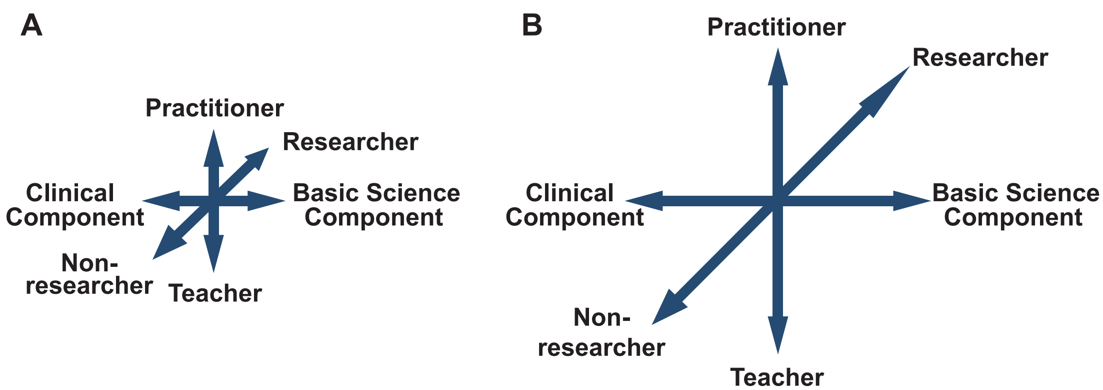


*Figure 2–4.*Three dimensions of medical school faculty include (1) from practitioner to teacher, (2) from expertise in the clinical to basic science components of the curriculum, and (3) from researcher to nonresearcher. Early modern U.S. medical schools favored a faculty that was balanced and interdependent (A). Dramatic scientific advances that outpaced applicability to clinical medicine have widened the curricular dimension while revenue demands have widened the teacher–practitioner and nonresearcher–researcher dimensions (B).

Evolution of basic science and clinical departments. BSDs are in a state of transition and reorganization that affects their missions in both teaching and research (Mallon, Biebuyck, & Jones, 2003). Advancements in biomedical sciences and technologies have made biomedical research more interdisciplinary and sometimes at odds with the basic sciences at the core of most traditional medical school curricula (e.g., anatomy, biochemistry, microbiology, physiology, and pharmacology). As BSDs began to speak the same molecular language, it became clear that it was a language that was increasingly foreign to the educational needs of undergraduate medical students (Ludmerer, 2005b). The decline in the number of BSDs began in the mid-1990s as mergers, reorganizations, and name changes reflected the shift in focus toward molecular and integrative sciences; nonetheless, the number of basic science faculty was still increasing (Ludmerer, 2005b; Mallon et al., 2003). From 1965 to 1990, the number of full-time basic science faculty in U.S. medical schools increased by 2.7 times; however, the increase in the number of full-time clinical faculty increased by 5.2 times, creating especially massive departments of internal medicine (Ludmerer, 2005d). For example, from 1972 to 1993 the Department of Medicine's annual budget at Washington University grew from $5 to $125 million, and its faculty expanded from 50 to 150 (Landefeld, 1993).

In addition to the increase in number of clinical faculty, the composition of CDs also changed with respect to their degree distribution. CDs began to hire more PhD scientists largely because of the declining population of physician-scientists (Arias, 2004). This decline was officially recognized in the often-cited Wyngaarden (1979) paper that declared the physician-scientist an endangered species. Wyngaarden reported that the number of PhDs continued to grow during the 1970s while the number of tenure-track positions in BSDs was declining. These PhDs began to find academic homes in CDs that could not fill their research positions with MD faculty. Also according to Wyngaarden, the number of medical school graduates and full-time faculty in U.S. medical schools doubled in the 1970s; however, the number of MDs reporting research as their primary activity declined by 49%. Wyngaarden and others questioned the "substitutability of the

Ph.D.-scientist, present in excess, for the clinical investigator, now in short supply" (p. 1258). As mentioned, Fang and Meyer (2003), reported that the number of PhD faculty in CDs surpassed the number of those in BSDs in the mid-1990s. AAMC faculty rosters from 2011 indicated that 57% of PhDs were housed in CDs, and 41% were housed in BSDs (Rowe & Wisniewski, 2012). However, it should be noted that BSD designations may have changed over time and will continue to do so as departmental organization continues to evolve.

As an alternative model to traditional academic departments, interdisciplinary research centers and institutes have contributed to organizational restructuring and have greatly increased in number over the last 30 years (Bunton & Mallon, 2006). The primary mission of the majority of these centers (83%) is research. Centers provide a variety of support to faculty, including recruitment packages, salary and administrative support, and venues for collaborative efforts and seminars. Bunton and Mallon (2006) surveyed full-time BSF, defined as holding an appointment in a BSD, and CF in the department of internal medicine at the top 40 U.S. medicals schools in terms of NIH grant funding (N = 728, response rate = 67 %). They reported that 51% of surveyed faculty were affiliated with at least one center. They also found that senior-level, center-affiliated faculty were more productive in terms of publication number and grant dollar support than their non-center-affiliated colleagues. This finding applied to both BSF and internal medicine MDs; however, the difference was not found among junior faculty. It is noteworthy that internal medicine PhDs and MD-PhDs were excluded from a number of their analyses. Center-affiliated BSF reported more total work hours than non-center-affiliated colleagues, suggesting that their center work was "in addition to, not a substitute for, her or his departmental duties" (p. 738). Interestingly, center-affiliated MD faculty reported less teaching and patient care time than their non-center-affiliated colleagues, suggesting that their center work functioned like a "sanctuary" from their patient care responsibilities (p. 740).

As both basic science and clinical departments continue to evolve, using the department variable as a proxy for BSF/CF becomes increasingly problematic. Bunton and Mallon's solution for this problem was simply to exclude PhD and MD-PhD faculty housed in the internal medicine department from many of their analyses (2006). However, this excluded 96 out of the 430 internal medicine faculty (22%). Degree data for the 285 faculty housed in BSDs were not provided, so the distribution of PhDs between department types cannot be calculated; however, even if all 285 BSF were PhDs, Bunton and Mallon's exclusion removed about a quarter of all PhD faculty from their analyses. Further, an interesting contrast emerged between the BSF and internal medicine PhDs regarding where they felt their primary sense of identity. Although 69% of BSF primarily identified with their department rather than their center, only 31% of the internal medicine PhDs did so. For 41% of the internal medicine PhDs, their primary sense of identity was with their center rather than their department. Bunton and Mallon speculated that the internal medicine PhDs identified more strongly with their center because they likely had lower status within the large internal medicine department and felt more at home in the smaller and perhaps more intimate setting of their center. Although not demonstrated, it is also possible that they perceived their goals and values were more aligned with those of their center than their department. Regardless, it seems that this cohort of faculty is not only substantial but also in need of being included in, rather than excluded from, faculty research. The broader perspective of faculty provided by the role variable captures this cohort.

Evolution of academic tracks and faculty needs. Prior to the 2000s, institutional policies that governed BSF aligned with those defined by the American Association of University Professors (Liu & Mallon, 2004). Faculty typically received a tenure-track appointment at a medical school that culminated in a traditional "up-or-out" tenure decision. Tenure for the BSF member meant guaranteed full salary, typically lower than their CF colleagues and funded by the school (versus external funding through patient care revenue). However, as biomedical research began to reveal its potential to generate its own revenue streams, most institutional leaders and department chairs instituted "growth tactics for the biomedical enterprise in similar fashion to the unprecedented growth of the clinical arena after the passage of Medicare in the 1960s" (Liu & Mallon, 2004, p. 206). These changes have resulted in policy and academic track revisions aimed at protecting institutions from financial liabilities while at the same time broadening the diverse productivity demands for BSF. Part of this revision includes the separation of the teaching role for some basic science researchers.

Clinical faculty tracks are also changing due to changes in healthcare reimbursement and productivity demands, both in terms of patient load and research (Bland, Center, et al., 2005). The introduction of nontenure clinician-scholar and clinical tracks demonstrates a shift in role expectation that emphasizes patient care over research and teaching (Ludmerer, 2005d). Physician-scientists in a tenured academic track typically allocate 90–95% of their time to research while those in clinician-scholar or clinician teacher tracks allocate only 20–50% of their time to research. The research of clinician-scholars typically includes patient-centered studies, drug trials, or clinical case studies, with the remainder of their time dedicated to patient care and teaching (Ludmerer, 2005d). This latter group of faculty tends to be promoted more slowly. The findings of Thomas et al. (2004), who examined the career paths of MD faculty in the Department of Medicine at Johns Hopkins University School of Medicine, align with Ludmerer's assertion that faculty with heavier clinical loads tend to have lower academic ranks. Because of Hopkins' single-track system, Thomas et al. grouped faculty into the following four career paths to study their relationships with rank and satisfaction: basic researchers, clinical researchers, academic clinicians, and teacher-clinicians (see Table 2–1). They found lower ranks and levels of satisfaction among the academic clinicians and teacher-clinicians as compared to their colleagues who were engaged in either clinical or basic science research. The specifics of this study are not as relevant to this project as the general finding that different roles or activities, regardless of track system, are significantly related to key aspects of faculty lives, in this case satisfaction and promotion.

Table 2–1

Time spent rubric for career paths defined by Thomas et al. (2004)

Career Path (*N* = 178)	% Time Spent			
	Research	Patient Care	Teaching	Administration
Basic Researcher[a] (*n* = 46)	> 50 (Basic science)	Remaining time	Remaining time	Remaining time
Clinical Researcher[a] (*n* = 69)	> 50 (Clinical)	< 50	<10	Remaining time
Academic Clinicians (*n* = 38)	none	70 – 90	Remaining time	Remaining time
Teacher-Clinicians (*n* = 25)	none	< 50	Remaining time	Remaining time

Note. [a]Greater than 50% of salary is derived from extramural grants.

The University of Michigan Medical School provides another example of how academic tracks are evolving and partitioning faculty activities related to the tripartite mission. Its three faculty tracks include instructional, research, and clinical (see Figure 2–5). Instructional track faculty are “expected to make contributions to the Medical School in the areas of scholarly research, teaching, organizational service, and health care if it pertains to their professional field” (University of Michigan Medical School, 2012, p. 4). The research track has two pathways: research professor and research scientist. Research professor track faculty “actively contribute to the Medical School research and teaching missions” and are primarily researchers but also “teach and mentor within the context of research in the Medical School” (p. 8). Faculty in the research scientist track “actively contribute to the Medical School’s research mission”—but not its teaching mission—primarily through their research, “either in a team science/co-investigator role or as an independent scientist” (p. 11). Clinical track faculty focus “mostly on clinical care and teaching with a variable degree of involvement in scholarship and organizational service in the Medical School” (p. 13). Tenure is only an option for those faculty in the instructional track.

Chung et al. (2010) studied faculty satisfaction at the University of Michigan Medical School by track; however, because the response rate was so low for the research track faculty (22.7%), only data from instructional and clinical track faculty were analyzed. It is important to differentiate between clinical faculty and clinical track faculty (i.e., holding a clinical appointment). Among MD faculty participants, 42% held instructional track appointments, and 58% held clinical track appointments. Among PhD faculty, the distribution was 76% instructional and 24% clinical track. Thus, the

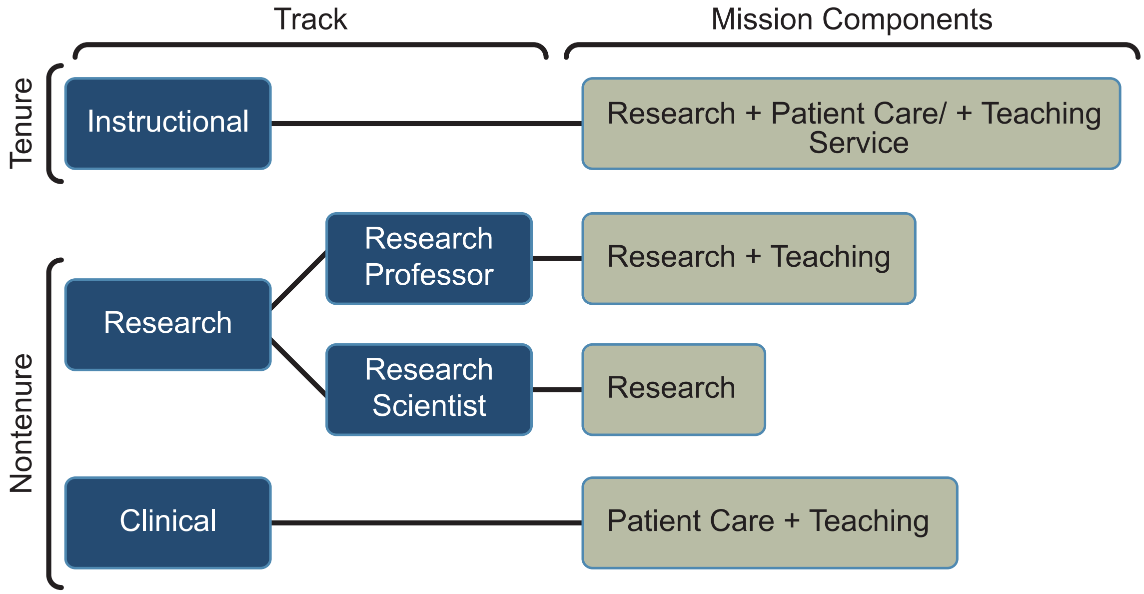


Figure 2–5. Academic track system at the University of Michigan Medical School (University of Michigan Medical School, 2012).

distinction here, between tracks, is emphasis on the research component of the school's mission. Chung et al. (2010) found no significant difference between the two tracks with respect to overall satisfaction; however, clinical track faculty were significantly less satisfied than instructional track faculty in the categories of research support, career advancement, collaborations, and mentorship. Significant predictors of job satisfaction for both tracks included departmental leadership, autonomy, achieving career expectations, and work-life balance, which is consistent with the findings of Dankoski et al. (2011). Compensation, understanding of the promotion process, and the perception of consistently applied promotion policies were predictors of satisfaction for clinical track faculty only.

To further describe their cohorts, Chung et al. (2010) divided participants into two groups based on the extent of their participation in research activities. They asked faculty to choose which statement was most applicable: "I spend a majority of my time on research" (group 1) or "I am involved in research-related activities, but research does not take a majority of my time" (group 2). This approach grouped faculty according to how much time they devoted to research and, in this way, is analogous to the role variable. Subgrouping their participants by degree of research involvement allowed a better understanding of satisfaction results—especially those related to collaboration and research support—and painted a clearer picture of the faculty. Importantly, without subgrouping by research time, they found no significant difference in overall job satisfaction between the two tracks. However, with subgrouping, they found that within group 2, overall satisfaction for clinical track faculty was significantly lower than instructional track faculty. In this case, academic track alone did not reveal a significant difference in overall satisfaction, but the addition of how time was spent did allow a significant difference to emerge.

Because faculty tracks are evolving to represent the increasing diversity of faculty functions as well as changing institutional needs and cultures, they may vary greatly from one institution to the next and thus are a challenging variable to include in multi-institutional faculty research. Chapter 3 describes the track designations used at the four schools included in this study and how they relate to how faculty spend their time. These four track systems are different from each other and from the system at the University of Michigan. As demonstrated by Chung et al. (2010), the track system is important and can help describe institutional expectations for faculty members; however, quantifying research time as "majority" or "not majority" improved understanding of faculty satisfaction.

Bland, Center, Finstad, Risbey, and Staples (2006) also studied the influence of academic track or appointment type. They analyzed a subgroup of data from the 1999 National Study of Postsecondary Faculty (NSOPF) that included research and doctoral institutions (Carnegie classifications) and 5,226 faculty members. They examined the data for relationships between appointment type (tenure track, nontenure track, or no tenure system in place) and levels of research productivity, teaching productivity, and commitment level. Not surprisingly, they found that full-time tenure appointed faculty were significantly more productive in both research and education measures, were more committed to an academic career and their current position, and reported working about 4 hours more than their nontenure colleagues. The authors clearly state that no causal relationships can be implied by these findings. Perhaps the selection and hiring process placed people with a history of being less productive in nontenure track positions. Perhaps faculty who desire to have a more balanced professional life (work-life balance) may seek nontenure appointments as a better career fit. These researchers described how "institutions increasingly talk about 'unbundling' the faculty role and having 'differentiated' faculty, in addition to their traditional faculty cohort where the role expectations include teaching, research, and service" (p. 95). For the institution, benefits of newer track systems are many and include providing economic and academic flexibility as well as increasing faculty diversity. For the individual, increased flexibility can lead to a career that is more balanced between work and family life and more tailored to specific interests.

Concurrently, medical schools are recognizing that the expectations of new faculty are also changing. Studying higher education faculty, Rice and Sorcinelli (2002) found that that new faculty feel "under siege" and that their greatest complaint was a "lack of time — 'being overwhelmed' by multiple responsibilities" (p. 103). Norman, Ambrose, and Huston (2006) also describe the "extreme degree to which junior faculty felt overwhelmed by competing demands and anxious about tenure and promotion" (p. 362). Menges (1999) noted that for junior faculty the anxiety that once surrounded getting a job "has been transformed into anxiety about surviving in the job" (p. 20). Menges also found that junior faculty "feel tremendous pressure from obligations that compete for their time and energy" and often "find themselves taking time from important professional activities and from meaningful personal pursuits in order to meet demands that seem more urgent" (p. 20). Junior faculty also tend to feel more isolated from colleagues than they anticipated and that workplace stress often affects their personal lives and relationships. These stressors may be the source of their higher rates of depression and anxiety than older faculty (Schindler et al., 2006). New faculty have expressed an expectation to be able to balance these competing demands (Bunton & Mallon, 2007; Gappa et al., 2007; Pololi, Dennis, Winn, & Mitchell, 2003).

In summary, the vicissitudes of economic and financial resources, advances in biomedical research, broadened productivity demands placed on faculty, and evolving expectations of new faculty have contributed to a reexamination of medical school tenure and track systems to allow more institutional and individual flexibility. This flexibility has come in the form of extended probationary time, elimination (or alteration) of the "up-or-out" provision, tenure-clock-stopping options, part-time tenure options, recognition of interdisciplinary teamwork, and expanded definitions of scholarship (Bunton & Mallon, 2007; Liu & Mallon, 2004). Nontenure track options are also on the rise as marketplace pressures have reconfigured the academic appointment options for faculty (Bunton & Mallon, 2007; Schuster & Finkelstein, 2006). Because the evolution of faculty academic tracks is beginning to mirror the changing roles of faculty, they can be a useful variable in faculty research; however, because they can differ significantly between institutions, their use in cross-institutional studies is limited.

Climate and culture in AMCs. Ashkanasy and Jackson (2001) describe organizational culture and climate as comprising "cognate sets of attitudes, values, and practices that characterize the members of a particular organization" (p. 398). They support the following distinction between the two terms: Culture represents the "deeply embedded values and assumptions" at an organization, whereas climate represents "consciously perceived environmental factors subject to organizational control" (p. 399). According to Schneider (2000), climate is that which employees report as having happened to or around them and is represented by the terms they use to describe their workplace environment. Culture, he believes describes the "beliefs employees have about what management believes and values" (p. xxi); these attributions are based on what employees experience in their work climate. Thus, climate causes culture, but culture also causes climate; the two are reciprocal and are "two complementary ideas that reveal overlapping yet distinguishable nuances in the psychological life of organizations" (p. xxi).

Many of the historical changes that have been described thus far represent how cultural values of AMCs have changed over time. Specifically, these value changes have been described in terms of the following: shifts in curricular emphasis, varying dependence on research and clinical revenues, the molecular scientific revolution, departmental reorganizations, the emergence of interdisciplinary research centers, and the diversification of academic tracks. Returning to Bandura's triadic reciprocal causation model (see Figure 2–1), these external changes interact with faculty's personal factors and behaviors. This study focused on a specific aspect of faculty behavior: their role as represented by how they allocate their time to four academic activities. Just as Lent et al. (1994) and Bandura (1997) emphasize an individual's objective experience as well as the perception of that experience, Schneider's (2000) definition of climate emphasizes the individual's perception of the experience of organizational culture. Bandura's reciprocal causation model can then be adapted as a development model to describe how faculty roles have evolved over time, partially as a result of external institutional and societal influences and the personal phenomenological experiences of these pressures (see Figure 2–6). Due to the reciprocality of the model, faculty roles and behaviors simultaneously act as codeterminants within the model. A primary aim of this study was to examine how influential faculty role is, specifically in explaining FV and its related constructs.

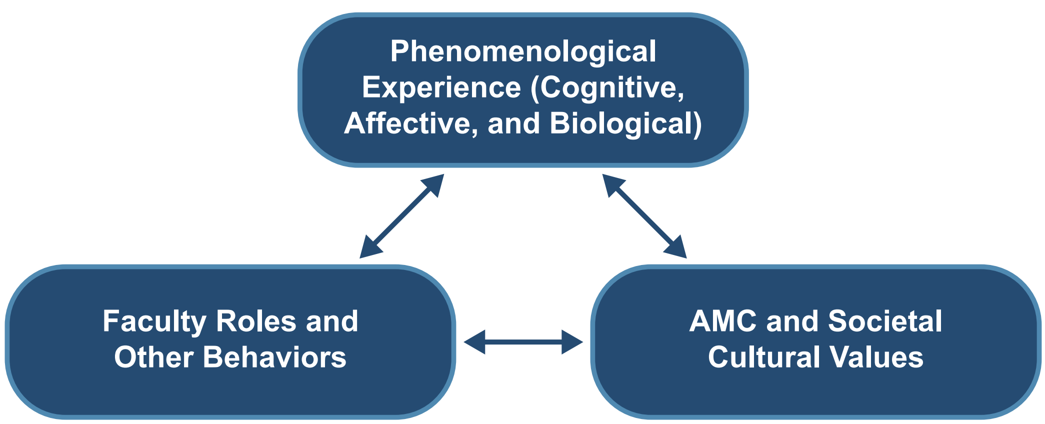


Figure 2–6. An adaptation of Bandura's triadic reciprocal causation model as a developmental model for medical school faculty. The model describes how faculty roles can evolve over time, partially as a result of external institutional and societal influences as well as the personal phenomenological experiences of these pressures. Due to the reciprocality of the model, faculty roles and behaviors simultaneously act as codeterminants. Adapted from *Self-efficacy: The Exercise of Control*, by A. Bandura, 1997, p. 6. Copyright 1997 by W. H. Freeman and Company.

Prior Research that Compares BSF/CF and FV Measures

The literature regarding FV-related findings that report differences between basic science and clinical faculty has primarily focused on satisfaction. The following review, which is summarized in Table 2–2, includes those studies published within the last 10 years that included department and/or degree independent variables to create these faculty cohorts. Some of these studies have been previously discussed; however, the focus of this section is to demonstrate the inconsistent conclusions about both BSF and CF based on the traditional methods of creating these faculty cohorts.

Table 2–2

Studies published within the last 10 years that investigated medical school faculty and used department and/or degree as independent variables to examine FV-related dependent variables

Authors	Satisfaction	Other findings/comments
Bland, Center, Finstad, Risbey, and Staples (2005)	BSF less satisfied than CF[a] with their departments	• No difference in productivity between BSF and CF[a] • Individual and institutional factors predicted individual productivity; institutional and leadership factors predicted group productivity
Bunton et al. (2012)	• BSD more satisfied with their department than MDs • BSD equally satisfied with their medical school as MDs • MDs more satisfied than BSD when asked about choosing the same school again.	BSF had a slightly positive multiple regression coefficient for choosing the same school again (MD as reference group)
Chung et al. (2010)	No difference between surgical, medical, or basic science departments.	Research track faculty were excluded due to low response rate
Dankoski, Palmer, Nelson Laird, Ribera, and Bogdewic (2011)	BSD were less satisfied than CD when only demographic and appointment characteristics were considered; however, this difference was no longer significant when PUCL and CLM constructs were included	The same pattern of findings were found regarding PRO, ENG, and overall FV (constructs/scale scores)

Table 2–2 continues

Table 2–2 (continued)

Studies published within the last 10 years that investigated medical school faculty and used department and/or degree as independent variables to examine FV-related dependent variables

Authors	Satisfaction	Other findings/comments
Lowenstein, Fernandez, and Crane (2007)	• CD were more likely to consider leaving academic medicine than BSD • No difference between roles or degree	
Schindler et al. (2006)	BSF[b] more satisfied than academic physicians	No differences in health-related problems or the Work Related Strain Inventory.

Note. BSD = faculty in a basic science departments; BSF = basic science faculty; CD = faculty in clinical departments; CF = clinical faculty; PUCL = primary unit climate and leadership; CLM = career life management; PRO = productivity; ENG = professional engagement; FV = faculty vitality.

[a]The terms basic science and clinical faculty were used without explicit description of these cohorts; the reader may assume, however, that they refer to faculty having corresponding departmental affiliations. [b]The term basic science faculty was used without explicit description of this cohort; the reader may assume, however, that they refer to faculty having corresponding departmental affiliations.

Bland, Center, et al. (2005). These researchers examined a model for research productivity that includes three predictive variables, which are determined by individual, institutional, and leadership characteristics. They examined individual productivity (defined as producing five or more articles in the last 2 years) separately from group or departmental productivity (defined as 48% or more of the faculty within a department meeting the high productivity criteria). Individual and institutional factors contributed more to individual productivity whereas institutional and leadership factors contributed more to group productivity measures. The study was based on a vitality survey administered to all full-time faculty at the University of Minnesota Medical School–Twin Cities. Responses from 76% of the faculty ($N = 465$) showed that three demographic variables were not predictors of research productivity: (a) age, which is consistent with Blackburn's work (1979, 1985); (b) gender, although males publish more, the difference is not significant when rank is controlled for; and (c) department type (clinical versus basic science). They noted, however, that CDs are composed of both PhD and MD faculty and found that PhDs in CDs were the most productive faculty subgroup. Two demographic variables were predictors: appointment type, with tenure-track associated with higher productivity, and rank, with higher rank associated with higher productivity. Both findings are intuitive and expected given that research productivity is a criterion for promotion. These researchers also reported that BSF were generally less satisfied with their department than CF. However, satisfaction data by department type were not provided nor were significance levels and effect sizes. Given the use of the department variable, it is a reasonable assumption that BSF refers to departmental affiliation, although this is not explicitly stated. The researchers also reported that BSF spent more time engaged in research than CF (32 versus 18 hours per week). The number of hours per week engaged in research, administration, and teaching were considered institutional (versus personal) factors and demonstrated a relatively weak, although significant, relationship with satisfaction (research: $\beta = .019$, $OR = 1.02$, $p = .032$; administration: $\beta = .057$, $OR = 1.06$, $p = .001$; teaching: $\beta = -.065$, $OR = 0.97$, $p = .001$).

Bland, Center, et al. (2005) found that 15 of their items that were associated with productivity explained 53% of the variance in the satisfaction item, indicating a relationship between productivity and satisfaction. Although they reported no difference in basic science and clinical faculty relative to their productivity measures, the finding that BSF are less satisfied than CF was not further explored. The purpose of the study was to explore the applicability of a productivity model not the relationship between satisfaction and productivity, so this is somewhat understandable. The details of the model are not as relevant as the combination or pattern of findings. The pattern is that no significant difference in a key dependent variable (in this case, productivity) is found based on the department variable. The model being tested is then assumed to apply equally across a homogenous medical school faculty. However, another finding is also reported (in this case, satisfaction) that suggests that there are differences among faculty groups and that perhaps a conclusion of homogeneity is not appropriate.

Bunton et al. (2012). These researchers examined data from the 2009 AAMC survey of all full-time medical school faculty at 23 U.S. medical schools that self-selected to participate in the Faculty Forward initiative ($N = 9{,}638$). The program is a collaboration between U.S. medical schools and the AAMC "to apply evidence-based approaches to improve faculty workplace environments" (p. 575). The study examined satisfaction at the departmental and medical school levels across several demographic subgroups. In addition to examining gender, race/ethnicity, and rank, Bunton et al. grouped faculty according to department type (basic science and clinical) and then further divided the faculty housed in CDs by degree (PhD and MD). Their analyses compared faculty of BSDs to MDs in CDs in three models and measured satisfaction with department, satisfaction with medical school, and likelihood of choosing to work at the same medical school again.

More BSF (74%) than clinical department MDs (71%) were satisfied or very satisfied with their department as a place to work ($\chi^2 = 13.6$; $p = .001$). However, there was no significant difference between the groups regarding satisfaction with their medical school as a place to work. Surprisingly, more clinical MDs (71%) than BSF (66%) indicated that they agreed or strongly agreed with the statement “If I had it to do all over, I would again choose to work at this medical school” ($\chi^2 = 14.9$; $p = .001$). Multiple regression analyses of these three satisfaction models demonstrated that their survey items explained much of the variance in global satisfaction (department level, $R^2 = .67$; school level, $R^2 = .60$; and choosing the same school, $R^2 = .51$). The only regression model to show a significant difference for belonging to the BSF group was choosing the same school again ($\beta = 0.04$, $p = .001$). This discrepancy between the chi-square group analysis indicating less satisfaction than clinical MDs and the multiple regression coefficient indicating more satisfaction, though slight, was not explained. Also, possible reasons why BSF were more satisfied at the departmental level while clinical MDs were more likely to choose to work at the same school again were not explored.

Their analyses ignored the cohort of clinical department PhDs, the same approach used by Bunton and Mallon (2006). According to the sample demographics Bunton et al. (2012) provide, this ignored cohort (n = 1,512) represents 16% of their respondents, 19% of their CD faculty, and—if one considers all BSF to be PhDs—45% of PhDs. These authors did not explain why this cohort of clinical department PhDs was not included with the BSF, clinical MDs, or treated as a separate group. Because the majority of all PhDs within U.S. medical schools are affiliated with CDs (Rowe & Wisniewski, 2012), it seems unwise to exclude this cohort. It represents not only a large bias within the data that was analyzed but also a disregard for these faculty whose data were ignored. This exclusion strategy seems especially inappropriate given the finding that clinical PhD faculty may be a particularly vulnerable cohort. Recall that Bunton and Mallon (2006) found that PhDs in internal medicine departments tended to identify more with their interdisciplinary centers than their departments.

Chung et al. (2010). Most of the relevant aspects of their study at the University of Michigan School of Medicine have already been described in the context of the relationship between tracks and satisfaction. However, these authors used department type in addition to track to stratify their sample. In this case, department types included medical (e.g., dermatology, neurology, psychiatry, emergency medicine, family medicine, internal medicine, pediatrics, etc.) surgical (i.e., neurosurgery, obstetrics and gynecology, ophthalmology, orthopedic surgery, general surgery, and urology), and basic science (i.e., anatomical sciences, bioinformatics, biological chemistry, cell and developmental biology, human genetics, microbiology and immunology, molecular and integrative physiology, pharmacology, and the unit for laboratory animal medicine). No significant difference in satisfaction measures emerged between these three department types; however, as mentioned, the research track, which represents 16% of the total faculty, was excluded from the analyses due to low response rates.

Dankoski et al. (2011). Their work provided both the vitality model and survey instrument that served as the foundation for the present study. In their hierarchical multiple regression models, demographics and appointment characteristics were entered as block 1 variables, and the predictive constructs of primary unit climate and leadership (PUCL) and career life management (CLM) were entered as block 2 variables. Four outcome variables were examined: productivity, career satisfaction, professional engagement, and overall FV score (calculated as the grand mean of productivity, satisfaction, and engagement scores). Thus four multiple regressions were run separately, one for each construct. These researchers did not generalize departmental affiliation to BSF/CF designations and were careful to treat the department variable as a single demographic independent variable. They found that faculty from BSDs scored lower on all four vitality measures than their CD colleagues (see Table 2–3). However, when the predictive constructs of PUCL and CLM were added as block 2 variables, these differences were no longer significant, indicating a complex relationship between the independent variables. Table 2–4 demonstrates the relationships between the predictive and constituent FV constructs. In general, individual factors characterized by the ability to manage the demands of both personal and professional aspects of their lives (i.e., CLM) were more influential than institutional factors (i.e., PUCL). The exception to this generalization was for satisfaction, which was associated with relatively equal contributions from PUCL and CLM constructs. The unexpected negative regression coefficient for the PUCL and PRO constructs (β = −0.22) and positive zero-order correlation coefficient (not provided) indicated a probable suppressor effect that requires further investigation.

Table 2–3

Relationship between department affiliation (basic science vs clinical) and FV constituent constructs from multiple regression analyses (Dankoski, Palmer, Nelson Laird, Ribera, and Bogdewic, 2011)

Constituent construct	*B* (Block 1[a])	*B* (Full model)
PRO	–0.30*	–0.23
ENG	–0.34**	–0.14
SAT	–0.26*	–0.03
FV	–0.38**	–0.17

Note. [a]Block 1 variables included demographics and appointment characteristics, including departmental affiliation (basic science vs clinical; clinical as reference group).
*p < .05. **p < .01.

Table 2–4

Relationships between FV predictive constructs and constituent constructs from multiple regression analyses (Dankoski, Palmer, Nelson Laird, Ribera, and Bogdewic, 2011)

Predictive construct[a]	*B*	*SE*	Constituent construct	R^2 (Full model)[b]	ΔR^{2b}
PUCL	–0.22	0.05***	PRO	.28	.12
CLM	0.44	0.05***			
PUCL	0.17	0.04***	ENG	.45	.35
CLM	0.51	0.04***			
PUCL	0.40	0.04***	SAT	.56	.46
CLM	0.39	0.04***			
PUCL	0.15	0.03***	FV	.59	.40
CLM	0.57	0.04***			

Note. [a] Predictive constructs were entered into the regression as block 2 variables. [b]Block 1 variables included demographics and appointment characteristics, including departmental affiliation (basic science vs clinical). ΔR^2 represents the change in R^2 between block 2 (full model) and block 1 variables.
***$p < .001$.

The full regression models from Dankoski et al. (2011) suggested that there was no difference between faculty in clinical versus basic science departments; however, the block 1 models suggested that faculty from BSDs were less productive, satisfied, engaged, and had lower overall FV scores than their CD colleagues. Again, here is a case, similar to Bland, Center, et al. (2005), in which some findings suggested homogeneity of faculty with respect to departmental affiliation while others suggested there was a cohort difference and that further exploration was needed. A notable demographic difference that persisted in the full model was academic rank. Lower rank faculty (i.e., assistant and associate professors) scored lower on all four measures than full professors.

Lowenstein et al. (2007). The approach used by these researchers is similar to the present study and warrants closer review; however, key differences are also highlighted. Lowenstein et al. (2007), using a 75-item web-based questionnaire to survey all full-time faculty at the University of Colorado School of Medicine, looked for prevalence and predictors of discontent. Among the demographic variables they examined were departmental appointment (basic science or clinical), highest degree earned, and primary role (clinician-educator, clinician-researcher, or primary researcher). Respondents were asked to self-assign their role; however, full descriptions of these roles were not included in their paper, and it is unknown if or how the roles were defined for the participants within the survey. Their response rate was 38%, and associate and full professors as well as women were overrepresented in the sample (54% versus 43% and 40% versus 36%, respectively). Most held appointments in CDs (84%) and were MDs (68%). Although CD appointments were representative of eligible faculty, no such data were provided about highest degree earned. In terms of faculty role, 45% identified as clinician-researchers, 24% as clinician-educators, and 31% as primary researchers.

In addition to demographic variables, survey items were intended to measure faculty experience using 1 to 5 Likert responses to items in the following domains: quality of life (including work-family balance); faculty development (mentoring programs and performance feedback from leadership); participation in institutional governance; and adequacy of support and resources for scholarship, teaching, and clinical practice. These domains align with the CLM, ENG, and PUCL constructs of Dankoski et al. (2011). The two outcome variables were assessed using the same Likert scale for agreement or disagreement with the following statements: "I am seriously considering leaving academic medicine in the next five years" and "My academic career has been progressing at a satisfactory rate since I joined the School of Medicine" (Outcome Variables section, para. 1).

Instead of using regression modeling, Lowenstein et al. (2007) collapsed outcome responses into having an intent to leave or not and used bivariate analyses to determine odds ratios for their independent variables. They found that members of CDs were more likely to consider leaving academic medicine (*OR* = 1.71, 95% CI [1.01, 2.91]); however, no difference was found among the three faculty roles or highest degree. With the lower limit of an odds ratio confidence interval at 1.01, it appears that the difference between basic science and clinical departments was very close to not being significant. Further, such a wide confidence interval suggests an uncertainty about these effects and that more study is needed. The results for the second outcome variable (satisfactory career progress) were missing from the paper. As mentioned, faculty composition of CDs is varied and may include multiple cohorts (e.g., PhD scientists, MD scientists, and MD clinicians). Lowenstein et al. did not subset their data to examine roles within departments; however, overall, there was no significant difference between the three self-identified roles.

Several important differences in the approach to role are noteworthy between Lowenstein et al. and the present study. While bivariate analyses are useful initial explorations of data, they fail to capture the complex institutional environment that includes multiple variables acting simultaneously. The path analyses employed in the present study addressed these issues (see Chapter 3). Next, Lowenstein et al. only examined the demographic variables of department, degree, and role for their association with two satisfaction outcome variables, excluding other domains of faculty life. Thus, the associations of faculty role, departmental affiliation, and degree were studied only relative to faculty's intent to leave academic medicine and their satisfaction with career progress. The present study examined the association of these independent variables with broad areas of faculty life, including productivity, professional engagement, career satisfaction, vitality, primary unit climate and leadership, and faculty's ability to manage their career and personal lives.

Another difference between the two studies relates to role ambiguity. Because the role choices of Lowenstein et al. were limited to three (clinician-educator, clinician-researcher, or primary researcher), faculty who did not fit clearly into a role were forced to make a choice that could have introduced significant ambiguity into the study. For example, MDs who primarily see patients and rarely teach or do research do not fit clearly into one of these roles. Similarly, MDs who spend most of their time doing research—and thus may consider themselves primary researchers—would have been faced with an especially difficult choice. Finally, PhDs who no longer engage in research also would not fit into one of these roles. This ambiguity may have contributed to the lack of any significant differences between the roles. In contrast, the present study clearly describes how roles were defined using time allocations. Further, nine roles instead of three allowed for improved faculty fit and reduced role ambiguity.

A strength of Lowenstein et al.'s work is asking faculty to self-identify their role. Although their menu of choices was overly limited, the conceptual approach is worthy of further investigation. Although comparing roles determined by time-spent data with self-identified roles was not possible in the present study, it will be a next step in this line of inquiry.

Schindler et al. (2006). These authors analyzed survey responses from 1,951 faculty at four medical schools that addressed depression, anxiety, work strain, job and life satisfaction, physical and mental health symptoms, impact of institutional financial stability, and colleague attrition. The results were stratified by gender, rank, age, marital status, discipline, and medical school. The researchers compared academic physicians to BSF; however, the reader is unsure of the exact composition of the BSF cohort. Given that departmental disciplines are reported, the assumption is that departmental affiliation was the criterion used. The sample and cohort sizes are inconsistently reported in the paper; however, academic physicians were approximately 75% of the sample. Statistical comparisons between disciplines were only reported for CDs, and no demographic stratification within BSF was provided. As mentioned in Chapter 1, this study raised general concerns about high levels of depression, anxiety, and dissatisfaction, especially among younger faculty.

Among the hypotheses being tested was that BSF would have a different experience of recent "changes in the academic health care environment" than the medical specialty faculty (p. 28). BSF reported that they worked less hours per week than their clinical colleagues (55 versus 61), took less vacation, and spent more of their time engaged in research (46% versus 15%) and teaching (21% versus 11%). They also reported that BSF were more likely to eat three meals per day, sleep adequately, and drink less alcohol. BSF reported "small but significantly higher levels of job satisfaction than academic physicians" on six scales ($p < .005$), an interesting finding given that these researchers used the Physician Job Satisfaction Scale (p. 31). No significant differences were found between the cohorts regarding health-related problems and mean scores on the Work Related Strain Inventory. Unfortunately, no analyses were reported for depression, anxiety, or faculty well-being related to perceptions of institutional financial health. Because none were reported, the reader may assume that there were no significant differences related to these variables. The impact of institutional financial health would have been interesting given the differences in how institutions compensate various faculty cohorts. In spite of stated hypothesis to be tested, the clear emphasis of this study was on clinical faculty. The study also suffered from a lack of statistical analyses and failed to present some data clearly.

In summary, studies have shown that BSF are more, less, and equally satisfied as their MD colleagues. These conflicting findings suggest that department and/or degree variables fail to create meaningful cohorts, at least relative to career satisfaction. I posit that this is due in large part to the inconsistency in how basic science and clinical faculty cohorts have been defined, the high levels of diversity within these cohorts, and their static natures that are tethered to the past.

Faculty Vitality-Related Constructs

The FV conceptual model of Dankoski et al. (2011), which served as the foundation for the present study, describes relationships between five constructs (see Figure 2–7, p. 76). These constructs have been studied in a number of research contexts and warrant a brief review.

Productivity. In the faculty literature, it seems that virtually every faculty parameter has been correlated with productivity, which has been defined through self-reporting, database searches, or document searches. It remains central to the promotion and tenure process for most faculty and is ideally explicitly defined by appointment type and academic track. For research-focused faculty, it is often measured by quantifying the number of scholarly publications or presentations. For clinical faculty, relative value units (RVUs) are also used. For teaching-focused faculty, student interactions are considered. Bland et al. (2006) cited the work of a number of systems theorists including Deming and the 85–15 rule that suggests 85% of performance is determined by the system in which an individual works, and 15% is determined by the efforts of the individual. This is in marked contrast to Dankoski et al. (2011) who found larger contributions generally come from individual rather than institutional factors. The study of scientific research productivity probably began with Merton’s work in the 1940s (Wheeler & Creswell, 1985). As a sociologist, Merton described the social structures that govern behavioral norms within the scientific research community, including competition for resources, stratification, and reward/recognition structures. In summary, the productivity of faculty is well studied, influenced by many factors, and an important criterion for promotion and tenure.

Career satisfaction. Bunton et al. (2012) assert "the level of satisfaction of a medical school's faculty plays a central role in determining the effectiveness of that institution's workforce" (p. 574). Some researchers study the lack of satisfaction and its impact, such as burnout, leaving academia, and the cost of faculty turnover (Demmy, Kivlahan, Stone, Teague, & Sapienza, 2002; Lowenstein et al., 2007; Shanafelt et al., 2012; Shanafelt et al., 2009). While most often measured using Likert-style survey questionnaires, rich qualitative data have also been collected relating to both satisfaction and dissatisfaction (Demmy et al., 2002; Huston, Norman, & Ambrose, 2007). Satisfaction has also been related to the alignment of personal and institutional values (Pololi, Kern, Carr, Conrad, & Knight, 2009) and frequently studied as a construct within specific demographics such as female faculty (Shollen, Bland, Finstad, & Taylor, 2009). Unexpectedly, Ambrose, Huston, and Norman (2005) found that satisfaction was not a good predictor of intent to leave an academic institution. On the other hand, Shanafelt et al. (2009) essentially equated dissatisfaction with intent to leave academia. Although the decision to equate the two was a weakness of that study's design, it demonstrates the variety of views associated with satisfaction as a construct.

Professional engagement. Of FV's three constituent constructs, engagement is likely the least studied; however, it has been related to productivity, satisfaction, organizational and peer support, and self-agency (Kahn, 1990; Rich, Lepine, & Crawford, 2010). Kahn (1990) defines engagement as "the harnessing of organization members' selves to their work roles [such that] …people employ and express themselves physically, cognitively, and emotionally during role performances" (p. 694). Rich et al. (2010) built on and operationalized Kahn's work. Similar to how Dankoski et al. (2011) see FV as a synergy of its constituent constructs and thus more than the sum of its parts, Rich et al. view engagement this way:

> Engagement, however, subsumes the traditional focus on physical or cognitive effort allocated to specific tasks or sets of tasks, as it reflects bringing forth increasing depths of the self in the service of one's broadly defined role. In other words, although individuals can be involved in their work roles physically, cognitively, or emotionally, engagement is maintaining these involvements simultaneously in a connected rather than fragmented manner. (p. 619)

Although engagement may be somewhat less studied than the other constructs, it is equally complex, multifactorial, and has been related to the other constructs within the model.

Agency/career-life management. In addition to the previous discussion of agency as a component of SCCT, a sense of agency and autonomy has been related to satisfaction for some time (Baldwin & Blackburn, 1981) and has been studied within academic medicine as well (Chung et al., 2010). Pololi et al. (2003) interviewed and surveyed junior, midlevel, and senior faculty and found that their most highly prioritized needs were for "(1) retaining their own values, (2) maintaining their academic vitality, and (3) balancing personal and professional demands" (p. 26). Autonomy has long been linked with faculty due to its connection with academic freedom and is one of the five essential elements of the academic workplace described by Gappa et al. (2007).

Primary unit climate and leadership. Gappa et al. (2007) describe the academic workplace has having its "distinctive culture, mission, and organizational history as well as distinct priorities and values" (p. 135). Each subunit's culture and organization is dependent on its size, complexity, mission, history, resources, and leadership. How faculty perceive, experience, and interact with these distinctive aspects of the work environment relates to each of the constructs described above, just as all of the above constructs are interdependent upon each other. This notion has been described in several ways. For example, Bland et al. (2006) describe three pillars of productivity: individual, environment, and leadership factors. Gappa et al. (2007) describe that positive outcomes can be expected when institution and individual interactions occur within the context of a work experience characterized by respect and the five essential elements. The five essential elements include the following: collegiality, employment equity, academic freedom and autonomy, flexibility, and professional growth. They conclude that, “these essential elements are critical to employees’ well-being and productivity” (p. 144). They relate these positive faculty outcomes to “enhanced institutional outcomes, such as the enrichment of the learning environment for students, increased scholarly and research productivity, and greater contributions to the college or university community and to the public good” (p. 143).

Current Gap and Contributions to the Field

Historical use of the BSF/CF variable in the literature has affirmed the intuitive assumption that there is some qualitative difference between these two faculty cohorts. This qualitative difference remains unclear, I believe, largely due to inconsistent use of problematic, overly diverse, proxy variables, vague variable definitions, and consequently conflicting findings across investigators. The present study, grounded in SCCT, introduces behavior as a current and dynamic determinant of faculty cohorts in contrast to department and/or degree, which are static and tethered to the past. SCCT

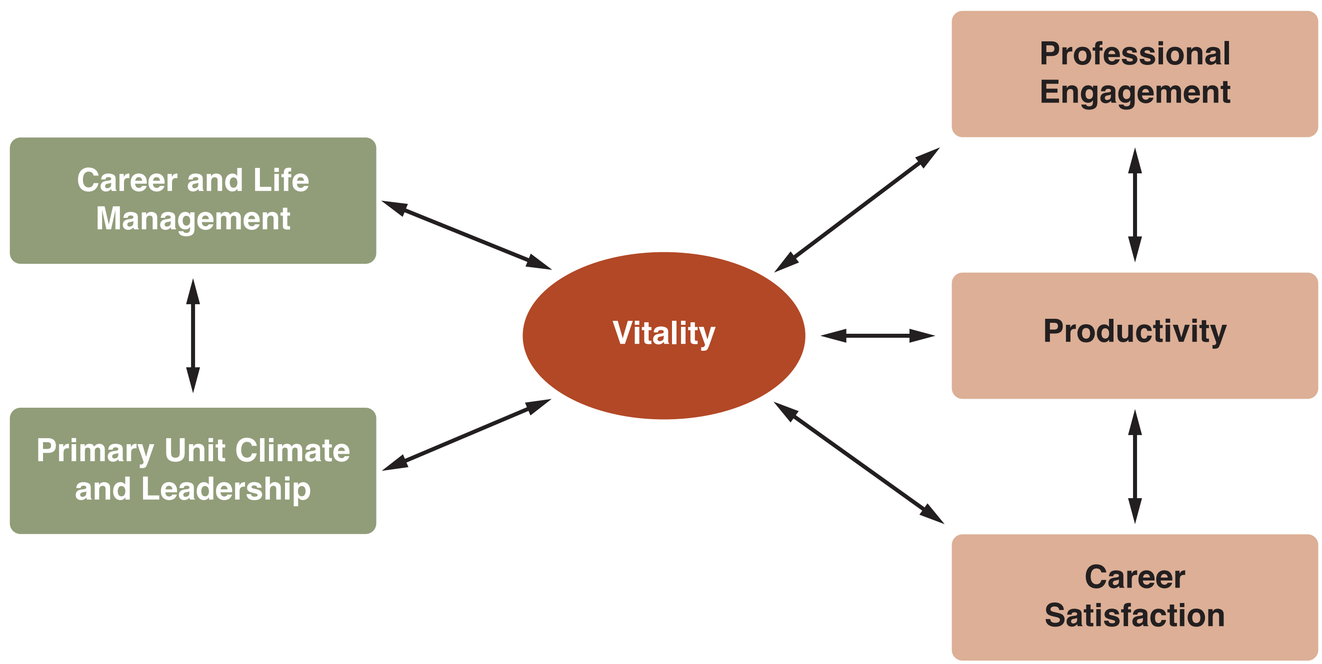


Figure 2–7. Conceptual model of Dankoski et al. From “An expanded model of faculty vitality in academic medicine,” by M. E. Dankoski, M. M. Palmer, T. F. Nelson Laird, A. K. Ribera, & S. P. Bogdewic, 2011, doi: 10.1007/s10459-011-9339-7, Figure 1. Copyright 2011 by Springer Science+Business Media B.V. Reproduced with permission.

acknowledges that a person's behaviors influence the situations in which transactions occur and thus influence the environment, the individual's cognitive and affective states, and subsequent behaviors (Lent et al., 1994). Thus, faculty cohorts based on behavior or role groups can clarify our understanding of the professional lives of medical faculty.

Department and degree variables can be useful in faculty research when they are used unto themselves, clearly defined, and inclusive rather than exclusive. However, they become problematic when used as proxies for BSF/CF, are undefined, and exclusive of key faculty cohorts. These variables have been inconsistently used in the current literature, which has resulted in interpretive challenges not only for single studies but also for comparing multiple studies across investigators. Both variables have strengths and limitations, depending on the research questions being asked; however, of the two, degree earned is likely to better capture shared values and goals of MDs and PhDs and thus may be a more influential variable when studying faculty. This variable, however, is based on a choice to attend medical or graduate school that occurred in the past—sometimes distant past—and may not represent important career choices made since that time, such as an MD's decision to no longer see patients or a PhD's transition from research to teaching or administration. These career choices are captured by this study's approach to the role variable, which is based on how faculty currently choose to spend their time.

Our understanding of basic science and clinical faculty, however defined, has not been advanced by research that makes claims about one cohort or the other based on different grouping criteria. The addition of role to the repertoire of faculty variables advances our understanding of faculty and may cause us to rethink the dichotomous BSF/CF variable that has enjoyed such historical privilege and precedence. Perhaps

BSF/CF should be represented by multiple variables or perhaps the distinction has outlived its usefulness altogether. Although Lowenstein et al. (2007) found no differences between the three faculty roles they chose, the present study took a broader yet more defined approach to examining role differences in terms of their potential influence on faculty lives. Specifically, this broader approach contributes to our understanding of the association between faculty role and productivity, professional engagement, career satisfaction, vitality, and faculty's perceptions of their primary unit climate, leadership, and ability to manage their career and personal lives.

The professional lives of faculty today are experiencing two driving forces—among many others—that at first glance seem to be in opposing directions. The first is a trend toward homogeneity and unification. Increasing interdisciplinary work, both locally and globally, is uniting diverse cohorts of faculty to work together. Traditional departmental boundaries are increasingly seen as anachronistic as interdisciplinary centers are making advances in both science and medicine. The second trend is toward heterogeneity and appreciation of diversity. Some AMCs are adapting academic tracks not only to fit the increasingly diverse professional interests and personal needs of their faculty but also to find creative ways to generate revenue in a time of ebbing budgets and healthcare reform. Further, advances in science and medicine are becoming increasingly complex, requiring higher levels of specialization and expertise, a trend that could contribute to increased isolation as scholars climb higher in their proverbial ivory towers.

Paradoxically, the trend toward heterogeneity may be contributing to the trend toward homogeneity. As science and medicine become increasingly specialized and as faculty roles diversify, collaborative work in teams becomes not only advantageous, but also necessary. These interdisciplinary teams may have shared goals that supersede those of department and degree. Previously isolated ivory towers may be crumbling as institutions build “big tents” to coordinate the work and talents of a wide array of faculty to meet today’s challenges that face academic medicine. Some of the literature points to this trend of homogeneity with findings of little difference between basic science and clinical faculty; however, such conclusions should be informed by clear and inclusive rather than ambiguous and narrow methodologies. The present study’s methodology aims to accomplish this goal and is the topic of the next chapter.

Chapter 3: Methodology

In this chapter, the 2011 IUSM Faculty Vitality survey, which generated the data for this study, is described in terms of its development, general characteristics, data collection, and sampling processes. I then review the two approaches to the role variable, with particular attention to the rationale for defining nine faculty role groups using a time allocation rubric. Next, sample demographics are presented with representativeness analysis of the four participating medical schools along with comparisons with national datasets. An exploratory factor analysis (EFA) of the survey items is reviewed along with the scales that emerged. Finally, the research questions of this study and the proposed analyses to answer them are presented.

2011 IUSM Faculty Vitality Survey

Survey development. The 2011 IUSM Faculty Vitality Survey is part of an initiative coordinated by the Office of Faculty Affairs and Professional Development (OFAPD) to study, provide, and improve faculty and institutional support. Central to this initiative is the development and ongoing refinement of a theoretical model for FV (Dankoski et al., 2011). Earlier surveys, in 2006 and 2009, have played a key role in this process; specifically, EFA of the 2009 dataset reduced its survey items to the constructs shown in Figures 1–3 and 2–7. Each construct, represented by a mean score of its associated survey items, was analyzed using multiple linear regression to yield the current model; this analysis is summarized in Chapter 2 and explored further later in this chapter.

The 2011 survey evolved from these previous surveys, with item analysis from each iteration informing subsequent revisions. Administrations of the two previous surveys were limited to faculty of IUSM, and results from these studies have been presented at meetings of the AAMC Group on Faculty Affairs and the Association for the Study of Higher Education. Grant funding from the Professional and Organizational Development Network in Higher Education (POD Network) allowed expansion of the 2011 survey to include multiple institutions and health professional schools (see *Sample and Participants* section). Due to the revisions in both the 2009 and 2011 surveys, overall survey reliability has not been assessed. However, internal scale reliabilities were reported on the 2009 dataset (Dankoski et al., 2011) and will be compared to those for the 2011 dataset later in this chapter. To date, there have been no validation studies; however, the survey has been informed through extensive reviews of both the extant literature and similar instruments as well as contributions from multiple faculty development professionals.

Survey characteristics. Participants could choose to access this web-based survey at any computer at any time during the survey period using an email-provided link. No print or paper-based versions of this survey were used. The welcome screen contained a consent form and allowed participants to choose to participate in the survey or not. Consisting of a core set of 73 Likert-style items and one open-ended item, the survey was estimated to take 15 minutes to complete. Up to 10 additional items were added that were unique to a specific discipline or institution and estimated to take an additional 1 to 5 minutes. The Indiana University Institutional Review Board approved the 2011 Faculty Vitality Study, and this study falls under that approval's purview.

Data Collection

Administrative leaders at participating institutions decided which faculty members to include in this survey and sent data files containing the names and email addresses of these faculty to a third-party survey vendor, the Indiana University Center for Survey Research (CSR). In the spring of 2011, over the course of 3 to 4 weeks, up to three recruitment messages were sent to participants, including the following: an invitation to participate, a follow-up message, and a final reminder. A unique hyperlink to the survey was embedded in each email, allowing CSR to track response rates and discontinue invitations after faculty had logged into the survey. CSR administered the survey, sent recruitment messages, collected and stored the raw data, and assigned survey identification numbers (Survey IDs) to each participant. Prior to providing data to the IUSM research team, CSR removed all faculty names and email addresses. All links between Survey IDs, faculty names, email addresses, and survey responses were destroyed within 60 days after the survey was closed. CSR provided the raw data files (in SPSS® format) that were used for this study.

Sample and Participants

Institutions. Some participating institutions learned of the 2011 IUSM Faculty Vitality Survey through presentations at national meetings while others were solicited through professional contacts within the OFAPD. The following schools participated in the survey: IUSM, IU School of Dentistry, IU School of Nursing, IU School of Health and Rehabilitation Sciences, University of Kentucky School of Dentistry, University of Iowa College of Nursing, University of Illinois at Chicago (UIC): College of Medicine and School of Public Health, Penn State Hershey College of Medicine (Penn State), and

University of Arkansas for Medical Sciences (UAMS). However, this study only included the four schools of medicine (see Table 3–1 for descriptions of each school). A review of the mission statements for all institutions, as stated on their respective websites, revealed that they share the following themes (among others): educating present and future physicians, advancing medical research, and providing quality, innovative healthcare. This tripartite mission of teaching, research, and service directly relates to the four academic activities that define the role variable: teaching, research, patient care, and administrative duties, with the last two supporting the service mission. Institutional expectations regarding how faculty contribute to the realization of these missions guide the promotion and tenure process and thus can shape faculty behavior and the roles they play.

Table 3–1

Descriptions of Participating Medical Schools from the AAMC Organizational Characteristics Database (Accessed July, 2013)

School	Geographic Region	Ownership/ control[a]	Relationship to parent university[b]	Research intensity[c]	Ownership of AMC[d]
IUSM	Central	Public	Related/Distant	47	Other, Non-Profit
Penn State	Northeast	Private	Related/Distant	76	Other, Non-Profit
UAMS	Southern	Public	Freestanding/ State System	62	State
UIC	Central	Public	Related/Distant	53	State

Note. [a]Classified as either Public or Private. [b]Related/Distant relationships are characterized by a medical school that is part of a university but not located in the same city as the parent university; Freestanding/State System describes freestanding medical schools or schools that are part of a freestanding health sciences university and part of a state system of higher education. [c]Research intensity is ranked based on federal research expenditures in terms of grants and contracts. [d]Based on American Hospital Association definitions.

Further, an institution's expectations are codified in its academic tracks, which can provide insights as to how an institution perceives its faculty. As described in Chapter 2, academic tracks are also beginning to adapt to the changing and less traditional roles of faculty as well as reflecting creative ways for institutions to generate revenue (Bland et al., 2006; Bunton & Mallon, 2007; Holcombe, 2005; Liu & Mallon, 2004; Schuster & Finkelstein, 2006; Thomas et al., 2004). Faculty academic tracks for each institution included in this study are shown in Table 3–2.

Table 3–2
Faculty Academic Tracks by Institution/School of Medicine

School	Academic tracks	School	Academic tracks
IUSM	Tenure	UAMS	Basic scientist–tenure
	Clinical (nontenure)		Basic scientist–non-tenure
	Lecturer		Clinical scientist–tenure
	Academic specialist		Clinical scientist–non-tenure
	Research scientist		Clinical educator–tenure
	Librarian		Clinical educator–nontenure
	Other		Clinical attending–nontenure
			Instructor
Penn State	Tenure (basic science)	UIC	Tenure
	Tenure (clinical faculty)		Clinical (non-tenure)
	Fixed-term (basic science)		Research faculty
	Fixed-term (clinical faculty)		Lecturer
	Librarian		Research scientist
			Other

IUSM and UIC have similar track designations that include tenure, clinical (nontenure), lecturer, and research scientist. A search of the IUSM Academic Handbook (2010) and documents available through the Office of Academic Administration (2011) revealed no estimates of how faculty in each track spend their time, with the exception of the research scientist track. Faculty in this track are described as spending “essentially 100%” of their time in research. Those in the lecturer track are expected primarily to teach and provide some service for the school and little to no research, except some scholarship of teaching. A search of the UIC Faculty Handbook (2011) revealed no estimates or expectations of how faculty in various tracks spend their time. UAMS has a tenure and nontenure pathway (track) for three types of faculty: basic scientists, clinical scientists, and clinical educators. The clinical attending track is only a nontenure pathway. Criteria and guidelines documentation from the UAMS Office of Faculty Affairs (2011) provides estimated time distributions in teaching, research, clinical service, and administration for each pathway (see Table 3–3). Many of these time distributions align with the roles described in the time allocation rubric presented later in this chapter. Penn State has tenure track and fixed-term (nontenure) tracks for both basic science and clinical faculty. A general search of their Office of Faculty Affairs materials did not reveal any information regarding expectations of how faculty spend their time relative to their academic track. All institutional materials that referenced basic science or clinical faculty either explicitly stated or implied that departmental appointment type was the criterion used to distinguish the two groups.

Faculty. The total response rate for the four medical schools was 41% with UAMS having the highest rate (49%) and Penn State the lowest (31%). The effective response rate was 31% and represents that about a quarter of faculty members (486) were excluded from the analysis due to missing demographic and/or other survey item data (see Table 3–4). Required demographic data included gender, race, rank, track, part- or full-time status, primary unit, department, and degree. Participants also had to answer at least two fifths of the items included in each survey scale to be included in the analyses. After exclusion of these faculty, the sample size for this study is 1,497. IUSM is most represented (45% of sample), followed by UAMS (27%), Penn State (16%), and UIC (11%). The response rate is lower than most surveys of its kind and lower than the average response rates for mailed physicians questionnaires reported by Cummings, Savitz, and Konrad (2001). They reviewed 84 physician surveys with samples greater than 1,000 and reported an average response rate of 52%.

Table 3–3

UAMS Percent Time Distributions per Activity by Pathway (Academic Track), Ranges, and Typical Time Spent

	Basic Scientist TP	Basic Scientist NTP	Clinical Scientist	Clinical Educator	Clinical Attending
Activity	Range (Typical)	Range (Typical)	Range (Typical)	Range (Typical)	Range (Typical)
Teaching (Total)	10–35 (30)	0–30 (5)	5–10 (7.5)	10–50 (25)	0–30 (20)
Didactic			1–3 (2.5)	2–10 (5)	0–2 (1)
Bedside			2–10 (5)	10–40 (20)	0–30 (20)
Research	50–85 (60)	90–100 (90)	40–90 (75)	5–30 (10)	0–10 (5)
Clinical (Total)			10–50 (20)	40–80 (80)	70–100 (90)
Direct Patient Care			10–50 (15)	40–60 (60)	70–100 (70)
Bedside Teaching			2–10 (5)	10–40 (20)	0–30 (20)
Admin Service	0–35 (10)	0–10 (5)	0–10 (2.5)	0–20 (5)	0–10 (5)

Note. TP = Tenure Pathway; NTP = Nontenure Pathway. Adapted from "Criteria and Guidelines for UAMS College of Medicine Faculty Appointments, Promotion, and Tenure" from the Office of Faculty Affairs (2011).

Table 3–4

Faculty Response Rates (RR) by Institution/School

School	Effective RR(%)	Valid Respondents	RR (%)	All Respondents	Invited
IUSM	36	678	44	830	1,892
Penn State	22	238	31	327	1,060
UAMS	36	411	49	562	1,146
UIC	25	170	38	264	690
Total	31	1,497	41	1,983	4,788

Note. Effective response rate and valid number of respondents indicate the exclusion of 486 faculty members due to missing demographic and/or faculty vitality scale items.

To mitigate concerns regarding nonresponder bias, sample representativeness was examined by comparing known demographics of each school to those of the sample (see Appendix B). The source for these data is the 2011 AAMC Faculty Roster, accessed via the Faculty Administrative Management Online User System (FAMOUS) . Demographic data for the entire sample, the population of these four medical schools (combined), and the population of all U.S. medical schools are shown in Table 3–5.

Table 3–5

Sample and Population Demographics

Demographic	% Sample	% Population of 4 Schools	% U.S. Medical Schools[a]
Gender			
Men (*n* = 960)	64.1	65.0	63.8
Women (*n* = 537)	35.9	35.0	36.2
Race			
White (*n* = 1,063)	71.0	61.5	61.1
Asian (*n* = 221)	14.8	12.6	12.5
Underrepresented Minority[b] (*n* = 125)	8.4	4.7	9.3
No Response/Unknown (*n* = 88)	5.9	21.2	17.1
Rank			
Full Professor (*n* = 427)	28.5	23.8	23.6
Associate Professor (*n* = 420)	28.1	22.4	20.7
Assistant Professor (*n* = 619)	41.3	47.4	43.0
Other (*n* = 31)	2.1	6.4	12.7
Department Type			
Basic Science (*n* = 168)	11.2	15.9	12.6
Clinical (*n* = 1,274)	85.1	82.7	86.5
Other (*n* = 55)	3.7	1.4	0.9
Degree			
MD or DO (*n* =935)	62.5	66.3	64.3
PhD (*n* = 492)	32.9	27.3	24.0
MD and PhD (*n* = 70)	4.7	6.4	7.4

Note. [a]Data from AAMC Faculty Roster, December 31, 2011. When possible, data excludes other health professional schools (e.g., dentistry, social sciences, veterinary sciences). [b]Underrepresented minority for sample includes the following: Black, Hispanic, Multiple races, Native American, and Other; the AAMC Faculty Roster includes the following: Black, Cuban, Mexican American, Multiple races, Multiple Hispanic, Native American, Other, Other Hispanic, and Puerto Rican.

With respect to gender, the sample is representative of the participating institutions, both individually and collectively. With respect to race, White faculty were overrepresented in all institutions (ranging from 7.3% to 10.0% for individual institutions, and 9.6% for all institutions combined). At UAMS, Asian faculty were also overrepresented (8.0%). Regarding academic rank, at UAMS and UIC, full professors were overrepresented (8.0% and 8.5%, respectively). At UIC, associate professors were also overrepresented (12%). Assistant professors were generally under-represented in the total sample (−6.1%), but especially at IUSM and UIC (−9.2% and −16.8%, respectively). Regarding department type, at Penn State, BSDs were under-represented (−10.5%) while "other" departments were overrepresented (6.6%). At UAMS, clinical departments were overrepresented (7.4%). Finally, regarding degree, PhDs were overrepresented at Penn State, UAMS, and UIC (6.3%, 8.0%, and 12.0%, respectively), whereas MDs at UIC were underrepresented (−8.7%).

Another approach to evaluating the effects of nonresponder bias is to compare the data collected from early versus late survey responders (Kypri, Samaranayaka, Connor, Langley, & Maclennan, 2011; Shanafelt et al., 2009). The assumption is that faculty who respond later, after an email prompt, can approximate nonresponders. In this sample, early and late responders did not differ significantly with regard to gender, race, degree, department, or rank. Regarding the FV-related constructs, early and late responders did not differ significantly in CLM, productivity, overall FV, or professional development (PD) raw scale scores; however, the mean satisfaction score for early responders was significantly lower than that of late responders (3.52 versus 3.61, respectively; $t(938) = -2.06$, $p < .05$). Early responders also had lower PUCL scores than late responders (3.53 versus 3.67, respectively; $t(833.8) = -2.25$, $p < .05$). Thus, while no demographic differences were found between early and late responders, early responders were less satisfied and have a perspective that their leadership and institutional climate are less supportive.

Defining Roles: Two Approaches

Both approaches to the role variable were based on how participants answered the following survey item:

> Consider your work over the last academic year, approximately what percentage of your time was devoted to activities related to the following areas (Must add to 100%): Teaching, Research, Patient care/clinical work, and Administrative duties (including committee service).

Participants were required to answer this item to be included in this study.

Percent time spent. Each valid participant provided the percent time devoted to each of the academic activities, which ranged from 0 to 100%. These continuous time allocation variables were divided by 10 to make interpretation more meaningful (i.e., it is more meaningful to interpret a change in a dependent variable for each 10% change in time spent per activity versus each 1% change). The percent time spent engaged in patient care addresses the assumption that all MDs are equally engaged in this activity and allows some PhD faculty who are engaged in patient care to be represented (e.g., psychologists). Given the perspective of Miller and Rosenstein (2003) that MDs who engage in research are different from those who do not, the percent of faculty time dedicated to research also serves an important function as a proxy for research proclivity among MDs as well as PhDs. Although the percent time spent in teaching and administrative duties have not routinely been included in studies of medical school faculty, they were included in this study because they can represent large time commitments for some faculty members. Thus, to fully investigate the relationship between how faculty spend their time and vitality, all four percent time variables were included in the analyses. Because of the collinear dependence of these four variables (their sum must equal 100), four models were run, each including one time spent variable. This approach to the role variable focuses on the degree to which faculty engage in each single academic activity.

Role groups: Time allocation rubric. In contrast to focusing on single activities, the role group approach focuses on patterns of activities. Role groups are defined by their patterns of time allocation and described in the rubric shown in Table 3–6. As mentioned, these nine role groups can be collapsed or clustered into higher order patterns such as researchers versus nonresearchers and clinicians versus nonclinicians. Further, Teachers, Researchers, Administrators, and Clinicians dedicate the majority of their time to a single activity. In contrast, Clinician-Teachers, Clinician-Researchers, Clinician-Administrators, Jugglers, and Clinician-Jugglers allocate significant time to more than one activity. Thus, another higher order pattern compares single- versus multiple-activity roles. Two key decisions were made to create the time allocation rubric: the 60% cutoff to define each role and the 20% clinical time cutoff to distinguish nonclinician from clinician faculty.

Table 3–6

Time Allocation Rubric: Faculty Role Groups Assigned by Percent Time Spent in Each Academic Activity

	Academic Activity (%)			
Role Group	Teaching	Research	Administration[a]	Patient Care
Teacher	≥ 60	≤ 40	≤ 40	< 20
Researcher	≤ 40	≥ 60	≤ 40	< 20
Administrator	≤ 40	≤ 40	≥ 60	< 20
Juggler	< 60	< 60	< 60	< 20
Clinician	≤ 30	≤ 30	≤ 30	≥ 70
Clinician-Teacher	~60% NCT			20–69
Clinician-Researcher		~60% NCT		20–69
Clinician-Administrator			~60% NCT	20–69
Clinician-Juggler	~30% NCT in any 2 activities or ~20% NCT in any 3 activities			20–69

Note. NCT = Nonclinical time (i.e., the time remaining for clinicians when not engaged in patient care).
[a]Administrative duties include committee service.

The 60% cutoff to define single-activity roles reflects that a significant proportion of a faculty member's time is spent engaged in a single activity. A 70% cutoff was analyzed but determined to create too many faculty in multi-activity role groups and insufficient faculty in single-activity role groups. However, the 70% cutoff was used to define single-role Clinicians due to the large (and growing) number of physicians hired with the primary—if not only—responsibility of seeing patients (Bunton & Mallon, 2007; Ludmerer, 2005b). The 60% guideline was also applied to the nonclinical time (NCT) of the three dual clinician roles (Clinician-Teachers, Clinician-Researchers, and Clinician-Administrators), which reflect allocation of approximately 60% of NCT to a single nonclinical activity. The NCT for a Clinician-Juggler is divided into three activities of approximately 20% each or any two activities of approximately 30% each. Finally, for a Juggler, no single activity can occupy more than 60% of a faculty member's time. Jugglers spend 0–19% of their time seeing patients, which leaves 81–100% of their time to be distributed among the remaining three activities; therefore, the < 60% guideline ensures that Jugglers are substantially engaged in two or more activities.

The 20% cutoff for clinicians versus nonclinicians was guided by the work of Shanafelt et al. (2009). They determined that academic physicians who spent at least 20% of their time engaged in the activity they found most meaningful were less likely to experience burnout. Building on this finding, I have made the assumption that physicians who choose to see patients less than 20% of their time have prioritized other, nonclinical activities. Thus, these physicians were assigned to a nonclinician role (Teachers, Researchers, Administrators, or Jugglers).

Application of the time allocation rubric to the survey sample revealed that most of the faculty in the sample are Clinicians (30%), followed next by Researchers (24%) and Clinician-Jugglers (19%). Single-activity faculty comprise 58% of the sample, and 42% belong to multiple-activity role groups (see Table 3–7). The mean distribution of time spent among the four primary academic activities for each role group is shown in Table 3–8. Not surprisingly, the highest standard deviations are seen in the Juggler group.

Table 3–7

Frequency and Percentage of Faculty per Role Group (N = 1,497)

Role Group	*n*	%
Teacher	28	1.9
Researcher	354	23.6
Juggler	123	8.2
Administrator	47	3.1
Clinician	445	29.7
Clinician-Teacher	71	4.7
Clinician-Researcher	66	4.4
Clinician-Administrator	79	5.3
Clinician-Juggler	284	19.0
Total	1,497	100.0

Table 3–8

Mean Time Spent in Each Activity by Role Group (N = 1,497)

Role	Activity	Min	Max	*M*	*SD*	Role	Activity	Min	Max	*M*	*SD*
T	Teaching	60	100	70.6	12.4	C	Teaching	0	30	12.0	6.8
	Research	0	35	14.1	12.2		Research	0	25	4.1	4.7
	Pt Care	0	12	2.1	4.1		Pt Care	60	100	77.4	9.1
	Admin	0	40	13.2	11.5		Admin	0	25	6.5	5.9
R	Teaching	0	35	10.3	8.6	CT	Teaching	30	70	41.4	10.6
	Research	60	100	80.0	12.6		Research	0	20	4.3	4.7
	Pt Care	0	15	1.1	3.3		Pt Care	20	67	46.8	13.7
	Admin	0	40	8.6	7.8		Admin	0	15	7.0	4.8
A	Teaching	0	30	10.1	9.2	CR	Teaching	0	20	7.5	4.9
	Research	0	30	6.4	8.9		Research	30	80	56.1	14.0
	Pt Care	0	18	3.5	5.2		Pt Care	20	60	30.5	11.3
	Admin	60	100	80.0	12.2		Admin	0	15	5.9	4.2
J	Teaching	0	55	28.4	15.6	CA	Teaching	0	20	8.7	4.5
	Research	0	55	35.7	16.6		Research	0	15	4.1	3.9
	Pt Care	0	15	2.1	4.7		Pt Care	20	65	38.3	13.4
	Admin	0	55	28.2	16.0		Admin	30	75	48.9	12.9
						CJ	Teaching	0	50	20.7	8.5
							Research	0	40	11.9	10.4
							Pt Care	20	66	46.9	13.1
							Admin	0	50	20.6	11.0

Note. T = Teacher; R = Researcher; A = Administrator; J = Juggler; C = Clinician; CT = Clinician-Teacher; CR = Clinician-Researcher; CA = Clinician-Administrator; CJ = Clinician-Juggler.

Demographics of Each Role Group

The picture becomes more complete with an exploration of the demographics of the nine role groups. These include the following: gender, race, rank, track, part- or full-time status, primary academic unit, department (basic science or clinical), and degree (MD, PhD, or MD-PhD). Regarding faculty degrees, physicians with a DO are included with MD faculty. Table 3–9 shows the demographics for the four nonclinician roles and

Table 3–10 shows the same for the five clinician roles. Table 3–11 shows the distribution of degrees among department types and vice versa.

Table 3–9

Demographics of Nonclinician Role Groups by Percentage (N = 552): Teachers (T), Researchers (R), Administrators (A), and Jugglers (J)

Demographic	T (*n* = 28)	R (*n* = 354)	A (*n* = 47)	J (*n* = 123)	Total (*N* = 552)
Gender					
Men	78.6	70.9	66.0	63.4	69.2
Women	21.4	29.1	34.0	36.6	30.8
Race					
White	85.7	67.5	85.1	75.6	71.7
Asian	3.6	21.2	8.5	9.8	16.7
Underrepresented Minority[a]	3.6	6.2	2.1	4.9	5.4
No Response/Unknown	7.1	5.1	4.3	9.8	6.2
Rank					
Full Professor	21.4	32.2	51.1	52.8	37.9
Associate Professor	35.7	24.3	23.4	33.3	26.8
Assistant Professor	28.6	40.1	23.4	12.2	31.9
Other	14.3	3.4	2.1	1.6	3.4
Academic Track					
Tenure	53.6	69.5	61.7	90.2	72.6
Nontenure/Clinical	25.0	14.4	34.0	6.5	14.9
Other	21.4	16.1	4.3	0.7	12.5
Employment Status					
Full-time	75.0	98.9	93.6	99.2	97.3
Part-time	25.0	1.1	6.4	.8	2.7
Primary Academic Unit					
School	7.1	10.7	21.3	15.5	12.5
Regional Center	21.4	3.1	12.8	11.4	6.7
Division	3.6	17.5	19.1	8.1	14.9
Department	64.3	66.1	42.6	64.2	63.6
Other	3.6	2.5	4.3	.8	2.4

Table 3–9 continues

Table 3–9 (continued)

Demographics of Nonclinician Role Groups by Percentage (N = 552): Teachers (T), Researchers (R), Administrators (A), and Jugglers (J)

Demographic	T (*n* = 28)	R (*n* = 354)	A (*n* = 47)	J (*n* = 123)	Total (*N* = 552)
Department Type					
Basic Science	35.7	26.6	21.3	36.6	29.3
Clinical	46.4	68.6	74.5	44.7	62.1
Other	17.9	4.8	4.3	18.7	8.5
Degree					
MD	32.1	10.2	46.8	16.3	15.8
PhD	64.3	84.5	51.1	82.1	80.1
MD and PhD	3.6	5.4	2.1	1.6	4.2

Note. URM = Underrepresented minority; NR = No response or unknown.
[a]Underrepresented minority for sample includes the following: Black, Hispanic, Multiple races, Native American, and Other.

Table 3–10

Demographics of Clinician Role Groups by Percentage (N = 945): Clinicians (C), Clinician-Teachers (CT), Clinician-Researchers (CR), Clinician-Administrators (CA), and Clinician-Jugglers (CJ)

Demographic	C (*n* = 445)	CT (*n* = 71)	CR (*n* = 66)	CA (*n* = 79)	CJ *n* = 284)	Total (*N* = 945)
Gender						
Men	59.6	70.4	53.0	68.4	61.3	61.2
Women	40.4	29.6	47.0	31.6	38.7	38.8
Race						
White	66.5	62.0	69.7	82.3	76.1	70.6
Asian	15.3	18.3	19.7	7.6	10.2	13.7
URM[a]	12.6	11.2	4.5	3.8	8.9	10.0
NR	5.6	8.5	6.1	6.3	4.9	5.7
Rank						
Full Professor	13.3	18.3	18.2	45.6	34.5	23.1
Assoc Prof	25.4	33.8	31.8	39.2	29.2	28.8
Assist Prof	60.0	46.5	48.5	13.9	35.2	46.9
Other	1.3	1.4	1.5	1.3	1.1	1.3

Table 3–10 continues

Table 3–10 (continued)

Demographics of Clinician Role Groups by Percentage (N = 945): Clinicians (C), Clinician-Teachers (CT), Clinician-Researchers (CR), Clinician-Administrators (CA), and Clinician-Jugglers (CJ)

Demographic	C (*n* = 445)	CT (*n* = 71)	CR (*n* = 66)	CA (*n* = 79)	CJ *n* = 284)	Total (*N* = 945)
Academic Track						
Tenure	29.0	31.0	66.7	45.6	55.6	41.2
Nonten/Clinical	70.1	66.2	25.8	54.4	43.3	57.4
Other	0.9	2.8	7.6	0.0	1.1	1.5
Employment Status						
Full-time	89.4	87.3	100.0	93.7	93.0	91.4
Part-time	10.6	12.7	0.0	6.3	7.0	8.6
Primary Academic Unit						
School	2.2	4.2	0.0	10.1	4.9	3.7
Regional Center	4.7	7.0	0.0	6.3	3.5	4.3
Division	32.1	26.8	43.9	17.7	27.8	30.1
Department	59.1	62.0	54.5	65.8	62.0	60.4
Other	1.8	0.0	1.5	0.0	1.8	1.5
Department Type						
Basic Science	1.1	0.0	0.0	0.0	0.4	0.6
Clinical	98.7	97.2	98.5	98.7	98.6	98.5
Other	.2	2.8	1.5	1.3	1.1	0.8
Degree						
MD	90.8	95.8	74.2	94.9	88.7	89.7
PhD	5.6	2.8	13.6	0.0	4.9	5.3
MD and PhD	3.6	1.4	12.1	5.1	6.3	5.0

Note. URM = Underrepresented minority; NR = No response or unknown.
[a]Underrepresented minority for sample includes the following: Black, Hispanic, Multiple races, Native American, and Other.

Table 3–11

Degree Distributions among Departments and Department Distributions among Degrees

Department	MD, n = 935 (% of Dept)	PhD, n = 492 (% of Dept)	MD-PhD, n = 70 (% of Dept)	Department Totals
Basic Science	11 (6.5)	152 (90.5)	5 (3.0)	168 (100)
Clinical	914 (71.7)	296 (23.2)	64 (5.0)	1,274 (100)
Other	10 (18.2)	44 (80.0)	1 (1.8)	55 (100)
	% of Degree	% of Degree	% of Degree	
Basic Science	1.2	30.9	7.1	
Clinical	97.8	60.2	91.4	
Other	1.1	8.9	1.4	
Degree Totals	100.0	100.0	100.0	

When examining the sample by department, BSDs are composed of 7% MDs, 90% PhDs, and 3% MD-PhDs. This composition is notably different from the national figures of 10% MDs, 81% PhDs, and 8% MD-PhDs reported by the AAMC (Rowe & Wisniewski, 2012). Some of this discrepancy can be attributed to differences in the assignment of departmental types. Appendix A contains a general list of departments categorized by type from the AAMC; however, not all departments in the four participating schools could be clearly identified as one type or the other, and thus differences could have resulted from this ambiguity. The sample's CDs are composed of 72% MDs, 23% PhDs, and 5% MD-PhDs, which better aligns with the national figures of 76% MDs, 17% PhDs, and 7% MD-PhDs reported by the AAMC. These percentages have been adjusted to remove all other degrees (i.e., they only consider faculty with PhDs, MDs, and MD-PhDs).

When examining the sample by degree, the vast majority of the MDs (98%) are housed in CDs with only 1% housed in BSDs (and 1% in departments described as

“Other”). This distribution matches the 98% and 2% distribution nationally (Rowe & Wisniewski, 2012). As expected, a slightly lower percentage of MD-PhDs (91%) have CD affiliations. The PhDs in the sample are more divided, with 31% belonging to BSDs and 60% to CDs. The national distribution is 41% and 57% respectively. In both cases, it is the sample distributions within the BSDs and PhD faculty that are least consistent with the national data. Finally, Table 3–12 shows mean time spent in each activity by department type and degree.

Table 3–12

Mean Time Spent in Each Activity by Department and Degree

	M (*SD*)			
Demographic	Teaching	Research	Patient Care	Administration
Department Type				
Basic Science	22.5 (17.3)	56.4 (27.2)	2.7 (13.7)	17.8 (18.9)
Clinical	15.3 (12.8)	24.5 (31.7)	44.1 (31.1)	15.7 (18.2)
Other	29.5 (21.0)	41.6 (28.7)	7.0 (17.2)	21.9 (18.7)
Degree				
MD	16.7 (13.0)	11.7 (19.4)	54.8 (25.1)	16.1 (18.3)
PhD	17.1 (16.3)	59.5 (29.7)	6.6 (19.6)	16.6 (18.8)
MD and PhD	12.8 (10.4)	38.3 (34.6)	35.7 (29.8)	13.1 (15.5)

Exploratory Factor Analysis (EFA)

Preliminary analysis suggested that seven of the nine productivity and all five satisfaction items should be removed prior to EFA as they represented large sources of missing data and would have excluded large portions of the sample from the analysis. Missing data from this survey is one of its limitations and is described further in Chapter 4. However, these items specifically asked participants about their productivity and satisfaction and were directly used to represent their respective constructs. Two productivity items, however, were included in the EFA because of their potential to align (load) with the engagement construct. The EFA would determine if they should be moved from the engagement scale to the productivity scale. These items queried participation in the following areas: "university/department/school service" and "professional organizations in my field." An item that asked about the degree to which faculty considered leaving academia was also excluded from the EFA. Its distribution was bimodal, and including it reduced the overall variance captured by the analysis and interfered with achieving a simple structure solution.

A 10:1 subject-to-item ratio is an often cited minimum recommendation for factor analysis, but ratios of 20 to 40:1 are recommended (Osborne & Costello, 2004). Given that 45 vitality items were analyzed, a minimum of 450 cases were required, so this sample of 1,497 falls well within the recommended range. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy estimates the proportion of variance in these items that may be caused by underlying factors. In this case, the KMO of .936 indicated that EFA was suitable for this dataset. A significant Bartlett's test of sphericity ($p < .001$) indicated that EFA may be useful because it is unlikely that these variables are unrelated to each other.

Number of factors. The number of factors with eigenvalues greater than one (Kaiser's criterion) was nine. However, the Cattell scree plot indicated a clear "elbow" that suggested extracting four factors (see Figure 3–1). Theory and the vitality model also supported a four-factor solution. The 2009 survey items reduced to five scales (PUCL, CLM, productivity, engagement, and satisfaction). The 2011 survey was expanded to include items that asked about faculty's perceptions of professional development (PD). These new items required investigation to determine if they would form a new construct (and thus new scale) or load on existing constructs (e.g., on the engagement scale). Thus, a four-factor solution was a clear theoretical possibility given the removal of the productivity and satisfaction items and the possibility of a new PD factor; however, this needed to be explored through EFA.

A four-factor solution did provide simple structure whereas three- and five-factor solutions did not. Extraction by principal axis factoring (PAF) accounted for 45.2% of the variance and generated 140 (14.0%) computed residuals—between observed and reproduced correlations—with absolute values ≥ 0.05. The principal components (PCA) extraction explained 50.0% of the variance, which is understandably higher because PCA assumes that all variance can be explained whereas PAF does not. Because factor analysis is an iterative process and repeated until convergence is achieved (or a maximum number of iterations is reached), very similar loadings were generated with both extractions. Because two of the six factor correlations were ≥ .3, a promax rotation was used (kappa = 3). The factor loadings (pattern matrix) of the 45 items included in the analysis are shown in Table 3–13.

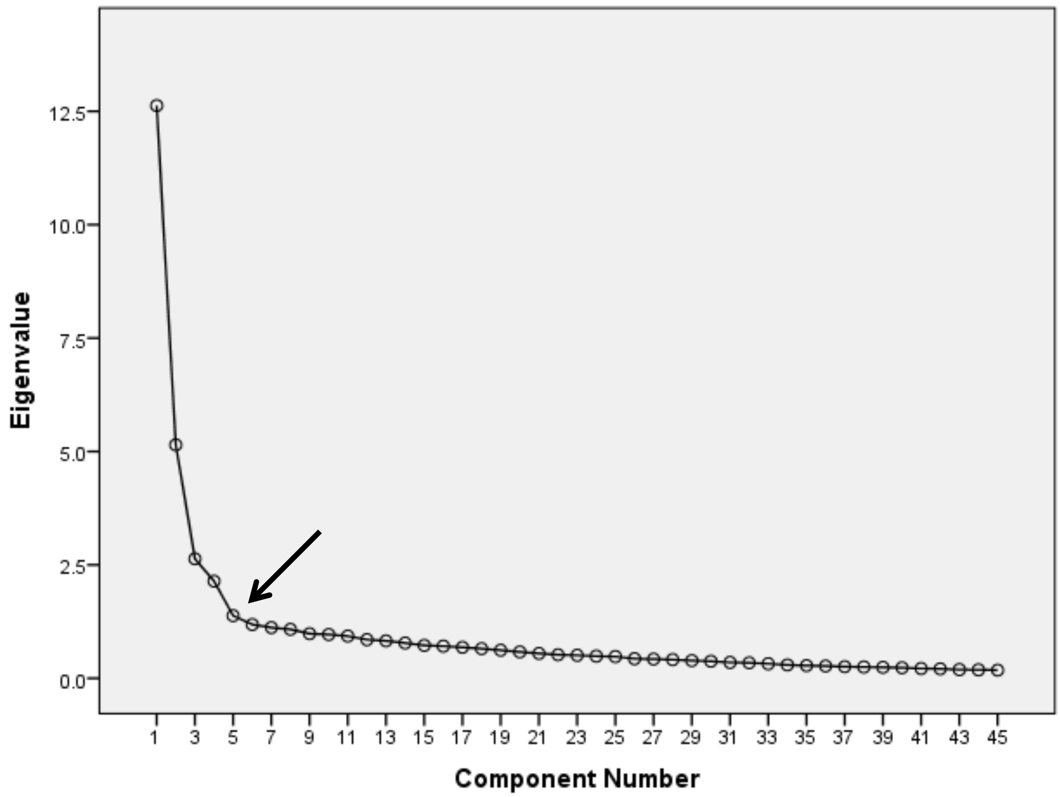


Figure 3–1. Cattell scree plot for exploratory factor analysis of 45 faculty vitality items. The plot indicates a clear "elbow" (arrow) that suggested extracting four factors.

Table 3–13

Factor Loadings for Exploratory Factor Analysis with Promax Rotation for Primary Unit Climate & Leadership (PUCL), Career Life Management (CLM), Professional Engagement (ENG), and Professional Development (PD) Survey Items

	Factors/Scales			
Item/variable	PUCL	CLM	ENG	PD
PUCL_inclusv_R	**.88**	-.04	.01	-.01
PUCL_empowr_R	**.87**	.00	-.01	.00
PUCL_achiev_R	**.85**	-.05	.03	.03
PUCL_value_R	**.84**	-.06	.07	-.02
PUCL_within_R	**.83**	-.07	-.05	.06
PUCL_improve_R	**.83**	.02	.02	.02
PUCL_fairmec_R	**.83**	-.03	-.03	.03
PUCL_share_R	**.83**	.01	-.03	.03
PUCL_opinion_R	**.80**	-.04	.11	.05
PUCL_conflct_R	**.80**	.05	-.05	-.05
PUCL_retain_R	**.78**	.07	-.03	-.03
PUCL_statusqo_R	**.76**	-.02	-.04	.08
PUCL_netwrk_R	**.76**	.05	-.06	.00
PUCL_outside_R	**.74**	.02	.00	-.03
PUCL_recruit_R	**.72**	.11	-.06	-.05
PUCL_facdev_R	**.70**	.01	.02	.06
PUCL_minorty_R	**.63**	-.04	.10	-.18
PUCL_women_R	**.61**	-.01	.10	-.13
PUCL_engage_R	**.51**	.13	-.11	-.07
CLM_bound_R	-.04	**.78**	-.15	.03
CLM_blance_R	.02	**.66**	-.22	-.02
CLM_acplans_R	-.06	**.62**	.26	-.10
CLM_feedbck_R	.07	**.60**	.03	.15
CLM_complx_R	.17	**.53**	.01	-.02
CLM_change_R	-.07	**.53**	.11	-.04
CLM_assist_R	.21	**.49**	.04	-.08
CLM_driven_R	-.12	**.48**	.21	-.18
CLM_mentor_R	-.08	**.48**	.08	.16
CLM_input_R	.21	**.47**	-.01	.05
CLM_seeopp_R	.28	**.44**	.02	.13

Table 3–13 continues

Table 3–13 (continued)

Factor Loadings for Exploratory Factor Analysis with Promax Rotation for Primary Unit Climate & Leadership (PUCL), Career Life Management (CLM), Professional Engagement (ENG), and Professional Development (PD) Survey Items

	Factors/Scales			
Item/variable	PUCL	CLM	ENG	PD
ENG_mentcoll_R	–.01	.05	**.72**	.04
ENG_organz_R	–.12	.04	**.71**	–.05
ENG_comtee_R	.06	–.09	**.69**	.05
ENG_prof_org_R	–.05	.10	**.68**	–.05
ENG_service_R	.04	–.15	**.67**	.04
ENG_serve_R	–.04	.08	**.60**	.08
ENG_fd_act_R	.08	.08	**.51**	.33
ENG_collab_R	.25	.12	**.41**	.05
PD_minrty_pd_R	–.04	.02	–.07	**.82**
PD_womn_pd_R	–.07	.01	–.03	**.79**
PD_div_pd_R	–.06	.02	–.11	**.79**
PD_lead_pd_R	.01	–.04	.16	**.65**
PD_tchlrn_pd_R	.01	–.07	.10	**.51**
PD_tenure_pd_R	.06	–.04	.17	**.39**
PD_resrch_pd_R	–.04	.06	.09	**.38**

Note. Factor loadings > .37 are in boldface. See Appendix C for survey codebook that lists all vitality questions and their corresponding variable names (core set of questions only).

Factor interpretations, scales, and internal reliabilities. The six scales of the survey are described below.

Primary Unit Climate and Leadership (PUCL, 19 items): This scale was previously described by Dankoski et al. (2011) as an indicator of "the practices and policies that promote a sense that the institutional climate and primary unit leadership actively support the faculty" (Measures section, para. 2). The Cronbach's alpha for this scale in the 2009 and 2011 datasets were .97 and .96 respectively.

Career and Life Management (CLM, 11 items): Regarding this scale, "higher scores indicate a more proactive and confident approach to managing one's career and life demands" (Dankoski et al., 2011, Measures section, para. 2). This scale also contains several items related to faculty's sense of agency and autonomy (e.g., "I am internally driven" and "I have input into how I spend my time"). The Cronbach's alpha for this scale in the 2009 and 2011 datasets were both .81.

Professional Engagement (ENG, 8 items): This scale represents the level of professional engagement through activities such as mentoring, collaborating with colleagues, attending faculty development activities, participating in professional organization(s), and providing service to the university, department, or school. The two previously noted productivity items that query participation in institutional service and discipline specific organizations did load on this scale. It should be noted that the original engagement scale ranged from 1 to 4, while all other scales, including productivity, ranged from 1 to 5. Thus, a scale conversion was used to adjust to a single scale. The Cronbach's alpha in the 2009 and 2011 datasets were .70 and .81 respectively. The increase in reliability of this scale may be due the addition of the two former productivity items.

Professional Development (PD, 7 items): The items of this scale query the frequency of participation in various PD activities that cover a range of topics (e.g., promotion and tenure, teaching and learning, leadership, etc.). It was speculated that they may load with engagement items or load independently as a new factor. The latter occurred, and the Cronbach's alpha for this scale was .73. Although this alpha is higher than the minimum guideline of .70, it is lower than the others. This is possibly due to the high level of topic specificity and missing data for many of these items.

Productivity (PRO, 7 items): Similarly, the internal consistency of the productivity scale was lower than the other scales ($\alpha = .72$) but still met the minimum standard. Many of these items also had a high level of topic specificity and thus were not widely applicable to the entire sample; this will be discussed further in the *Limitations* section of Chapter 4. These items reflect how participants report their level of productivity relative to the perceived expectations of their primary academic unit. The Cronbach's alpha for the productivity scale in the 2009 dataset was .78.

Career Satisfaction (SAT, 5 items): Finally, the career satisfaction scale (α = .76) measures faculty satisfaction in the following areas: one's sense of community, one's overall productivity, institutional efforts to promote diversity, the promotion and tenure process, and one's overall satisfaction. Surprisingly, these items were among the most skipped of the survey. Regarding topic specificity, only the promotion and tenure question is not widely applicable to the entire sample (faculty in a nontenure track may have skipped this item). The missing items associated with this scale are also discussed further in the *Limitations* section of Chapter 4. The Cronbach's alpha for this scale in the 2009 dataset was .66.

Faculty Vitality: A Context to Evaluate the Role Variable

Dankoski et al. (2011) proposed a model in which PUCL and CLM constructs are predictors of FV, which they operationally defined as the mean of productivity, engagement, and satisfaction scale scores. Variables were entered into a linear regression as two blocks. The first block included demographics related to personal (e.g., race and gender) and academic (e.g., rank, track, department) characteristics. The second block included PUCL and CLM scale scores. According the model, demographics (block 1) accounted for 19% of the variance of overall FV scores, and PUCL and CLM (block 2) accounted for 40%, bringing total variance accounted for by the full model to 59% (see

Table 2–4). These investigators also ran separate linear regression models for the productivity, engagement, and satisfaction constructs.

As mentioned, the goal of this study is not to refine the FV model but use its context—as originally described—to evaluate the role variable. Thus, although the EFA revealed that the PD items of the 2011 survey loaded as a single factor and could be added to the model, this study did not include them in its analyses. However, some notable differences exist between the present study and Dankoski et al. (2011), such as a larger, multi-institutional sample and some statistical adjustments that are described later in this chapter. Exclusion of the PD construct allowed for more direct comparisons of variables between the two datasets; however, future studies aimed at refining the FV model will include the PD scale.

Research Questions

The general aim of this study was to explore if a new faculty cohort, one based on how faculty spend their time, could discern meaningful differences in how faculty report their perceptions and experiences as they relate to FV and its related constructs. It has been demonstrated that grouping faculty using the department and degree variables has led to inconsistent findings, especially when these variables are inconsistently used as proxies for basic science and clinical faculty. This study evaluated the usefulness of two approaches to the role variable in terms of creating meaningful faculty cohorts. Evaluation included comparing the two role approaches to each other and to the traditional cohort variables of department and degree. Specifically, this study aims to answer the following research questions:

1. Over and above the effects of department and degree, how do four variables that represent the percent of time spent by faculty engaged in teaching, research, patient care, and administrative duties relate to FV and its related constructs?
2. Over and above the effects of department and degree, how does the role variable, with nine levels, compare to percent time spent engaged in teaching, research, patient care, and administrative duties in terms of predicting the variance of FV and its related constructs?
3. If the categorical role variable proves to be as valuable as the percent time variables, department, or degree in terms of predicting the variance of FV and its related constructs, are there more parsimonious groupings of role groups that retain this value and improve our understanding of faculty experiences?

Statistical Analyses

Software and participant protection. Statistical analyses were performed using SPSS® (version 20) and LISREL® (version 8.8) statistical software packages. The anonymity of all faculty participants was protected because the raw data files provided by CSR had been previously de-identified.

Structural equation modeling (SEM). SEM begins with a sound theoretical model and then tests the degree to which a dataset supports that model (Schumacker & Lomax, 2010). Because the Dankoski et al. (2011) model for FV accounted for an impressive 59% of its variance, it provided the theoretical model that guided the path analyses of this study. Although the aim of this research was not to refine their model, its findings can inform future model modifications. Path models are extensions of multiple regression models; however, they may include any number of independent and dependent variables as well as any number of equations (Schumacker & Lomax, 2010). Thus, using path analysis will represent a difference from the original work of Dankoski et al., which consisted of a series of multiple regression analyses, one for each dependent variable (productivity, engagement, and satisfaction, and FV score).

Within the broad family of SEM, I specifically used observed variable path analysis (OVPA), a technique that focuses only on the structural component of a model. This approach contrasts with latent variable path analysis (LVPA) that tests both the measurement and structural components simultaneously and thus can be thought of as a hybrid of factor analysis and path analysis (Kline, 1991). In LVPA, factor analysis addresses the measurement component of the model while OVPA addresses the structural component. In OVPA, the latent constructs, which are usually thought of as unobservable and thus unmeasurable, are represented as scale scores and thus considered measured variables. As such, using conventional representations, they are depicted as rectangles rather than circles or ellipses. However, when interpreting path coefficients it should be noted that OVPA, like multiple regression, unrealistically assumes perfect reliability of all observed variables (Kline, 1991).

Two aspects of this study justified the use of OVPA rather than LVPA. First, the factor structure is still being refined and developed with new items. As previously described, 12 items had to be removed from the EFA in order to achieve a simple structure solution, and two items changed scales from the 2009 to 2011 datasets. In this situation, Kline (1991) recommends OVPA:

> [R]esearchers who are working with new measures or in new content areas probably should not undertake LVPA until enough assessment research has been done so that guidelines about factor structure are available. Instead, such researchers may use OVPA to evaluate their notions about

> direct/indirect effects, provided that theory is sufficiently developed to allow formulation of such hypotheses. (p. 477)

Second, the primary aim of this study was to evaluate the usefulness of the role variable, not refine the vitality model. Path analyses of fully saturated models allowed comparisons of direct, indirect, and total effect path coefficients among these variables of interest. Future studies that focus on the refinement of the vitality model and thus focus on construct level analysis could consider using LVPA. These studies would occur after the factor structure of this survey instrument is more developed and stable.

Model specification. To address the research questions, three initial core models were specified, and the following nomenclature was developed (see Table 3–14). Model numbers designate which role approach is used in the model. Model 1 represents role as the percent time spent in each of the academic activities. Because the four percent time variables must sum to 100 they could not be included in a single model. To address this colinearity issue, four models were specified, each including only one percent time variable. The percentages reported by participants were divided by 10 and thus range from 0 to 10. Model 2 represents role as nine role groups, as defined by the time allocation rubric. Model letters designate which vitality constructs are predicted in the model. The “A” models predict productivity, engagement, and satisfaction scores, whereas the “B” models predict overall FV scores. In order to investigate the effect of adding each approach to the role variable, Model 0 was specified as a basic model and does not include role variables of any kind.

Table 3–14

Model Descriptions and Nomenclature

		Vitality Constructs	
		A	B
Role Approach		PRO, ENG, and SAT	FV
0	Role not included (basic model)	Model 0A	Model 0B
1	Percent time spent in activities[a]	Model 1A[a]	Model 1B[a]
2	Nine role groups	Model 2A	Model 2B

Note. [a]Four models were specified, each with one percent time variable included: teaching, research, patient care, and administrative duties

The conceptual model for this study is shown in Figure 3–2. The demographic variables (gender, race, rank, track, full-or part-time status, primary unit, department, and degree) each have a direct relationship with productivity, engagement, and satisfaction, and FV scores (path B) as well as the PUCL and CLM constructs (path C). The relationship between the predictive and constituent vitality constructs is also represented (path F). One of the advantages of path analysis over multiple regression is that path C allowed for indirect effects of demographics to be calculated. In this model, these effects were mediated through the predictive constructs of PUCL and CLM. Thus, demographics have direct effects on PUCL, CLM, productivity, engagement, and satisfaction, and FV scores as well as indirect and total effects on productivity, engagement, and satisfaction, and FV scores. In this way, path analysis allows PUCL and CLM to function simultaneously as both dependent and independent variables. This is theoretically sound in that perceptions of climate and leadership and the ability to manage both personal and professional demands could be influenced by demographic and role variables while also influencing productivity, engagement, and satisfaction. Similarly, the conceptual model depicts a direct relationship between the role variables and vitality's predictive and constituent constructs (paths D and E respectively). This specification generated direct, indirect, and total effects for the role variables as well. Finally, all demographics and role

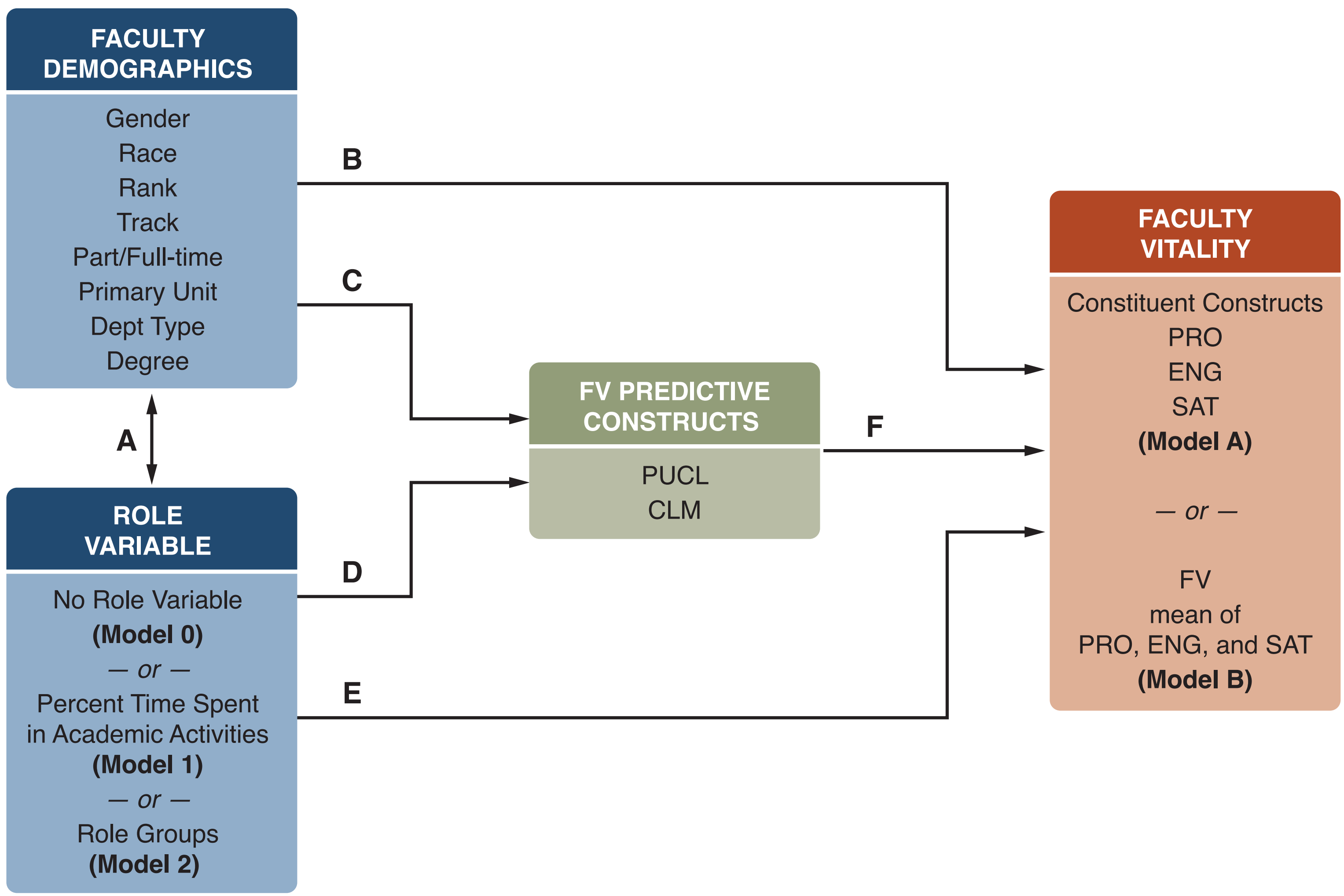


Figure 3–2. Conceptual model of the relationships among faculty demographics, role variables, and vitality's predictive and constituent constructs, based on the vitality model of Dankoski et al. (2011).

variables were allowed to intercorrelate (path A). For example, a correlation was fully expected between degree and percent time engaged in patient care. In fact, this correlation was .67, $p < .001$.

Although these models are based on early theoretical work, it should be emphasized that many other models could have been specified. Further work in this line of inquiry is likely to lead to modifications of these specified models. All models used to generate path coefficients were fully saturated ($df = 0$) and thus had perfect fit ($\chi^2 = 0$). This was achieved by allowing the error variances of all variables to freely covary with each other. Table 3–15 describes the reference groups for each dummy coded demographic variable in the analyses. The choices regarding reference groups were made by group sample size, with reference groups being the largest.

Table 3–15
Dummy coded reference groups for demographic variables

Variable	Reference Group	Comparison Group(s)
Gender	Men	Women
Race	White	Asian, URM[a], NR
Rank	Full professor	Associate and assistant professors, other
Track	Tenured	Nontenured/clinical, other
PT/FT	Full-time	Part-time
Primary academic unit	Department	School, regional center, division, other
Department type	Clinical	Basic science, other
Degree	MD	PhD, MD-PhD

Note. URM = Underrepresented minority; NR = No response or unknown.
[a]Underrepresented minority for sample includes the following: Black, Hispanic, Multiple races, Native American, and Other.

Model estimation and testing. The estimation method of maximum likelihood (ML) was used as it is recommended for slight to moderate non-normal interval and ordinal data (Schumacker & Lomax, 2010). Further, according to Mels (2006), LISREL allows a robust ML estimation that is based on Browne (1987) and Satorra & Bentler

(1988), which provides a corrected chi-square test statistic. Given these adjustments and a moderate-to-large sample size ($N = 1{,}497$) the robustness of ML should have tolerated the deviations from normality found in these data (Schumacker & Lomax, 2010; Ullman & Bentler, 2012). Because the models include a combination of both categorical and continuous variables as well as multiple unit scales, standardized parameter estimates are reported in Chapter 4. Standardized parameter estimates address the problem of multiple measurement units by removing scaling information through adjustments to all variables so that they have the same standard deviation (Lleras, 2005). Further, standardized scores can be directly interpreted as effect sizes to facilitate comparisons within models.

Analyses for Research Questions 1 and 2. The OVPA of Models 1A, 1B, 2A, and 2B generated path coefficients (direct, indirect, and total effects) and significance levels. These were used to determine the relative contributions of department, degree, and role variables to the variances of productivity, satisfaction, engagement, and overall FV scores. The relative contributions of the key variables were then compared to each other and interpreted within the context of each model. The models used for these analyses were justidentified (fully saturated, $df = 0$) and thus had perfect fit ($\chi^2 = 0$). This was achieved by allowing the error variances of all variables to freely covary with each other.

Analyses for Research Question 3. To determine if the addition of the role variable was an improvement to the basic vitality model (Model 0), two approaches were used. First, path analyses of unsaturated models generated a number of model fit indices. These were intended to determine if adding the role variable improved model fit, and if so, which approach to the role variable improved model fit more. In order for these models not to have perfect fit (so that fit indices could be compared), error covariances for the vitality constructs were not allowed to covary ($\psi = 0$). For "A" models, the following variable pairs were restricted: PRO–ENG, PRO–SAT, ENG–SAT, and PUCL–CLM ($df = 4$). For the "B" models, only the PUCL and CLM residuals were restricted ($df = 1$).

Model fit indices compare the variance-covariance matrix of the sample data to that of the implied model (Schumacker & Lomax, 2010). If the matrix of the observed data matches that which is implied by the model, then the model is said to have "good fit." A number of fit indices have been developed and are based on different criteria. However, it should be noted that measures indicating good fit do not necessarily support the validity of a model and that many different models can produce the same fit values. It should also be noted that no single fit index is free of bias. Biases may be dependent upon sample size, complexity (number of parameters), and degrees of freedom in the model.

Hooper, Coughlan, and Mullen (2008) recommend the following indices as they are the least sensitive to sample size, model misspecification, and parameter estimates: chi-square (because it is customary), root mean square error of approximation (RMSEA) with its confidence interval, the standardized root mean square residual (SRMR), comparative fit index (CFI), and the parsimony normed fit index (PNFI). As mentioned, each index has its strengths and weaknesses. The chi-square statistic is less meaningful with large sample sizes (> 200) as its significance, in such cases, generally represents sample variation (Hooper et al., 2008; Schumacker & Lomax, 2010; Ullman & Bentler, 2012). Although the sample size of this study is large, the chi-square is reported because of its historical importance. The RMSEA estimates the lack of fit in a model compared to a perfect or saturated model (Ullman & Bentler, 2012) and is sensitive to the number of estimated parameters in the model (Hooper et al., 2008). The SRMR improves with increasing complexity and sample size because nearly saturated and complex models (such as the models in this study) lead to an estimation process that heavily relies on sample data and paradoxically results in better fit indices (Hooper et al., 2008). The CFI is a revision of the normed-fit index that is less sensitive to sample size and is widely reported (Hooper et al., 2008). Parsimony fit indices, such as the PNFI, "penalize" models for added parameters and complexity. Because they do not have generally agreed upon thresholds, they are reported with other indices and used to compare alternative models with different degrees of freedom (Schumacker & Lomax, 2010). The Akaike information criterion (AIC) adjusts for sample size and complexity and is generally used to compare non-nested models within the same dataset (Hooper et al., 2008). Smaller values suggest better models. The D^2 test was not used because it is limited to nested models, that is, those models in which the only difference lies in restrictions placed on one of the models (Diamantopoulos & Siguaw, 2000).

The second analysis to address this question was hierarchical multiple regression analyses, similar in design to Dankoski et al. (2011). In this case, demographics were entered as block 1, and role variables were entered as block 2. For comparisons to be analogous, time spent in patient care (Model 1) and the Clinician role group (Model 2) served as reference groups. The analyses included examination of the significance and change in the coefficient of determination (ΔR^2) between block 1 (demographics) and block 2 (role) variables. The Hotelling's *t*-test for nonindependent correlations compared the ΔR^2 for each role approach (Model 1 versus Model 2).

Faculty time autonomy. This study assumes that faculty's autonomy is sufficiently high that their choice of how they spend their time is indeed *their* choice and not forced upon them. If their choices are their own, then time spent variables are meaningful reflections of personal faculty attributes. If, however, faculty feel that their choices are made for them, then time spent variables become more reflective of the institution or of its leadership. This assumption required investigation through analysis of the survey item "I have input into how I spent my time." The distribution of this item was not normal (see Figure 3–3). Thus, comparisons of groups were made using the nonparametric Kruskal-Wallis and Mann-Whitney tests. Although this test does not require normal distributions, it does require homogeneity of variances across the groups being compared. This was tested using the nonparametric Levene's test (Nordstokke & Zumbo, 2010; Nordstokke, Zumbo, Cairns, & Saklofske, 2011). For comparisons of time autonomy that rejected the null hypothesis that group variances were homogenous, the median test was used in place of the Kruskal-Wallis test.

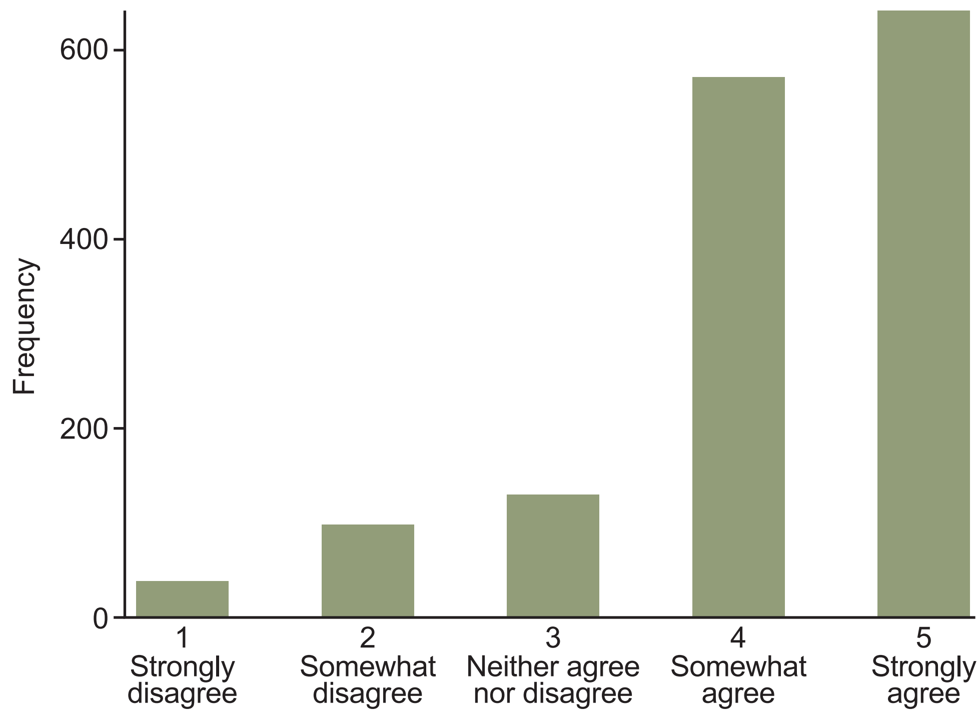


Figure 3–3. Histogram of responses to time autonomy survey item: “I have input into how I spend my time” (N = 1,489).

Methods Summary

This study’s methodology aims to answer the following questions: Over and above the effects of demographics, department, and degree, does it matter how faculty spend their time doing what they do? Does it matter in terms of shaping their experiences in terms of their perceptions of their work climate, leadership, and abilities to manage the demands of their professional and personal lives? Does it matter in terms of how faculty perceive their levels of productivity relative to the expectations of their primary academic unit? Does it matter in terms of their professional engagement and career satisfaction? By expanding the conceptual model of Dankoski et al. (2011) to include the role variable and expanding their statistical analyses to include OVPA, this study aims to answer these questions. The answers to these questions have the potential to shape policy, inform leadership, and improve faculty development programs.

Chapter 4: Results

In this chapter, I review several coefficient interpretation guidelines as well as the distributions of the FV scales. Then, results are organized by research question and include a summary followed by detailed findings. These findings are subsectioned by (a) general demographic variables (e.g., sex, race, rank, track, etc.); (b) variables of primary interest: department, degree, and role approach; and (c) model information regarding how FV predictive and constituent constructs related to each other and squared multiple correlations for the model(s) related to that research question. Because role represents behavioral choices of how one's time is spent, autonomy regarding that choice (i.e., time autonomy) is then explored across faculty cohorts. Some additional data that provided insights about the vitality model in which this research occurred is then briefly reviewed. Lastly, I describe several limitations of this study.

Coefficient Interpretation Guidelines

Prior to examining the results of this study, the following brief review of coefficient interpretation guidelines provides both context and perspective. As mentioned, unstandardized parameter estimates retain the unit scaling information of their respective variables and thus can pose interpretative challenges, especially when models contain a mixture of continuous and categorical variables. Standardized parameter estimates address this problem by removing this scaling information through adjustments to all variables so that they have the same standard deviation (Lleras, 2005). However, Grace and Bollen (2005) warn that readers should interpret all coefficients as having the "same units" only if they are also "willing to say that a standard deviation for one variable in one metric is *interpretationally equivalent* to a standard deviation of another variable that was measured in a different metric" (emphasis in original, p. 286). This warning should be kept in mind throughout this chapter as all coefficients have been standardized. Also, unless otherwise noted, coefficients represent the total effects of a variable. Direct and indirect effects, however, are important advantages of the path analyses of this research because they provide insights regarding the mediating effects of the two predictive constructs of vitality: (a) how faculty perceive the climate of their primary unit and the leadership within it (PUCL) and (b) the degree of agency and autonomy held by faculty as well as their ability to manage the demands of their personal and professional lives (CLM). Finally, according to Cohen (1988), coefficients in the order of 0.10 are considered "small," those around 0.30 are "medium," and those greater than 0.50 are "large."

In addition to keeping in mind that all path coefficients are standardized, it is also important to remember that path coefficients describe relationships between the variables or groups being compared. Thus, for example, the reader should not assume that because Clinicians reported significantly lower satisfaction levels than Researchers that Clinicians are dissatisfied. Group means for Clinicians and Researchers were 3.56 and 3.65 respectively, and both are higher than a neutral satisfaction score of 3.0.

Faculty Vitality Scale Distributions

Table 4–1 shows the mean raw vitality scores for all participants and the Likert scale of the original survey items to allow interpretation of nonstandardized scores. With the exception of the PUCL distribution, all scales are nearly symmetric (|skewness| < 0.5), with nearly equivalent mean and median scores. With the exception of engagement, all distributions have a negative skew, with productivity and FV scores being near zero skew.

Table 4–1
Mean raw vitality scores for all participants (N = 1,497)

Scale	Likert scale	*Range*	*M*	*Mdn*	*SD*	*Skewness*[a]
PUCL	1–5	1.00–5.00	3.65	3.79	0.96	−0.61
CLM	1–5	2.18–5.00	4.00	4.00	0.57	−0.33
PRO	1–5	1.00–5.00	3.21	3.17	0.71	−0.04
ENG	1–4	1.00–4.00	2.58	2.56	0.63	0.13
SAT	1–5	1.00–5.00	3.62	3.67	0.77	−0.45
FV	1–5	1.60–4.67	3.14	3.14	0.52	−0.06

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score
[a]*SE* = 0.063.

For all scales, higher scores indicate more positive vitality measures. Thus, the entire sample scored higher than the neutral point on all scales. Although distribution of the PUCL scale had the highest skewness, it is only moderately asymmetric. It also has the largest standard deviation, indicating more variation in this scale than the others. Note that its median is higher than its mean; in other words, more faculty feel supported by their primary unit and leadership than is suggested by the mean. Also note that the engagement scale on the original instrument was a 4-point Likert scale, so scale conversions were used as needed. The median score on the engagement scale is closest to its midpoint (2.5) and indicates that roughly half of participating faculty feel professionally engaged while half do not. Appendix D contains histograms and normal Q-Q plots for all vitality scales.

Research Question 1

Over and above the effects of department and degree, how do four variables that represent the percent of time spent by faculty engaged in teaching, research, patient care, and administrative duties relate to FV and its related constructs?

Summary of the findings. Path analysis of Model 1 (A and B) addressed this research question (Table 4–2). Findings related to the general demographic variables provided context and benchmarks to evaluate the role variables. For example, academic rank produced some of the highest coefficients of all models; however, even these coefficients would generally be thought of as "medium" effects. In contrast to the role variables, some of the demographic variables (race, rank, track, primary academic unit, and degree) had effects on the predictive FV constructs, primarily the CLM construct.

Department and degree variables created cohorts that were significantly different in terms of the vitality constructs. In Model 1, department discerned differences in three of the six constructs, whereas degree discerned differences in five. A number of findings from the present study highlighted how conclusions about basic science and clinical faculty would differ if these cohorts were conceptualized using department versus degree proxies. For example, had departmental affiliation alone been used as a proxy, this model would have demonstrated that basic science and clinical faculty do not report different levels of satisfaction. However, had degree been used alone, the model would have demonstrated that CF report higher levels of satisfaction. A similar set of findings emerged for productivity. Had departmental affiliation alone been used as a proxy, this model would have demonstrated that BSF rated themselves less productive than CF.

However, had degree been used alone, the model would have demonstrated that the opposite was true.

Of the 24 relationships between the four percent time variables and the six vitality measures, seven were significant. Increased percent time spent engaged in research was associated with higher overall FV scores. Increased percent time spent engaged in patient care was associated with higher levels of productivity but lower levels of satisfaction and FV scores. In contrast, increased percent time spent engaged in administrative duties was associated with lower levels of productivity but higher levels of satisfaction and FV scores. None of the percent time variables were significantly associated with the predictive vitality constructs. Thus, this study did not support the relationship depicted as path D in the conceptual model shown in Figure 3–2.

Detailed findings. Path analyses of Models 1A and 1B produced the standardized direct, indirect, and total effect coefficients shown in Table 4–2. As mentioned, all models used to generate path coefficients were fully saturated (*df* = 0) and thus had perfect fit ($\chi^2 = 0$). Significance levels as well as squared multiple correlations are also included. To facilitate reading the tables, all nonsignificant coefficients have been removed, and effect sizes have been color-coded as described in Figure 4–1. The full table is presented in Appendix E as Table E–1.

← Negative Relationships					Positive Relationships →			
< −.200	−.151– −.199	−.101– −.150	−.051– −.100	−.050– .050	.051– .100	.101– .150	.151– .199	> .200

Figure 4–1. Color codes to interpret standardized path coefficients (i.e., effect sizes) in path analysis tables.

Table 4–2

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Female[a]						
Direct			.			
Indirect			0.016*			
Total			.			
Asian[a]						
Direct		0.100***	.	.		.
Indirect			0.026***	0.033***		0.042**
Total			.	.		.
URM[a]						
Direct		0.090***	.	.	.	.
Indirect			0.020**	0.029***	0.046*	0.043**
Total			0.054*	.	.	0.048*
NR[a]						
Direct	−0.103***				.	.
Indirect					−0.066***	−0.036**
Total					−0.100***	−0.054*
Associate Professor[a]						
Direct		−0.106***	−0.110***	−0.140***	−0.108***	−0.163***
Indirect			−0.024**	−0.035**	−0.053*	−0.051**
Total			−0.134***	−0.174***	−0.162***	−0.213***

Table 4–2 continues

Table 4–2 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Assistant Professor[a]						
Direct			−0.203***	−0.286***	−0.167***	−0.304***
Indirect			.	.	.	.
Total			−0.195***	−0.277***	−0.157***	−0.292***
Other Rank[a]						
Direct			−0.081**	−0.108***	−0.042*	−0.101***
Indirect			.	.	.	.
Total			−0.086**	−0.110***	.	−0.096***
Nontenure[a]						
Direct		−0.068*	−0.111***	−0.075**		−0.098***
Indirect			−0.017*	−0.022*		.
Total			−0.128***	−0.098**		−0.128***
Other Tenure[a]						
Direct			.			−0.068**
Indirect			.			.
Total			−0.063*			−0.082**
Part−time[a]						
Direct				−0.084***		−0.046*
Indirect				.		.
Total				−0.082**		.

Table 4–2 continues

Table 4–2 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
PU–School[a]						
Direct	−0.080**			0.048*	.	
Indirect				.	−0.043*	
Total				0.052*	.	
PU–Regional Center[a]						
Direct				−0.064**		−0.047*
Indirect				.		.
Total				−0.060*		.
PU–Division[a]						
Direct		−0.110***	.	.	.	.
Indirect			−0.026***	−0.036***	−0.050**	−0.050***
Total			.	−0.058*	−0.059*	−0.065**
PU–Other[a]						
Direct						
Indirect						
Total						
Basic science dept[a]						
Direct			−0.103***	−0.073**		−0.084***
Indirect			.	.		.
Total			−0.117***	−0.088**		−0.101***

Table 4–2 continues

Table 4–2 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Other dept[a]						
Direct						
Indirect						
Total						
PhD[a]						
Direct		−0.082*	0.106**	.	−0.069**	−0.066*
Indirect			.	−0.027*	−0.058*	−0.046*
Total			0.091*	.	−0.127***	−0.112**
MD−PhD[a]						
Direct			0.060*			
Indirect			.			
Total			0.056*			
% Time Teaching[b]						
Direct						
Indirect						
Total						
% Time Research[b]						
Direct						.
Indirect						0.040*
Total						0.097**

Table 4–2 continues

Table 4–2 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
% Time Patient Care[b]						
Direct			0.137***		−0.088***	−0.176***
Indirect			.		.	.
Total			0.125**		−0.113**	−0.201***
% Time Administration[b]						
Direct			−0.070**		0.085***	0.092***
Indirect			.		.	.
Total			−0.078**		0.074**	0.080**
PUCL			−0.123***	.	0.572***	0.240***
CLM			0.287***	0.325***	0.240***	0.367***
Squared multiple correlations	0.031	0.055	0.142	0.212	0.547	0.437

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score; URM = Underrepresented minority (includes the following: Black, Hispanic, Multiple races, Native American, and Other); NR = No response or unknown; PU = Primary academic unit.

[a]Values from model that included % time spent in patient care (values from other models were similar). [b]Although the table includes all percent time variables, separate models were run—each with only one percent time variable included—to avoid multicollinearity concerns associated with the requirement that the four variables sum to 100.

**p* < .05. ***p* < .01. ****p* < .001.

***General variables*.** The results of the demographic variables are reported in this study for a number of reasons: (a) they are widely used in the literature of medical faculty, and their inclusion allowed extension of the theoretical model of Dankoski et al. (2011); (b) they are useful in tracking the changes (or lack thereof) in the experiences of these faculty cohorts; (c) they enable models to control for these variables when interpreting results relating to the variables of primary interest; (d) they provide a context in which to evaluate the department, degree, and role variables in terms of effect sizes; and (e) these demographics also apply to role groups (e.g., this study suggests Clinicians have lower overall vitality than Researchers and that assistant professors have lower overall vitality than full professors; thus, Clinician assistant professors may be in particular need of institutional support). However, interpretation of general variables is not the primary focus of this study; thus, review of these variables focuses on providing context and benchmarks for the variables of primary interest: department, degree, and role.

The data revealed no differences in how male and female faculty perceived support from their primary unit and leadership. Nor were differences found relative to the degree to which male and female faculty manage the demands of their personal and professional lives. Similarly, no differences in engagement, satisfaction, or overall FV scores emerged in these data. Being female, however, was associated with a slightly positive indirect effect on productivity (0.02), which was not significant as a total effect.

Asian and underrepresented faculty had higher CLM scores than White faculty (0.10). Asian faculty also reported higher levels of productivity, engagement, and had higher overall FV scores than White faculty, with all of these effects being indirect only.

Underrepresented faculty had higher CLM score (0.09) and reported higher levels of productivity, engagement, satisfaction, and had higher FV scores than White faculty as indirect effects. Productivity and vitality score effects were also significant as total effects (both 0.05). Whereas the effects for being female, Asian, or a member of an underrepresented minority were generally nonsignificant or slightly positive, the effects for faculty who chose not to report their race/ethnicity were negative and slightly larger, though still considered small. This faculty cohort had lower PUCL (−0.10), satisfaction (−0.10), and overall FV scores (−0.05) than White faculty, with significant indirect and total effects on satisfaction and FV scores.

Regarding rank, associate professors, when compared to full professors, had lower CLM scores (−0.11) but no difference in PUCL scores. The direct, indirect, and total effects of being an associate professor were negative in terms of productivity (−0.13), engagement (−0.17), satisfaction (−0.16), and overall FV scores (−0.21). Although assistant professors, when compared to full professors, reported no differences relative to PUCL and CLM scores, the effects on productivity (−0.20), engagement (−0.28), satisfaction (−0.16), and FV scores (−0.29) were also all negative, and generally more negative than associate professors (direct and total effects only). Satisfaction was the only measure in which the coefficient for associate professors was more negative than assistant professors, but this difference was slight. Similarly, faculty with "other" ranks had lower productivity, engagement, satisfaction (direct only), and FV scores. Academic rank produced some of the highest coefficients of both Models 1 and 2 and can be thought of as a benchmark to compare the effects of department, degree, and role. It is noteworthy that although these effects were the strongest among all the models they are generally thought of as only “medium” effects (Cohen, 1988). These results related to rank followed the same pattern as the 2009 dataset.

The effects for being nontenure track faculty compared to tenure track faculty tended to parallel academic rank, though were smaller in size. Although there was no difference in PUCL scores nontenure track faculty had lower CLM scores (−0.07). They reported being less productive (−0.13) and engaged (−0.10), with these effects being direct, indirect, and total. There was no difference in satisfaction level; however, the FV score showed direct and total negative effects for holding a nontenure track appointment (−0.13). Faculty belonging to “other” tracks reported lower productivity and FV scores. As mentioned, AMCs are developing less traditional approaches to track, including some nontraditional approaches to flexible hours and part-time careers. In the present study, when controlling for all other variables, part-time status was not significantly related to PUCL, CLM, productivity, satisfaction, or overall FV scores. However, part-time faculty did report lower levels of engagement than their full-time colleagues (−0.08).

Regarding primary academic units, all comparisons were with faculty who reported their department as their primary unit. In terms of the PUCL construct, the only significant difference occurred at the school level, and this effect was negative (−0.08). For the CLM construct, the only difference was at the division level, and this effect was also negative (−0.11). Regarding productivity, having a division-level academic unit related to lower scores, as an indirect effect only. Faculty whose primary unit was at the school level reported slightly higher levels of engagement (−0.05), whereas those at regional center and division levels were associated with lower levels of engagement (each −0.06), with division-level effects attributable to indirect effects. For the satisfaction construct, school and division levels had negative effects, with school effects being indirect and not significant as a total effect, and division effects (−0.06) being primarily due to indirect effects. For overall FV scores, regional center and division levels had negative effects, again with division effects (−0.07) primarily being indirect. The direct negative effect of the regional level was not significant as a total effect. Having a primary unit in the "other" category was not associated with any differences from the department level.

Comparing the number of significant relationships between demographic variables and vitality constructs reveals that demographics are more likely to influence constituent rather than predictive constructs. In other words, path C of the conceptual model (Figure 3–2) is less robust than path B. Nonetheless, race, rank, track, primary academic unit, and degree all showed significant effects on predictive FV constructs; these effects were primarily on the CLM construct.

Department, degree, and role. In this model, degree discerned more differences in faculty experience than department, and this was true in most—but not all—of the other models. In Model 1, degree was able to do so in five of the six constructs, whereas department was limited to three.

Assignment to a BSD had no significant relationship with PUCL or CLM scores. However, net the effects of other measures in the model, faculty from BSDs rated themselves as less productive and engaged and had lower FV scores than their CD colleagues. These effect sizes were generally similar and ranged from −0.09 to −0.12. No difference was found in levels of satisfaction. Faculty with PhDs (only) had lower CLM (−0.08) and FV scores (−0.11) and reported being slightly less engaged (an indirect effect only), less satisfied (−0.13), but more productive (−0.09) than faculty with MDs. Thus, lower levels of engagement associated with having a PhD, though slight, were primarily related to individual (CLM) factors rather than direct effects of having a PhD degree and were not significant as a total effect. The lower levels of satisfaction and lower vitality score also included significant indirect effects attributable to individual factors. The only difference between MD-PhDs and MDs is that MD-PhDs reported being more productive (−0.06).

Two comparisons between the department and degree variables standout as exceptions to the assumptions that PhDs and BSDs have similar effects and MDs and CDs have similar effects. The first is that although department had no significant effect on satisfaction, PhDs were less satisfied than MDs. The second is that faculty from BSDs perceived themselves to be less productive than their CD colleagues, whereas PhD faculty reported that they were more productive than MD faculty. Although the findings for productivity between department and degree were in opposing directions, those for levels of engagement and FV score were in the same direction. Faculty from BSDs reported less engagement than faculty from CDs, and faculty with PhDs reported less engagement than faculty with MDs (indirect effect only). Similarly, faculty from BSDs scored lower on the FV scale than their CD colleagues, and faculty with PhDs had lower scores than MD faculty. Finally, for PhD faculty, productivity did not always correlate with engagement scores, as they reported being more productive yet less engaged than their MD colleagues. This demonstrates that measuring productivity alone would have provided an incomplete picture of PhD faculty. The relationship between productivity and engagement is addressed further later in this chapter.

Of the 24 relationships between the four percent time variables and the six vitality measures, seven were significant. The percent of time faculty spent engaged in teaching was not related to any of the vitality measures. The percent of time faculty spent engaged in research was only related to having higher overall FV scores, and this effect was primarily due to indirect effects. Specifically, controlling for other variables in the model, every 10% increase in time devoted to research—at the expense of time devoted to the other three academic activities—was associated with a 0.10 standard deviation increase in overall FV score. Spending more time engaged in patient care was related to higher levels of productivity (0.13) but lower levels of satisfaction (−0.11) and lower FV scores (−0.20). The effects related to percent time allocated to patient care were the highest among the percent time variables. Spending more time engaged in administrative duties was associated with lower levels of productivity (−0.08) but higher levels of satisfaction (0.07) and higher overall FV scores (0.08), the opposite pattern of patient care time.

Model-related findings. Table 4–3 shows the relationships between FV predictive and constituent constructs from the 2009 and 2011 data sets. The table shows the coefficients and squared multiple correlations only from Model 1; however, these were stable across the other models. The positive relationship between PUCL and SAT scores (0.57) was stronger than that which was reported by Dankoski et al. (2011) and based on the 2009 dataset (0.40). However, in both data sets, the strongest effect of the PUCL construct was on satisfaction. The positive relationship between PUCL and FV scores also became stronger. Another change for the PUCL construct is that it no longer had a significant relationship with engagement levels. Finally, the unexpected negative relationship between PUCL score and productivity level found in the 2009 dataset remained in the 2011 dataset, though smaller in effect size. This suggests that, over and above the effects of all other variables in the model, the more faculty feel supported by their work climate and leadership, the less productive they rated themselves. As with the analysis of the 2009 data, there was a slightly positive zero-order correlation between PUCL score and productivity level, suggesting a complex relationship exists between these constructs. In contrast to institutional factors (PUCL), individual factors (CLM) had a positive and consistent effect on all constituent constructs; all effect sizes decreased somewhat from 2009.

Table 4–3

Relationships between FV predictive and constituent constructs from the 2009[a] and 2011 data sets (Model 1[b])

Predictive construct	Coefficients 2009[a]	Coefficients 2011	Constituent construct	R^2 (Full model)[c] 2009[a]	R^2 (Full model)[c] 2011
PUCL	−0.22***	−0.12***	PRO	.45	.14
CLM	0.44***	0.29***			
PUCL	0.17***	0.00	ENG	.28	.21
CLM	0.51***	0.33***			
PUCL	0.40***	0.57***	SAT	.56	.55
CLM	0.39***	0.24***			
PUCL	0.15***	0.24***	FV	.59	.44
CLM	0.57***	0.37***			

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score. [a]2009 dataset was described by Dankoski et al. (2011). [b]Data are from the Model 1 that included percent time spent engaged in patient care. [c]The full model for the 2009 dataset was analyzed as a hierarchical multiple regression with demographics as block 1 and PUCL and CLM constructs as block 2 (full model); the 2011 dataset was analyzed using path analysis in which demographics and percent time spent in academic activities were independent variables, and PUCL and CLM acted as both independent and dependent variables simultaneously.
***$p < .001$.

Demographic variables and percent time spent engaged in patient care accounted for only 3% of the variance in PUCL scores and 6% of the variance in CLM scores

(Table 4–2). Demographics, percent time spent engaged in patient care, PUCL scores, and CLM scores accounted for 14% of the variance of productivity, 21% of professional engagement, 55% of satisfaction, and 44% of overall FV score. These variances differed by only one-tenth of one percentage point in the models that included the other percent time variables. The amount of variance of the vitality constructs accounted for by this model compared to 2009 is similar for levels of engagement and satisfaction. However, captured variance of the productivity construct dropped from 45% to 14%. This decrease also contributed to the drop from 59% to 44% of the variance accounted for in the FV score (because it is calculated as the grand mean of productivity, engagement, and satisfaction scores).

A number of changes to the productivity items occurred in the 2011 survey that may have contributed to this drop in the model's squared multiple correlation. Although the two surveys covered the same productivity topic areas, the question stem and response sets were modified for the 2011 survey to try to increase the variance of these items. In the 2009 survey, participants were asked "Given the expectations in your primary unit, how do you rate yourself in comparison with your colleagues?" The anchors for the item ranged from 1 (*Well below average*) to 5 (*Well above average*), with a neutral reference point of 3 (A*verage*). The very high mean and low variance of this scale were attributed to what has been dubbed the "Lake Wobegon Effect," which describes the potential measurement-error bias related to the tendency of self-reported data to overestimate achievement (Maxwell & Lopus, 1994). In the 2011 survey, the comparative component of the question was removed so that the stem read, "Given the expectations in your primary unit, how do you currently rate yourself?" The anchors for the revised items ranged from 1 (*Well below [expectations]*) to 5 (*Well above [expectations]*), with a neutral reference point of 3 (*At expectations*). Shifting the reference point from *average* to *at expectations* was designed to address the tendency to see one's achievements as "above average."

Another difference in the two productivity scales involves the "Not applicable" response: The 2009 survey included it, but the 2011 survey did not. This is important because not all items were applicable to all faculty. Of the seven items included in the scale, one was related to patient care; four were related to research; and two were related to teaching. Within the clinician roles (i.e., faculty who spend at least 20% of their time seeing patients), 6% have a PhD only (see Table 3–10). However, close to 60% of the PhD faculty answered the clinical productivity (RVU) question. Although some nonclinician roles also spend some time seeing patients, it is clear that a large number of faculty who do not see patients answered this item. Of PhD faculty who responded to the clinical productivity item, 65% answered "At expectations;" 14% responded with "Well below;" and 10% answered "Well above" expectations. This introduced some level of error into the productivity scale, which could affect comparisons of productivity that include nonclinician faculty; however, it is unknown exactly how or by how much. Similar errors may be associated with the research and teaching productivity items, depending on if and how faculty not involved with these activities answered these items. The next iteration of the survey will address this issue and should clarify the data related to reported levels of productivity.

Some or all of these changes in productivity items may explain the drop in the amount of variance explained by these vitality models. Differences between the two data sets that could have affected all scales include the following: (a) 2009 data were analyzed using a series of multiple regressions models whereas 2011 data were analyzed using path analysis and (b) 2009 data included faculty only from IUSM campuses whereas 2011 data included faculty from four different medical schools.

Research Question 2

Over and above the effects of department and degree, how does the role variable, with nine levels, compare to percent time spent engaged in teaching, research, patient care, and administrative duties in terms of predicting the variance of FV and its related constructs?

Summary of the findings. Path analysis of Model 2 (A and B) addressed this research question (Table 4–5). The mean raw vitality scores for all faculty and all role groups were above the neutral reference point of the original survey items. The only exception to this was the Clinician-Teacher group, which had a mean engagement score slightly lower than the midpoint of that scale. Like the percent time role variables, none of the role groups significantly influenced the predictive FV constructs. Thus, this study did not support a relationship between role groups and PUCL or CLM constructs (path D in the conceptual model shown in Figure 3–2).

The conceptual model relationships between role groups and FV constituent constructs (path E), however, were supported. Notably, unlike some demographic and most of the percent time variables, none of the effects of role groups included a significant indirect effect. Clinicians rated themselves more productive relative to perceived expectations than all other role groups (except Clinician-Teachers) and more engaged than four groups (no difference with the remaining four). They also had lower

FV scores than six groups (no difference with the remaining two) and were less satisfied than four groups (no difference with the remaining four). The importance of the number of activities that faculty engage in began to emerge in this model, especially for the clinician role groups. Clinicians who engaged in an additional academic activity (except Clinician-Teachers) reported lower productivity but scored higher on the overall FV scale, and some also reported being less engaged but more satisfied. The importance of activity number, versus activity type, is further explored in the additional models associated with Research Question 3.

The increased level of satisfaction associated with higher percent time spent engaged in administrative duties was also demonstrated among role group variables with an administrative focus. Also, indirect effects of the PUCL and CLM constructs were more important for Researchers and PhD faculty than other role groups and MD faculty. Further, more significant differences emerged between clinician groups and nonclinician groups than between nonclinician groups. This supported an exploration of a clinician versus nonclinician model (Model 2.1). Finally, effect sizes were largest in comparisons that involved Clinicians.

Detailed findings. Prior to reviewing the standardized coefficients of the path analyses of Models 2A and 2B, the mean raw vitality scores for each role group are shown in Table 4–4. For the entire sample, mean faculty scale scores were greater than the neutral point on all scales, and this was generally also true for the role groups. The exception was the Clinician-Teacher group's mean score for engagement level (2.46), which was slightly lower than the neutral point for the scale (2.50). The standardized direct, indirect, and total effect coefficients for all faculty demographics and role variables included in these models are shown in Table 4–5. Significance levels and squared multiple correlations are also included. As with the first model, to facilitate reading the table, all nonsignificant coefficients have been removed, and effect sizes have been color-coded as described in Figure 4–1. The full table can be found in Appendix E in Table E–2. Again, these models were fully saturated (*df* = 0) and thus had perfect fit ($\chi^2 = 0$).

Table 4–4
Mean raw vitality scores for each role group (N = 1,497)

Role	Scale	Min	Max	*M*	*SD*
Teachers (*n* = 28)	PUCL	1.67	5.00	3.65	0.82
	CLM	3.00	4.91	4.05	0.49
	PRO	2.25	4.33	3.08	0.56
	ENG	1.71	3.78	2.54	0.63
	SAT	2.00	5.00	3.59	0.83
	FV	2.18	4.19	3.07	0.56
Researchers (*n* = 354)	PUCL	1.11	5.00	3.65	0.98
	CLM	2.45	5.00	4.08	0.53
	PRO	1.00	5.00	3.37	0.71
	ENG	1.13	4.00	2.55	0.60
	SAT	1.40	5.00	3.60	0.75
	FV	1.64	4.67	3.18	0.53
Jugglers (*n* = 123)	PUCL	1.11	5.00	3.48	1.01
	CLM	2.70	5.00	4.01	0.54
	PRO	1.00	5.00	3.33	0.73
	ENG	1.59	4.00	2.77	0.55
	SAT	1.20	5.00	3.54	0.79
	FV	2.00	4.52	3.21	0.51

Table 4–4 continues

Table 4–4 (continued)

Mean raw vitality scores for each role group (N = 1,497)

Role	Scale	Min	Max	*M*	*SD*
Administrators (*n* = 47)	PUCL	1.53	5.00	3.97	0.81
	CLM	2.36	5.00	4.17	0.62
	PRO	1.29	4.43	3.07	0.67
	ENG	1.69	4.00	2.87	0.67
	SAT	2.33	5.00	3.83	0.74
	FV	2.26	4.28	3.26	0.50
Clinicians (*n* = 445)	PUCL	1.00	5.00	3.56	0.96
	CLM	2.18	5.00	3.87	0.59
	PRO	1.00	5.00	2.99	0.68
	ENG	1.00	4.00	2.32	0.61
	SAT	1.20	5.00	3.56	0.80
	FV	1.60	4.52	2.95	0.49
Clinician-Teachers (*n* = 71)	PUCL	1.06	5.00	3.59	1.16
	CLM	2.55	5.00	3.91	0.61
	PRO	1.86	4.29	3.05	0.57
	ENG	1.00	3.91	2.46	0.65
	SAT	1.40	5.00	3.61	0.89
	FV	1.84	4.06	3.04	0.51
Clinician-Researchers (*n* = 66)	PUCL	1.42	5.00	3.58	0.90
	CLM	2.64	4.91	4.04	0.53
	PRO	2.00	4.86	3.58	0.66
	ENG	1.61	4.00	2.68	0.53
	SAT	1.00	4.80	3.47	0.80
	FV	1.65	4.19	3.25	0.52
Clinician-Administrators (*n* = 79)	PUCL	1.58	5.00	3.98	0.84
	CLM	2.45	5.00	4.11	0.56
	PRO	1.00	4.29	3.07	0.73
	ENG	1.67	4.00	2.93	0.62
	SAT	2.00	5.00	3.87	0.65
	FV	2.16	4.43	3.29	0.49
Clinician-Jugglers (*n* = 284)	PUCL	1.28	5.00	3.77	0.90
	CLM	2.40	5.00	4.03	0.56
	PRO	1.43	5.00	3.35	0.70
	ENG	1.22	4.00	2.80	0.58
	SAT	1.80	5.00	3.74	0.70
	FV	1.98	4.37	3.30	0.45

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.

Table 4–5

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Female						
Direct			.			
Indirect			0.016*			
Total			.			
Asian						
Direct		0.099***	.	−0.050*		.
Indirect			0.026***	0.032***		0.041**
Total			.	.		.
URM						
Direct		0.089***	.	.	.	.
Indirect			0.020**	0.029***	0.047*	0.043**
Total			.	.	.	0.052*
NR						
Direct	−0.103***				.	.
Indirect					−0.066***	−0.036**
Total					−0.099***	−0.053*
Associate Professor						
Direct		−0.111***	−0.109***	−0.150***	−0.097***	−0.157***
Indirect			−0.025**	−0.036***	−0.057*	−0.053**
Total			−0.135***	−0.186***	−0.153***	−0.210***

Table 4–5 continues

Table 4–5 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Assistant Professor						
Direct			−0.212***	−0.316***	−0.147***	−0.291***
Indirect			.	.	.	.
Total			−0.207***	−0.310***	−0.141***	−0.283***
Other Rank						
Direct			−0.081**	−0.115***		−0.099***
Indirect			.	.		.
Total			−0.087**	−0.117***		−0.095***
Nontenure						
Direct		−0.069*	−0.124***	−0.086**		−0.102***
Indirect			−0.018*	−0.022*		.
Total			−0.142***	−0.108***		−0.131***
Other Tenure						
Direct			−0.056*			−0.058**
Indirect			.			.
Total			−0.067*			−0.074**
Part−time						
Direct				−0.091***		
Indirect				.		
Total				−0.089***		

Table 4–5 continues

Table 4–5 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
PU−School						
Direct	−0.077**			0.056*	.	
Indirect				.	−0.041*	
Total				0.060*	.	
PU−Regional Center						
Direct				−0.060*		−0.042*
Indirect				.		.
Total				−0.055*		.
PU−Division						
Direct		−0.111***	.	.	.	.
Indirect			−0.026***	−0.036***	−0.052**	−0.052***
Total			.	−0.065*	−0.053*	−0.062*
PU−Other						
Direct						
Indirect						
Total						
Basic science dept						
Direct			−0.097***	−0.070*		−0.060**
Indirect			.	.		.
Total			−0.111***	−0.086**		−0.077**

Table 4–5 continues

Table 4–5 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Other dept						
Direct						
Indirect						
Total						
PhD						
Direct		−0.087*	0.121**	.	.	.
Indirect			.	−0.029*	−0.066*	−0.051*
Total			0.105*	.	.	.
MD−PhD						
Direct			0.063*			
Indirect			.			
Total			0.059*			
Teachers[a]						
Direct			−0.058*			
Indirect			.			
Total			.			
Researchers[a]						
Direct			−0.172***		.	0.108**
Indirect			.		.	.
Total			−0.163***		0.094*	0.140***

Table 4–5 continues

Table 4–5 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Jugglers[a]						
Direct			−0.165***	−0.101**		.
Indirect			.	.		.
Total			−0.158***	−0.091**		0.067*
Administrators[a]						
Direct			−0.057*	−0.056*	0.073***	0.070***
Indirect			.	.	.	.
Total			−0.059*	−0.058*	0.071*	0.068**
Clinician-Teachers[a]						
Direct						
Indirect						
Total						
Clinician-Researchers[a]						
Direct			−0.063*			0.087***
Indirect			.			.
Total			−0.062*			0.099***
Clinician-Administrators[a]						
Direct			−0.057*	−0.077**	0.077***	0.087***
Indirect			.	.	.	.
Total			−0.058*	−0.076**	0.084**	0.091***

Table 4–5 continues

Table 4–5 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Clinician-Jugglers[a]						
Direct			−0.104***	−0.086**	0.080***	0.181***
Indirect			.	.	.	.
Total			−0.105***	−0.084**	0.092**	0.188***
PUCL			−0.121***	.	0.571***	0.236***
CLM			0.286***	0.324***	0.244***	0.372***
Squared multiple correlations	0.032	0.055	0.152	0.224	0.556	0.451

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score; URM = Underrepresented minority (includes the following: Black, Hispanic, Multiple races, Native American, and Other); NR = No response or unknown; PU = Primary academic unit.

[a]Clinicians ($n = 445$) served as the reference group for these comparisons.

*$p < .05$, **$p < .01$, ***$p < .001$.

General variables. The coefficient patterns of the general demographic variables for Model 2 were very similar to that of Model 1 and are not reviewed.

Department, degree, and role. The pattern of findings for the department and degree variables in Model 2 was similar to that described for Model 1, with some exceptions. The negative effects of being housed in a BSD on productivity (−0.11), engagement (−0.09), and FV score (−0.08) were similar to those in Model 1. Faculty with PhDs scored lower on the CLM scale (−0.09) and higher on the productivity scale (0.11); this too was similar to Model 1. However, the negative effects of having a PhD on satisfaction and FV scores, which included indirect, direct, and total effects in Model 1, were indirect only in Model 2. The negative effect of having a PhD on engagement scores was indirect only and nonsignificant as a total effect in both Models 1 and 2.

With respect to role groups and vitality's predictive constructs of PUCL and CLM, no differences were found among any of the role groups. Thus, regarding the conceptual model (Figure 3–2), these data did not support the relationship indicated by path D for role groups. The relationships between role groups and constituent vitality constructs (path E), however, were supported and provide insights regarding how role groups experience these constructs. Although these effect sizes were less than those of rank, most were similar to those of department and degree, and some were larger. Further, none of the effects of any of the role groups included a significant indirect effect. The Clinician role group (n = 445) was the largest and served as the initial reference group for comparison in this model. These comparisons are shown in Table 4–5; data for Researchers and Jugglers serving as reference groups are shown in Tables E–3 and E–4 respectively.

Clinicians reported higher levels of productivity than all other groups, with the exception of Clinician-Teachers. The greatest effect sizes on productivity were found with Researchers (−0.16) and Jugglers (−0.16), both nonclinician role groups. Productivity was the only scale on which Teachers showed a significant difference, a direct effect only. The general lack of significant differences with the Teacher role group may be due, in part, to its low sample size ($n = 28$). The low number of Teachers may have contributed to that group having the highest standard errors among all groups and thus highest proverbial "significance bar." It is also noteworthy that single-activity Clinicians reported higher productivity than most of their multiple-activity clinician (MAC) colleagues, including Clinician-Researchers, Clinician-Administrators, and Clinician-Jugglers. The highest effect size occurred with Clinician-Jugglers (−0.11), the clinician role group with the most number of activities. Not surprisingly, engagement scores followed a similar—though not identical—pattern.

Although Clinicians reported higher levels of productivity than seven out of the eight remaining groups, they reported higher levels of engagement than four of the remaining groups (Jugglers, Administrators, Clinician-Administrators, and Clinician-Jugglers), with total coefficients ranging from −0.06 to −0.09. They also generally reported lower levels of satisfaction, with coefficients ranging from 0.07 to 0.09; however, no differences in satisfaction were found with Teachers, Jugglers, Clinician-Teachers, and Clinician-Researchers. Regarding the calculated FV score, Teachers and Clinician-Teachers did not score significantly differently than Clinicians. However, all other groups reported higher overall vitality scores, with the largest effect size belonging to Clinician-Jugglers (0.19), followed by Researchers (0.14). An interesting pattern emerged among the clinician groups. Excluding the Clinician-Teachers, who failed to produce any significant differences with Clinicians, clinicians who choose to participate in an activity in addition to treating patients reported lower productivity but scored higher on the overall FV scale. In addition, Clinician-Administrators and Clinician-Jugglers also reported feeling less engaged but more satisfied. The highest effect sizes for all measured constructs occurred with Clinician-Jugglers, faculty who have added two or three additional activities to their patient care responsibilities. Model 2.3 collapsed the MAC roles into a single cohort to explore this pattern further.

When Researchers served as the reference group (Table E-3), their PUCL and CLM scores were not statistically different than any other role group. Except for Teachers, significant differences emerged for at least one constituent construct with all other role groups. However, of the new significant comparisons to emerge (i.e., excluding the comparison of Researchers with Clinicians), only one was significant as a total effect: Jugglers reported being less engaged than Researchers (−0.07). The remaining comparisons each included a direct effect that was no longer significant as a total effect: Administrators and Clinician-Administrators reported being more satisfied whereas Clinician-Researchers reported being less satisfied; Clinician-Teachers reported being more productive; and Clinician-Jugglers had higher overall FV scores. Thus, for Researchers, although individual and institutional factors and indirect effects were not significant, these mediators sufficiently mitigated direct effects to render them nonsignificant at total effects.

Although significant differences were found between Researchers and all other role groups (except Teachers) in at least one construct, not as many differences emerged as when Clinicians served as the reference group (nine versus 21 significant comparisons, counting any kind of effect). Of the nine significant comparisons with Researchers, two were with nonclinician role groups (Jugglers and Administrators), and seven were with clinician role groups (three with Clinicians and four with MACs). In contrast, of the 21 significant comparisons with Clinicians, 11 were with nonclinician role groups and 10 were with the MAC group. These patterns further supported the idea to cluster roles into nonclinician and clinician groups (Model 2.1) and to cluster the MAC roles into a single group (Model 2.3).

Jugglers were less engaged than both Clinicians (−0.15) and Researchers (−0.10), suggesting that perhaps wearing multiple academic hats may decrease levels of engagement. The finding that Clinician-Jugglers and Clinician-administrators were less engaged than Clinicians also supported this idea. However, Jugglers were not significantly less engaged than Teachers or Administrators. Because the group size of Teachers is so low, that nonsignificant finding may not be meaningful. However, also conflicting with the idea that multiple activities may compromise engagement is the finding that Researchers were not less engaged than any of the MAC roles. Importantly, some of these exceptions involve comparisons that include two dimensions: clinician versus nonclinician *and* single- versus multiple-activity faculty. Models 2.1, 2.3, and 2.4 explored these dimensions further and suggested that separating these dimensions can clarify these data.

Individual role groups data from Model 2 also suggested that administrative roles may be associated with higher levels of satisfaction. Administrators and Clinician-Administrators reported higher levels of satisfaction than Clinicians, Researchers, and

Jugglers. However, for Researchers and Jugglers, these effects were direct but no longer significant as total effects.

All differences between Clinicians and the other role groups were found as direct and total effects. However, the differences found between Researchers and Administrators (satisfaction), Clinician-Teachers (productivity), Clinician-Researchers (satisfaction), Clinician-Administrators (satisfaction), and Clinician-Jugglers (FV score) were found only as direct but not total effects. The same is true for the differences found between Jugglers and Administrators (satisfaction), Clinician-Administrators (satisfaction), and Clinician-Jugglers (FV score). The mediating effects of the PUCL and CLM constructs, though not significant themselves, rendered the total effects nonsignificant for these groups.

Model-related findings. The effects of PUCL and CLM constructs within Model 2 were essentially the same as Model 1 (to the nearest one-hundredth). Differences between Models 1 and 2 in squared multiple correlations were generally small, with Model 2 accounting for slightly more variance. The largest difference occurred for the overall FV score. The next section, which addresses Research Question 3, includes a more detailed discussion of these comparisons.

Research Question 3

If the categorical role variable proves to be as valuable as the percent time variables, department, or degree in terms of predicting the variance of FV and its related constructs, are there more parsimonious groupings of role groups that retain this value and improve our understanding of faculty experiences?

Summary of the findings. Two kinds of analyses determined the value of adding each role approach to the basic vitality model. The first analysis examined model fit indices but resulted in inconsistent conclusions and generally suggested that model fit was poor. The second—hierarchical linear regression—demonstrated that the addition of each role approach was associated with a significant, though small, ΔR^2. Although adding role groups accounted for slightly more variance in the model than adding percent time variables, this difference was not significant. However, as with the path analyses, coefficients for role groups were generally larger and more numerous than those for the percent time variables. Because effect sizes for role groups were also generally similar to and sometimes larger than those for department and degree, role groups were found to be at least as valuable as these traditional variables in terms of predicting FV measures. Thus, additional models using higher order role groups were specified and explored. These more parsimonious models were specified by clustering role groups by activity *type* (i.e., patient care and research) or activity *number* (i.e., Clinicians versus MACs and single- versus multiple-activity faculty).

Clustering faculty roles into clinician versus nonclinician groups and researcher versus nonresearcher groups failed to produce cohorts that were substantively different in terms of how they experience FV constructs. Importantly, these higher order role groups align with two key ways in which many traditionally conceptualize basic science and clinical faculty. It seems that collapsing faculty role groups by academic activity type reduces the predictive power role group variables, even if those activities are as fundamental as patient care or research. Grouping roles by number of activities, however, allowed more differences to emerge. When MAC roles were collapsed into a single group and compared to single-activity Clinicians, MACs generally reported lower levels of productivity and engagement but higher satisfaction and overall FV scores. When all faculty were clustered by activity number, similar patterns emerged; however, these effects were not as great.

Detailed findings. Two kinds of analyses were employed to determine if adding the role variable to the basic vitality model (Model 0) was beneficial. The first approach examined model fit indices generated by path analyses of the three models. In order for these models not to have perfect fit (so that fit indices could be generated), error covariances for the vitality constructs were not allowed to covary ($\psi = 0$). For "A" models, the following variable pairs were restricted: productivity–engagement, productivity–satisfaction, engagement–satisfaction, and PUCL–CLM ($df = 4$). For "B" models, only the PUCL and CLM residuals were restricted ($df = 1$). Although most of the models indicated poor fit, some indicated good fit. It should be noted, however, that measures indicating good fit do not necessarily support the validity of a model and that many different models can produce similar fit values. Further, no single fit index is free of bias; thus, six of them were evaluated (Table 4–6). Biases may be related to sample size, complexity (number of parameters), and degrees of freedom in the model.

Table 4–6

Model Fit Indices for Various Approaches to the Role Variable in Predicting FV Constructs

Model			χ^2	RMSEA [90% CI]	SRMR	CFI	PNFI	AIC
Guidelines for acceptable/good thresholds for model fit			NS	< .08[a, b]	< .08[a,b]	≥ .95[a]	Highest[a]	Lowest[a]
0	Role not included (basic model)	A. PRO, ENG, SAT (df = 4)	576.46***	.31 [.29, .33]	.04	.86	.014	1,166.46
		B. FV (df = 1)	274.99***	.43 [.39, .47]	.03	.91	.004	776.99
1	Percent time spent in activities	A. PRO, ENG, SAT (df = 4)	636.82***	.31 [.29, .34]	.04	.93	.011	1,328.06
		B. FV (df = 1)	302.24***	.43 [.39, .47]	.03	.96	.003	919.66
2	Nine role groups	A. PRO, ENG, SAT (df = 4)	575.09***	.31 [.29, .33]	.03	.91	.008	1,621.09
		B. FV (df = 1)	274.30***	.43 [.39, .48]	.02	.95	.002	1,200.30

Note. RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index; PNFI = parsimony normed fit index; AIC = Akaike information criterion; NS = nonsignificant; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.
[a]Hooper, Coughlan, and Mullen (2008). [b]Kenny (2013).
***$p < .001$.

Model fit indices. The χ^2 was statistically significant for all three models, indicating that the sample covariance matrix and the covariance matrix implied by the model were not similar. This traditional indicator of poor fit is less meaningful with large sample sizes (> 200) as its significance, in such cases, generally represents sample variation (Hooper et al., 2008; Schumacker & Lomax, 2010; Ullman & Bentler, 2012). Thus, given the sample size of this study, it is reported more for its historical importance than for its meaning. The RMSEA estimates the lack of fit in a model compared to a perfect or saturated model (Ullman & Bentler, 2012). This index showed essentially equal and very poor fit for all three models and suggested that adding the role variable made no impact on the basic model. The SRMR improves with increasing complexity and sample size because nearly saturated and complex models (such as those in this study) lead to an estimation process that heavily relies on sample data and thus results in better fit indices (Hooper et al., 2008). It has no penalty for model complexity (Kenny, 2013), which is also why these values indicated better fit. However, the differences between the models were small, with the some advantage to role groups, especially in the overall FV score (Model 2B). The CFI also showed reasonably good fit and differentiated between the models. However, this index pointed to an advantage of the percent time variables, especially for overall FV score. According to Kenny (2013), the penalty for model complexity in the CFI is too low, which is likely why the index shows better fit. Parsimony fit indices, such as PNFI, penalize models more strongly for complexity. Thus, these models are penalized substantially and have PNFIs very close to zero. The PNFI and AIC both indicated a preference for the basic model. These conflicting results led to the alternate strategy of evaluating the ΔR^2 associated with the addition of each role approach to Model 0. Hotelling's *t*-test for nonindependent correlations evaluated statistical significance.

Multiple linear regression. Models 1B and 2B were chosen for regression analysis for two reasons. First, using models that predicted FV scores (the B models) instead of individual constituent constructs (the A models) was simpler in that they represented a mean of the three constructs and allowed running one regression model rather than three. Second, when comparing the squared multiple correlations for the three saturated models, the largest difference was found in the FV score (Table 4–7).

Table 4–7
Comparison of Squared Multiple Correlations for Models 0, 1[a], and 2, from path analysis (LISREL®)

			A			B
Model	PUCL	CLM	PRO	ENG	SAT	FV
Model 0	0.030	0.054	0.134	0.212	0.544	0.423
Model 1[a]	0.032	0.057	0.143	0.212	0.550	0.438
Model 2	0.032	0.055	0.152	0.224	0.556	0.451
Model 1[a] – Model 0	0.002	0.003	0.009	0.000	0.006	0.015
Model 2 – Model 0	0.002	0.001	0.018	0.012	0.012	0.028

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.
[a]Model 1 included percent time spent in research, teaching, and administrative duties (with time spent engaged in patient care as reference group).

Hierarchical linear regression models using SPSS® (version 20) determined the ΔR^2 associated with adding each role approach to the basic model. To test Model 1B, block one variables included all faculty demographics, and block two variables included teaching, research, and administrative percent time allocations (with percent time spent engaged in patient care as the reference group). The demographic variables accounted for 16.4% of the variance in FV score, and the model was significant ($R^2 = .164$, $F(18, 1478) = 16.11$, $p < .001$). When the percent time variables were added to the model, the model was significantly improved and accounted for 18.2% of the variance of overall FV score (ΔR^2 = .018, $F(3, 1475) = 10.91$, $p < .001$). All three percent time variables had a significant beta coefficients (% research time: B = 0.19, $p < .001$, % teaching time: B = 0.07, $p < .05$, % administrative time: B = 0.13, $p < .001$).

In the analysis of Model 2B, the same faculty demographic variables were entered as block one; however, eight role groups were entered as block two (with Clinicians serving as the reference group). When the role group variables were added to the model, it accounted for 19.5% of the variance of FV score and was also significant (ΔR^2 = .031, $F(8, 1470) = 6.97$, $p < .001$). Thus, adding the role variable as faculty role groups also significantly improved the model (Table 4–8). Some role groups had significant beta coefficients, and all were larger than the percent time variables: Researchers (B = 0.33, $p < .01$), Jugglers (B = 0.24, $p < .05$), Administrators (B = 0.39, $p < .01$), Clinician-Researchers (B = 0.48, $p < .001$), Clinician-Administrators (B = 0.41, $p < .001$), and Clinician-Jugglers (B = 0.48, $p < .001$). Two role groups, Teachers and Clinician-Teachers did not have significant beta coefficients. Although the ΔR^2 was larger for Model 2 than Model 1 (.031 versus .018), the two models were compared using the Hotelling's *t*-test for nonindependent correlations to determine if this difference was significant (Steiger, 1980; see Appendix F). Among the two highly correlated models ($r = .947$, $p < .001$), there was no significant difference between the ΔR^2 for each model, $t(1494) = -1.85$, $p > .05$.

Table 4–8

Comparison of DR² for Models 1 and 2 from Hierarchical Linear Multiple Regression (SPSS®; N = 1,497)

Model	R^2	ΔR^2
Model 0 (Basic model, no role variable)	0.164	
Model 1B (Percent time spent in activities)	0.182	0.018***
Model 2B (Nine role groups)	0.195	0.031***

***$p < .001$

Additional models. Because the role group variables proved to be at least as valuable as the percent time variables, department, and degree, more parsimonious, higher order models were specified and explored. Analysis of the results of Models 1 and 2 suggested four such models, and all were variations of Model 2 because they varied in how role groups were organized (Table 4–9). The higher order groupings of the first two additional models focused on activity types: patient care and research. This decision was made because the largest two role groups—Clinicians (n = 445) and Researchers (n = 354)—represent these activities. Further, patient care and research were the two activities that occupied the highest mean proportion of faculty time (Table 4–10). Finally, Researcher and Clinician role groups broadly represent how many conceptualize basic science and clinical faculty. Model 2.1 compared nonclinician groups (collapse of Teachers, Researchers, Jugglers, and Administrators) versus clinician groups (collapse of Clinicians, Clinician-Teachers, Clinician-Researchers, Clinician-Administrators, and Clinician-Jugglers). Model 2.2 compared research groups (collapse of Researchers and Clinician-Researchers) versus nonresearch groups (collapse of Teachers, Jugglers, Administrators, Clinicians, Clinician-Teachers, Clinician-Administrators, and Clinician-Jugglers).

Table 4–9

Additional Model Descriptions and Nomenclature

Model	Role Approach	Vitality Constructs A PRO, ENG, and SAT	 B FV
0	Role not included (basic model)	Model 0A	Model 0B
1	Percent time spent in activities	Model 1A	Model 1B
2	Nine role groups	Model 2A	Model 2B
2.1	Nonclinician vs clinician roles	Model 2.1A	Model 2.1B
2.2	Research vs nonresearch roles	Model 2.2A	Model 2.2B
2.3	Multiple-activity clinicians (MACs)	Model 2.3A	Model 2.3B
2.4	Multiple- vs single-activity roles	Model 2.4A	Model 2.4B

Note. PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.

Table 4–10

Percent time allocation for all faculty (N = 1,497)

Academic activity	Range[a]	*M*[a]	*SD*[a]
Teaching	0–10	1.67	1.41
Research	0–10	2.87	3.28
Patient care	0–10	3.81	3.25
Administration	0–10	1.61	1.83

Note. [a]Percent time allocations were divided by 10.

The next two models shifted emphasis from *types* of activities to *numbers* of activities. Due to the significant differences observed in Model 2 between single-activity Clinicians and three of the MAC roles (Clinician-Researchers, Clinician-Administrators, and Clinician-Jugglers), Model 2.3 collapsed all MACs (including Clinician-Teachers) into a single role group with Clinicians as the reference group. Finally, extending this reasoning to all nine roles, Model 2.4 collapsed all single-activity role groups (Teachers, Researchers, Administrators, and Clinicians) and all multiple-activity role groups (Jugglers, Clinician-Teachers, Clinician-Researchers, Clinician-Administrators, and Clinician-Jugglers).

***General variables*.** The path coefficients for the demographic variables were generally stable over the additional models that were run to address the third research question. Thus, they will not be described again.

***Department, degree, and role*.** The results of the additional models are shown in Tables 4–11 to 4–14. These tables only include data for department, degree, and variations on the role variable.

Model 2.1: Nonclinician versus clinician roles. In this model, a more parsimonious grouping method was explored, and its data are shown in Table 4–11. Specifically, the higher order grouping of this model collapsed nonclinician roles (n = 552) and clinician roles (n = 945) into two cohorts. By comparing those faculty who generally do not see patients with those who do, this model examined one of the fundamental ways many have conceptualized basic science versus clinical faculty. The nonclinician group reported they were less productive (−0.12) than the clinician (combined) group, net the other effects in the model. This was the only significant difference to emerge; however, given the previously described challenges with the productivity scale it is unclear how meaningful this difference is.

Model 2.2: Research versus nonresearch roles. The higher order grouping of this model collapsed all research role groups into a single research cohort (n = 420) and all nonresearch role groups into a single nonresearch cohort (n = 1,077). Because Clinician-Researchers were slightly less satisfied than Researchers (−0.04, $p < .05$; direct effect only), combining these two groups meant that levels of satisfaction were slightly neutralized. However, this effect size was very small and not significant as a total effect, and Clinician-Researchers (n = 66) were a much smaller group than Researchers (*n* = 354). Controlling for all other measures in the model, the only difference to emerge was that the research cohort had slightly higher overall FV scores (0.06) than the nonresearch cohort (Table 4–12). Thus, collapsing neither clinician nor research groups created substantively different role cohorts in that both comparisons revealed a significant difference in only one of six FV constructs. Rather than collapsing role groups by activity type, the next two models collapsed role groups by activity number.

Model 2.3: Multiple-activity clinicians. The data from this model are found in Table 4–13. Because three of the four MAC roles demonstrated significant differences with Clinicians, this model collapsed the four MAC roles into a single cohort (*n* = 500). In this model, Clinicians were the reference group so they could be compared to the single MAC cohort. As expected, the effects for Teachers, Researchers, Jugglers, and Administrators were similar to Model 2. While no significant differences emerged between Clinicians and MACs in terms of their PUCL and CLM scores, significant differences were found among the remaining four vitality constructs. MACs reported that they were less engaged (−0.09) and less productive (−0.17) than single-activity Clinicians. However, they were also more satisfied (0.10) and had higher overall FV scores (0.20). Given that this pattern emerged when nonclinicians and clinicians were separated, the next step was to collapse all multiple-activity groups and compare them with a collapsed cohort of all single-activity groups.

Model 2.4: Multiple- versus single-activity roles. The data from this model are found in Table 4–14. In this model, all multiple-activity role groups were collapsed into one cohort (*n* = 623) and compared to a collapsed cohort of all single-activity role groups (*n* = 874). A pattern similar to the comparison of MACs to Clinicians emerged: Faculty who substantively engaged in more than one activity reported being less productive (−0.09) and less engaged (−0.08) than those who primarily focused on a single activity. Although no significant difference emerged for levels of satisfaction, multiple-activity faculty also had higher overall FV scores (0.12). Smaller effect sizes than those in Model 2.3 and loss of a significant difference in satisfaction scores for this model suggested that the effects of engaging in multiple activities are greater for clinician than nonclinician role groups.

Table 4–11

Standardized direct, indirect, and total effect coefficients for department type, degree, and role group subanalysis (Model 2.1 includes nonclinician vs clinician groups[a], N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Basic science dept						
Direct			−0.099***	−0.071**		−0.070**
Indirect			.	.		.
Total			−0.112***	−0.086**		−0.087**
PhD						
Direct			0.119**		.	.
Indirect			.		−0.059*	−0.046*
Total			0.105*		−0.102*	.
MD-PhD						
Direct			0.059*			0.045*
Indirect			.			.
Total			0.055*			.
Nonclinician roles[a]						
Direct			−0.131**			
Indirect			.			
Total			−0.123**			
PUCL			−0.123***	.	0.572***	0.239***
CLM			0.285***	0.325***	0.242***	0.371***
Squared multiple correlations	0.030	0.054	0.140	0.212	0.554	0.423

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.

[a]This subanalysis of Model 2 compares nonclinician role groups (*n* = 552), which collapsed the Teacher, Researcher, Juggler, and Administrator role groups, versus clinician role groups (*n* = 945), which collapsed the Clinician, Clinician-Teacher, Clinician-Researcher, Clinician-Administrator, and Clinician-Juggler role groups.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4–12

Standardized direct, indirect, and total effect coefficients for department type, degree, and role group subanalysis (Model 2.2 includes research vs nonresearch groups[a], N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Basic science dept						
Direct			−0.115***	−0.076**		−0.069**
Indirect			.	.		.
Total			−0.128***	−0.089**		−0.083**
PhD						
Direct	−0.077*			−0.067*	.	.
Indirect				.	−0.060*	−0.044*
Total				−0.090**	−0.076*	.
MD-PhD						
Direct			0.052*			0.041*
Indirect			.			.
Total			.			.
Research roles[a]						
Direct						.
Indirect						.
Total						0.060*
PUCL			−0.122***	.	0.572***	0.239***
CLM			0.284***	0.324***	0.242***	0.371***
Squared multiple correlations	0.031	0.054	0.135	0.212	0.544	0.424

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.

[a]This subanalysis of Model 2 compares research role groups (*n* = 420), which collapsed the Researcher and Clinician-Researcher role groups, versus nonresearch role groups (*n* = 1,077), which collapsed the Teacher, Juggler, Administrator, Clinician, Clinician-Teacher, Clinician-Administrator, and Clinician-Juggler role groups.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4–13

Standardized direct, indirect, and total effect coefficients for department type, degree, and role group subanalysis (Model 2.3 includes Clinicians as reference group and a merged group of multiple-activity clinicians[a], N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Basic science dept						
Direct			−0.097***	−0.070*		−0.060**
Indirect			.	.		.
Total			−0.111***	−0.085**		−0.077**
PhD						
Direct		−0.085*	0.118**	.	.	.
Indirect			.	−0.028*	−0.065*	−0.050*
Total			0.103*	.	.	.
MD-PhD						
Direct			0.060*			0.041*
Indirect			.			.
Total			0.056*			.
Teachers[a]						
Direct			−0.057*			
Indirect			.			
Total			.			
Researchers[a]						
Direct			−0.168***		.	0.102**
Indirect			.		.	.
Total			−0.159***		0.101*	0.133**

Table 4–13 continues

Table 4–13 (continued)

Standardized direct, indirect, and total effect coefficients for department type, degree, and role group subanalysis (Model 2.3 includes Clinicians as reference group and a merged group of multiple-activity clinicians[a], N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Jugglers[a]						
Direct			−0.163***	−0.100**		
Indirect			.	.		
Total			−0.156***	−0.091**		
Administrators[a]						
Direct			−0.056*	−0.055*	0.073***	0.069**
Indirect			.	.	.	.
Total			−0.058*	−0.057*	0.071*	0.066*
Multiple-activity clinicians[a]						
Direct			−0.116***	−0.090**	0.077***	0.185***
Indirect			.	.	.	.
Total			−0.116***	−0.086**	0.095**	0.195***
PUCL			−0.121***	.	0.570***	0.236***
CLM			0.286***	0.324***	0.244***	0.373***
Squared multiple correlations	0.032	0.055	0.151	0.221	0.551	0.447

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.

[a]This subanalysis of Model 2 includes a group of clinicians with multiple roles (n = 500), which collapsed the Clinician-Teacher, Clinician-Researcher, Clinician-Administrator, and Clinician-Juggler role groups. In this analysis, Clinicians (single role) are used as the reference group.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4–14

Standardized direct, indirect, and total effect coefficients for department type, degree, and role group subanalysis (Model 2.4 includes multiple- vs single-activity roles[a], N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Basic science dept						
Direct			−0.118***	−0.078**		−0.066**
Indirect			.	.		.
Total			−0.130***	−0.092**		−0.080**
PhD						
Direct				−0.076*		0.063*
Indirect				.		.
Total				−0.093**		.
MD-PhD						
Direct						0.049*
Indirect						.
Total						0.055*
Multiple-activity roles[a]						
Direct			−0.086***	−0.084***		0.119***
Indirect			.	.		.
Total			−0.087**	−0.084**		0.121***
PUCL			−0.121***	.	0.572***	0.238***
CLM			0.283***	0.324***	0.243***	0.372***
Squared multiple correlations	0.030	0.054	0.140	0.218	0.545	0.435

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.

[a]This subanalysis of Model 2 compares multiple-activity roles (n = 623), which collapsed the Juggler, Clinician-Teacher, Clinician-Researcher, Clinician-Administrator, and Clinician-Juggler roles, versus single-activity roles (n= 874), which collapsed the Teacher, Researcher, Administrator, and Clinician roles.

*$p < .05$. **$p < .01$. ***$p < .001$.

Faculty Time Autonomy

The following survey item measured faculty time autonomy over the previous academic year: "I have input into how I spent my time." Its response set ranged from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Most participants (82%) either strongly or somewhat agreed with this statement. Thus, the assumption that medical faculty have sufficient autonomy to link their time spent data to their personal choices (versus the demands of leadership or the institution) proved to be reasonable. The histogram of responses to this item is shown in Figure 3–3 and demonstrates its extreme non-normal distribution that ruled out ANOVA and pointed to the Kruskal-Wallis test to compare item scores across department, degree, and role groups. The nonparametric Levene's test confirmed homogeneity of variances (Nordstokke & Zumbo, 2010; Nordstokke et al., 2011), and the median test was used when this could not be confirmed.

Department types (CD, BSD, and Other). The nonparametric Levene's test revealed no significant difference between the variances of each group, $F(2, 1486) = 0.67$, $p = .514$. The Kruskal-Wallis revealed a significant difference in the way these groups answered the time autonomy item, $\chi^2(2, 1489) = 22.21$, $p < .001$. Post hoc Mann-Whitney tests revealed that CD faculty (*Mdn* = 4) felt they had less input over how they spent their time than BSD faculty (*Mdn* = 5), $U = 86631.5$, $p = .00006$, $r = .11$. Faculty from CDs also felt they had less input over how they spent their time than faculty in "Other" departments (*Mdn* = 5), $U = 27299.0$, $p = .006$, $r = .07$. No significant difference was found between BSD faculty and faculty from "Other" departments, $U = 4376.0$, $p = .767$.

Degree types (PhD, MD, and MD-PhD). Again, among these groups, no significant difference between the variances was found, $F(2, 1486) = 0.46$, $p = .629$. The omnibus test revealed a significant difference in the amount of time autonomy reported by the groups, $\chi^2(2, 1489) = 20.63$, $p = .00003$. Follow-up tests revealed that MDs (*Mdn* = 4) were not significantly different than MD-PhDs (*Mdn* = 4), $U = 30932.0$, $p = .438$. However, MDs reported significantly less time autonomy than PhDs (*Mdn* = 5), $U = 196164.5$, $p = .00001$, $r = .12$. MD-PhD were not significantly different than PhDs, $U = 15515.0$, $p = .181$.

Nine role groups. In this case, the nonparametric Levene's test revealed that the null hypothesis of equal variances among the nine role groups had to be rejected, $F(8, 1480) = 2.02$, $p = .041$. Thus, the median test, which is more robust against departures from homogeneity of variance, was used in place of the Kruskal-Wallis test. The null hypothesis of equal medians was rejected, $\chi^2(8, 1489) = 77.88$, $p < .001$. Post hoc tests for nine role groups required 36 comparisons, and a Bonferroni correction yielded a critical value of .0014. Table 4–15 shows the post hoc tests for the seven comparisons that were significantly different. Clinicians reported that they had significantly less input on how they spent their time than Clinician-Jugglers, Clinician-Administrators, Researchers, Administrators, and Jugglers. Clinician-Teachers reported significantly less autonomy with their time than Researchers and Jugglers.

Table 4–15

Post-hoc Analysis of Median Test for Differences in Time Autonomy Among Role Groups[a]

Roles[b] (*Mdn*)	χ^2	(*df*, *N*)	*p*[c]	ϕ
CJ (4) vs C (4)	20.33	(1, *N* = 729)	.00001	.167
CA (5) vs C (4)	17.22	(1, *N* = 522)	.00003	.182
R (5) vs C (4)	50.53	(1, *N* = 793)	.00001	.252
A (5) vs C (4)	17.77	(1, *N* = 490)	.00002	.190
J (5) vs C (4)	34.74	(1, *N* = 565)	.00000	.248
R (5) vs CT (4)	12.19	(1, *N* = 420)	.00048	.170
J (5) vs CT (4)	12.76	(1, *N* = 192)	.00035	.258

Note. CJ = Clinician-Juggler; C = Clinician; CA = Clinician-Administrator; R = Researcher; A = Administrator; J = Juggler; CT = Clinician-Teacher.

[a]Only the seven significant comparisons out of the 36 are shown. [b]Group with higher time autonomy is shown first and in bold typeface. [c]The Bonferroni correction for 36 post hoc comparisons is a critical value of .0014.

Using the Mann-Whitney test, the comparison of time autonomy was also extended to the additional models that included collapsed groups. The nonparametric Levene's test was nonsignificant for all three tests: researchers versus nonresearchers, clinicians versus nonclinicians, and single-activity versus multiple-activity roles. Nonresearch roles (*Mdn* = 4) reported less input in how they spent their time than research roles (*Mdn* = 5), *U* = 192959.0, *p* = .00001, *r* = .12. Clinician roles (*Mdn* = 4) reported less time autonomy than nonclinicians roles (*Mdn* = 5), *U* = 203575.0, *p* = .00000, *r* = .19. Finally, the collapsed group of single-activity roles reported less input on how they spent their time (*Mdn* = 4; Mean rank = 721) than the collapsed group of multiple-activity roles (*Mdn* = 4; Mean rank = 778), *U* = 249,007.5, *p* = .007, *r* = .07.

Additional Data

The following data do not directly address the research questions of this study; however, they provide additional insights about the vitality context in which it occurred. They also have theoretical implications for the Dankoski et al. (2011) model that will be discussed in Chapter 5. The standardized beta and psi coefficients of Model 2A are shown in Figure 4–2. The relationships indicated by straight arrows (beta coefficients) were previously presented and compared to the multiple regression models by Dankoski et al. (2011; see Table 4–3). The curved arrows (psi coefficients) describe the relationships between vitality constructs and have not yet been reported. Specifically, they are correlations of the error variances of these constructs.

Limitations

Internal validity. Path analysis is sometimes referred to as "causal modeling" due to the assumptions of its theoretical groundwork suggesting causal relationships between model variables. However, it should be emphasized that no causal conclusions can be derived from this study due its nonexperimental design. Further, there is no implication that models with good fit prove causality as many models can have the same fit indices.

External validity. Although this study included all part- and full-time faculty with PhDs, MDs, and MD-PhDs from four (somewhat) geographically varied U.S. medical schools, its results are not generalizable to all medical schools. However, the demographics of this sample were largely representative of all U.S. medical schools in 2011, as represented in the AAMC Faculty Roster. The largest disparities were in terms of race, rank, and degree, with overrepresentation of White faculty, full and associate professors, and PhD faculty. Future studies with larger samples will be needed to expand our understanding of the role variable in broader medical school contexts.

Low response rate and biases. Low response rate is a notable limitation of this study and raised concerns about nonresponder bias. Of the four participating medical schools, IUSM and UAMS had the highest effective response rates (36%) and Penn State

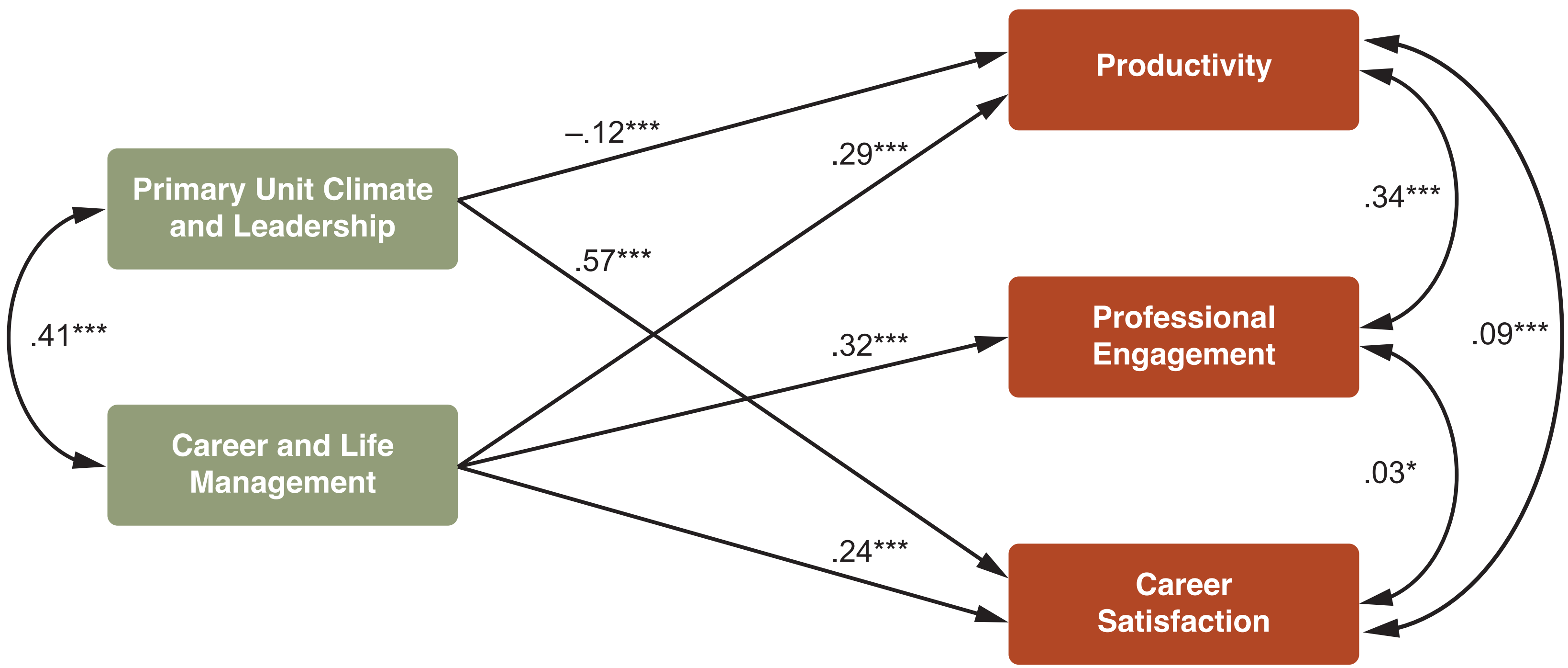


Figure 4–2. Standardized beta (straight arrows) and psi coefficients (curved arrows) in Model 2A.
$^{*}p < .05$. $^{***}p = <.001$.

had the lowest (22%). However, with previously noted institutional exceptions, the sample was largely representative of the population of the four schools. When examining all institutions combined, two demographics should be highlighted. White faculty were overrepresented (9.6%), and assistant professors were underrepresented (−6.1%). Also mitigating concerns about nonresponse bias is the finding that early and late responders did not differ significantly with regard to sex, race, degree, department, or rank. However, early responders were less satisfied and felt less supported by their leadership and institution, suggesting that perhaps the sample overrepresents faculty with this perspective.

Missing data. Among the respondents, missing data were also notable. Almost a quarter of the surveys (486 out of 1,983 returned surveys) had to be excluded because of missing data. Missing data associated with some productivity items can be attributed to not all faculty being productive in all areas queried by the survey. As mentioned, some items specifically asked about productivity in clinical work, teaching, and research; therefore, faculty not involved in these activities could not—or should not—have answered these items. The previously described productivity scale error is reviewed in the next section. The missing satisfaction data, however, are more difficult to explain. Within the entire sample, the five satisfaction items were among the top ten most missing items, with 14% to 23% of the respondents not providing a response. Within the valid sample (after excluding the 486 cases) these percentages dropped to 4% to 14%. The two most skipped items asked about satisfaction with the promotion and tenure process and efforts to promote diversity in one's primary academic unit. Nontenure track faculty's inability to answer the tenure-related item is understandable; however, why a diversity item would be heavily skipped remains unclear.

Productivity scale error. Related to the limitation of missing data was the lack of "Not applicable" as a response option for the productivity scale. As already described, this is important because not all items were applicable to all faculty. Of the seven items included in the scale, one was related to patient care; four were related to research; and two were related to teaching. Although 6% of the Clinician role group (25 faculty members) have a PhD (only) and thus see patients, close to 60% of the PhD faculty (295 faculty members) answered the clinical productivity (RVU) question. Of PhD faculty who responded to the clinical productivity item, 65% answered "At expectations;" 14% responded with "Well below;" and 10% answered "Well above" expectations. This introduced some level of error into the productivity scale that could have affected comparisons of productivity that included nonclinician faculty; however, it is unknown exactly how or by how much. Similar errors may also be related to the research and teaching items if faculty not engaged in these activities answered them. The next iteration of the survey will address this issue and should clarify the data related to reported levels of productivity.

Self-reported data. All data for this study were self-reported. Productivity measures could have been validated through the use of databases and other external sources (e.g., PubMed for publications, grant funding websites for research productivity, and faculty annual reports). Further, levels of engagement could have been validated through offices of faculty affairs that track participation in development programs. However, this level of validation would have posed significant challenges in the context of a multi-institutional study and may, in some respects, be less useful than self-reported data. The role variable represents faculty's behavioral choices that are based on their perceptions of their professional and personal experiences. Thus, self-reported levels of productivity relative to perceived expectations of their primary academic unit may be more useful than objective measures. Further, an objective measure such as publications found in a database search fails to capture work that fell just outside the time parameter of the search and could not account for discipline-specific variations in publication frequencies.

Time estimate questions. The role variable is based on faculty estimations of how they spend their time, which are data gathered using *time estimate questions*. Robinson, Martin, Glorieux, and Minnen (2011) describe these kinds of questions as having contributed to a "rich body of historical U.S. data" (p. 43); however, these authors also describe several limitations of such questions. Specifically, they argue that time estimate questions are usually more complex than they initially appear. First, the interpretation of the queried activities may not be clear or shared across the sample. In this study, for example, the line between patient care and teaching may be blurry for clinical faculty. Some faculty may interpret *teaching* as any time in the presence of students while others may interpret it as time dedicated to preparing and giving lectures. Second, participants are being asked to scan their memory and sum all periods of each activity across a week, month, or—in this case—year. Although this may be a valid critique for the general population, faculty are accustomed to documenting their time, as this is part of their annual review process. Third, critics of time estimate questions refer to "the gap" as the difference between time allocations from estimate questions and those from a time-diary (Robinson et al., 2011). Time-diaries shorten the period of recall (e.g., daily diaries demand recall of only the single day) and are presumed to be more accurate than estimates made after longer periods of time have passed. However, working with time diaries can be overly burdensome for both participants and researchers.

Although Robinson et al. (2011) offer these critiques, they ultimately cite literature that argues that the gap is “simply a result of the familiar ‘regression to the mean’ phenomenon” (p. 44). Thus, although faculty time estimates may not be as accurate as daily diaries, the differences tend to be small and approach longer-term means. Within the field of higher education, Porter (2007) also urges that “great caution” (p. 527) is needed when interpreting estimated time data. Nonetheless, he asked faculty to estimate their time spent in committee service to study if these time commitments were related to rank disparities among female faculty and faculty of color. Thus, although the use of time estimate questions has been critiqued, they are widely used in the study of faculty (Buckley, Sanders, Shih, Kallar, & Hampton, 2000; Kempainen, McKone, Rubenfeld, Scott, & Tonelli, 2004; Milem, Berger, & Dey, 2000; Shanafelt et al., 2009).

Interpreting time allocations and time autonomy. The interpretation of time allocations may not be as straightforward as it appears. The challenge lies in discerning among several motivations that may be behind these allocations and can be summarized by the following perspectives: (a) “I choose to spend my time this way because it represents my preferences, goals, and values;” (b) “I spend my time this way because this is what I need to do to advance my career;” and (c) “I choose to spend my time this way because of institutional rules…I’d rather spend 100% of my time in the lab but my appointment requires teaching time as well.” Although the time autonomy item allows some insight into the third perspective, it cannot distinguish between the first two. However, there is some support in the literature that the perspective of MDs aligns with the first. Shanafelt et al. (2009) reported that MDs tailored their time according to what they found most meaningful and that the tendency to do so increased with age.

Chapter 5: Discussion

I begin this chapter with summaries of this study's methodology, major findings, and conclusions. Findings related to the number of activities faculty engage in led to a search of the job complexity literature, which is explored next. The theoretical, research, and practice implications of this study that should result from improved understanding of faculty are then described. Finally, I suggest several areas for future research and conclude with a description of the strengths of this study and an initial answer to the question "Does time matter?"

Summary of Study Methodology

The aim of this research was to explore how well a new behavior-based faculty cohort variable would compare to traditional cohorts based on department type and degree earned. These traditional cohorts—alone or in combination—have served as proxies for how we conceptualize basic science versus clinical faculty, a distinction that itself has served as a predictor variable in research of faculty experiences. I have argued that this distinction has potentially outlived its usefulness and now tends to obscure rather than advance our understanding of faculty. The central comparisons of this study examined the degree to which these new and potentially more meaningful role-based cohorts would help to discern differences in how faculty experience the vitality constructs described by Dankoski et al. (2011). My assumption is that investigating new meaningful cohorts would advance our understanding of and ability to support faculty with similar experiences.

In general, the role cohort is defined by how faculty spend their time in four academic activities: teaching, research, patient care, and administrative duties. In this study, I analyzed two approaches to faculty role, both based on how faculty allocated their time among these activities during the previous academic year (the survey was administered in 2011). In the first approach (Model 1), role was represented by four continuous variables that described the percent of time a faculty member spent in each of these four activities. In the second (Model 2), role was represented by nine categorical variables or role groups defined by a time allocation rubric (Table 3–6). These two approaches to role were compared to each other as well as to a model with no role variable included (Model 0). All three models included department and degree, as well as other demographic variables. I chose vitality and its related constructs as the context for these comparisons because of its broad coverage of faculty experiences and thus increased theoretical capacity to discern meaningful differences between cohorts.

Dankoski et al. (2011) define vitality (FV) as a function of the synergistic effects of a faculty member's productivity, career satisfaction, and level of professional engagement. In their model, both institutional and individual factors predict FV. Institutional factors are related to perceptions of work climate and leadership (PUCL). Individual factors include the degree of agency and autonomy held by faculty as well as their ability to manage the demands of their personal and professional lives (CLM). In the present study, these constructs were measured using the web-based 2011 IUSM Faculty Vitality Survey, and faculty members' overall FV scores were calculated as the grand mean of their productivity, engagement, and satisfaction scores. This study's retrospective data analysis included faculty from the following four U.S. medical schools: IUSM (all regional campuses), UIC, Penn State, and UAMS. Part- and full-time faculty with MD, PhD, and MD-PhD degrees were included in the analyses ($N = 1{,}497$).

This research generated fit indices, parameter estimates, and squared multiple correlations using observed variable path analyses, which were guided by the conceptual model shown in Figure 3–2. Table 4–9 describes each model and summarizes nomenclature. Path analysis provided two key advantages over separate multiple regression analyses. First, it allowed simultaneous regressions of productivity, engagement, and satisfaction scores on the predictor variables (A models). Second, it allowed an examination of the mediating effects of PUCL and CLM constructs (through paths C and D of the conceptual model) and permitted them to act as both independent and dependent variables. Because fit indices of the path analyses were inconclusive regarding which role approach best fit the sample data, hierarchical multiple linear regressions were used to compare the ΔR^2 for each approach.

The connection between the role variable and the conceptual framework of SCCT is grounded in their focus on why and how people make choices regarding their actions and how they spend their time. Bandura (1986), Lent et al. (1994), and Lent (2013) have described a dynamic feedback loop of how changes in self-efficacy, outcome expectations, and contextual influencers can lead to changing interests, activity selections, and performance domains across the career span. In the present study, activity selections were represented by how faculty allocated their time. Although department and degree are static variables and tethered to past events, both approaches to the role variable are dynamic and flexible because they represent activity choices from the preceding year. Lent (2013) describes the fluidity of the theory, "SCCT assumes that interest stability is largely a function of crystallizing self-efficacy beliefs and outcome expectations, yet that adult interests are not set in stone" (p. 121). Personal and environmental contexts can act both as proximal and distal influencers and as supports or barriers as they shape faculty decisions.

Supporting faculty across the career span can enhance the intellectual capital they provide to their institution. Gappa et al. (2007) define this intellectual capital as “the most valuable resource that institutions have for achieving their goals” (p. 132). Thus, both institutional and individual goals can be advanced through improved understanding of faculty experiences. Specifically, this study seeks to inform policy leaders, administrators, and faculty development professionals by addressing the following research questions:

1. Over and above the effects of department and degree, how do four variables that represent the percent of time spent by faculty engaged in teaching, research, patient care, and administrative duties relate to FV and its related constructs?
2. Over and above the effects of department and degree, how does the role variable, with nine levels, compare to percent time spent engaged in teaching, research, patient care, and administrative duties in terms of predicting the variance of FV and its related constructs?
3. If the categorical role variable proves to be as valuable as the percent time variables, department, or degree in terms of predicting the variance of FV and its related constructs, are there more parsimonious groupings of role groups that retain this value and improve our understanding of faculty experiences?

Summary of Major Findings and Conclusions

Traditional variables: department and degree. A number of findings highlight both the challenges and assumptions that occur when department and degree variables serve as proxies for basic science and clinical faculty. First, although PhDs indicated they were less satisfied than MDs, no difference emerged in levels of satisfaction between faculty from basic science and clinical departments. Thus, if degree were serving as my proxy for basic science and clinical faculty, I would report that BSF were less satisfied than CF. However, if department were serving as my proxy, I would report no difference in levels of satisfaction between these two cohorts. The inability of department type to discern a difference in satisfaction may be due to the diverse composition of the CD cohort. In this study, recall that PhD faculty make up 23% of CDs, MD faculty 72%, and MD-PhD faculty 5% (see Table 3–11). Perhaps as a way to address diversity within CDs, Bunton and Mallon (2006) and Bunton et al. (2012) removed clinical department PhDs from their analyses and, in effect, compared clinical department MDs to faculty in BSDs.

A second finding of the present study also demonstrates the inconsistencies that arise when department and degree variables serve as proxies for basic science and clinical faculty. Although faculty from BSDs reported lower levels of productivity than faculty from CDs, PhDs reported higher levels of productivity than MDs. This is perhaps explained by two factors. First, the majority of PhDs (60%) in this study hold appointments within CDs. Second, PhDs in CDs have been reported to be the most productive faculty subtype (Bland, Center, et al., 2005); however, it is important to recall that these productivity metrics were different. Nonetheless, if degree were serving as my proxy for basic science and clinical faculty, I would report that BSF were more productive than CF. However, if department were serving as my proxy, I would report the opposite was true.

The department and degree distributions for each role group further challenge long-standing assumptions about these traditional cohorts. Even within nonclinician role groups (i.e., roles in which time spent seeing patients is less than 20%), more faculty in each role group were associated with clinical versus basic science departments. Specifically, 69% of Researchers and 45% of Jugglers were affiliated with CDs, whereas 27% and 37% were affiliated with BSDs respectively (see Table 3–9). Further, 10% of Researchers and 16% of Jugglers hold only MD degrees.

These findings related to satisfaction and productivity are in contrast with Bland, Center, et al. (2005) who found BSF were less satisfied with their departments than CF (these cohorts are presumed to be defined by departmental affiliation). Further, these researchers found no difference in productivity between the cohorts. The present study's findings also are in contrast to those of Schindler et al. (2006) who found BSF (also presumed to be those affiliated with BSDs) to be more satisfied than academic physicians. As previously discussed, I believe that one of the primary reasons for these discrepancies is related to cohort methodology. The flaws in these methodologies could lie in inconsistent group definitions and/or diverse group compositions. However, a perhaps equally influential flaw could lie in differences in how researchers defined satisfaction. Satisfaction can be defined at the departmental and/or school levels. Further, satisfaction, as a latent construct, is not a variable that can be measured like height or weight. Although most surveys use satisfaction items that query similar aspects of faculty life, unless the same survey or set of items are used across researchers, differences between groups can emerge as a result of differences in the instruments being used rather than the groups being studied. Again, the emphasis of this research focuses less on the meaning of these findings related to FV constructs *per se* and more on the comparison between the abilities of department, degree, and role to discern differences between faculty cohorts.

When examining the number of significant effects of any kind (direct, indirect, or total), degree was generally better at discerning differences between faculty cohorts than department. In Models 1 and 2, having a PhD versus an MD produced significant effects on five of the six FV constructs. In contrast, belonging to a basic science or clinical department produced significant effects in only three FV constructs. When examining the effect sizes of department and degree, they were generally similar, with department tending to be a slightly better predictor. A possible theoretical explanation for the variation in the ability of these variables to discern differences in vitality constructs is that degree tends to focus on differences at the individual level, whereas department tends to focus on differences at the academic unit and/or institutional level. Degree may capture the shared experiences associated with the long process of educational socialization, which began in medical or graduate school (Austin, 2002; Corcoran & Clark, 1984; Tierney & Rhoads, 1994).

The degree variable represented the only exception to the general rule that effects on productivity and engagement were in the same direction (i.e., had the same sign and were positively correlated). The psi coefficient between these constructs (0.34, $p < .001$) indicated a moderate positive relationship. The positive sign of this relationship is expected because it is reasonable that the more engaged faculty are the more productive they perceive themselves to be. That this relationship is not stronger indicates that there may be exceptions to this relationship, as when PhDs rated themselves more productive but less engaged than their MD colleagues. This supports the broad conceptualization of FV described by Dankoski et al. (2011) as the synergistic effects of multiple constructs. Measuring productivity alone would have provided an incomplete picture of PhD faculty.

All effects associated with department were (a) significant as total effects, (b) primarily due to direct rather than indirect effects (i.e., indirect effects were nonsignificant), (c) negative for belonging to a basic science versus a clinical department, and (d) restricted to lower levels of productivity, engagement, and overall FV score. In contrast, the effects of degree were more varied across the models and often included significant indirect effects that were no longer significant as total effects, which will be addressed further in the next section. Thus, lower vitality measures for PhDs were generally related to institutional (PUCL) and/or individual (CLM) factors, suggesting that these are important mediators for this cohort and could serve as targets for supportive interventions.

Institutional, individual, and indirect effects. Faculty with PhDs were not the only cohort to be influenced by the mediating effects of vitality's predictive constructs. Race and—to a lesser degree—sex were among the variables affected by perceptions of a supportive academic unit and/or institution, the leadership with that unit, and one's abilities to manage personal and professional demands. Academic rank, track, and reporting a division-level primary academic unit (versus departmental-level) were also variables significantly influenced by indirect effects. Although the indirect effects of the remaining variables were nonsignificant, differences between direct and total effects are attributable to indirect effects. For example, in Model 1, the significant, negative direct effect of part-time status on overall FV score was no longer significant as a total effect, even though its indirect effect was nonsignificant. The only percent time variable associated with a significant indirect effect was time spent engaged in research; it had positive indirect and total effects on overall FV score. Notably, none of the role groups were associated with significant indirect effects on the constituent vitality constructs.

With respect to effects on the predictive vitality constructs themselves, only demographic—not the role—variables demonstrated significant relationships. Three demographic variables had significant effects on how supported faculty felt by their primary unit climate and the leadership within it (PUCL), and these effect sizes ranged from 0.07 to 0.10. Faculty who chose not to report their race felt less supported than their White colleagues. Faculty who described their primary academic unit at the school level felt less supported than their colleagues who describe their primary academic unit at the departmental level. Finally, PhD faculty (in Model 2.2) reported feeling less supported than their MD faculty colleagues.

Although effect sizes were generally similar (0.07 to 0.11), the CLM construct had more significant relationships with demographic variables than the PUCL construct (six versus three). Asian and underrepresented minority faculty reported higher levels than their White colleagues; associate professors reported lower levels than full professors; nontenure track faculty reported lower levels than tenure track faculty; those who described their primary academic unit at the division level reported lower levels than those at the departmental level; and PhD faculty reported lower levels than their MD faculty counterparts (Models 1, 2, and 2.3). The CLM construct, like the PUCL construct had no significant relationship with either approach to the role variable.

From the perspective of SCCT, a number of items within the PUCL and CLM scales are directly related to the model depicted in Figure 2–3. For example, a number of PUCL items query the degree to which faculty receive acknowledgement and recognition and feel valued for their contributions. These are forms of performance domains that directly shape learning experiences and thus affect both feelings of self-efficacy and outcome expectations. According the model, self-efficacy and outcome expectations then influence a faculty member's interests, goals, and ultimately actions or behaviors. A key component of SCCT is its dynamic nature that spans the entire career. Thus, changes in how an institution and its leadership reward performance domains can positively—or negatively—affect the feedback loop that shapes faculty behaviors. Contextual influencers are also represented in a number of items that assess opportunities for women and minority faculty. Personal factors and predispositions are also reflected in a number of items within the CLM scale. The ability to actively manage both personal and professional demands mediates how contextual support and barriers affect the other dynamic components of the model and ultimately shape behavioral choices.

Although role groups did not have any significant effects on the predictive vitality constructs, indirect effects were important when Researchers were compared to Administrators and all four individual MAC roles (Table E–3). In each case, direct effects were significant, but indirect and total effects were not. The mediating effects of PUCL and CLM constructs, though not significant themselves, rendered the total effects for these groups nonsignificant. In contrast, all differences between Clinicians and other role groups were found as significant direct and total effects. From a workplace environment perspective, it is reasonable to suppose that Researchers, Clinicians, Administrators, and MACs function in somewhat different cultures and climates. These data suggest that relative to Researchers, institutional (PUCL) and individual (CLM) factors lessened the direct effects of Administrators and MACs but not of Clinicians, on a number of vitality measures.

Evaluating role variables. Evaluation of this new variable included comparisons of the role approaches to each other as well as to department and degree. This section examines this evaluation and highlights role's most influential effects.

Two approaches to the role variable. This research employed two methods to compare the impact of adding each role approach to the basic vitality model. The first method examined model fit indices generated by path analyses of all three models (Models 0, 1, and 2). These results were inconsistent as one or more indices indicated preferences for all three models: role not included in the model, role represented as percent time, and role represented as groups. In general, those indices that penalize models for complexity revealed extremely poor model fit for all three models. These conflicting results led to the second strategy of evaluating ΔR^2 through hierarchical linear regression models. These analyses determined that adding each approach to the role variable was a significant addition to the basic model. Although adding role groups captured an additional 3.1% of the variance (over the basic model) and adding percent time variables (teaching, research, and administration) only captured an additional 1.8%, the Hotelling's *t*-test failed to determine that this difference was statistically significant. This determined that both role approaches, at least statistically, were equally valuable additions to the basic model. From an interpretability standpoint, however, role groups offer some advantages over percent time variables; these are discussed later in this chapter (*Research Implications* section). Net the effects of all other variables in the model, role, department, and degree each generally had small effects on the vitality measures. As will be discussed later, some of the effects of role were larger than those of department and degree. From a practical perspective, aside from statistical coefficients, the diversity of department cohorts poses challenges when implementing applications to support faculty. Role groups, however, by design, create cohorts with shared behavioral patterns that are meaningful not only in research to improve our understanding of faculty but also for direct practical applications (e.g., faculty development interventions). These implications are also discussed later in this chapter.

The findings of the present study are partially at odds with the extant literature regarding time spent engaged in research, administrative duties, and teaching. At the University of Minnesota–Twin Cities, Bland, Center, et al. (2005) reported that the number of hours spent in research, administration, and teaching each had a weakly positive but significant relationship with satisfaction. Schindler et al. (2006) also found that faculty who spent more time engaged in research were slightly more satisfied. Although this study failed to reveal a significant relationship between satisfaction and percent time spent engaged in research or teaching, it did reveal weakly positive relationships between research time and FV score as well as administrative time and satisfaction. Relative to research productivity, Bland et al. (2002) found weak but significant relationships between productivity and the number of hours per week involved in research ($\beta = .019$), administration ($\beta = .057$), and teaching ($\beta = -.065$). The present study revealed no relationship between research or teaching time with productivity and a weakly negative relationship with administrative time. With respect to time spent engaged in patient care, this study's findings agree with those of Buckley, Sanders, Shih, and Hampton (2000) who found that MDs who spent more than 50% of their time seeing patients were less satisfied with academic medicine. These authors found this to be true even though those clinicians valued patient care more than scholarship. They also reported that physicians in this group had lower rank and were less likely to be tenured than those who spend less than 50% of their time seeing patients, reinforcing the important relationship between rank and satisfaction.

Although findings related to the role variable were significant and help advance our understanding of faculty, they also raise new questions and interpretive challenges. For example, being a Researcher or Juggler (versus a Clinician) had negative effects on productivity; however, having a PhD or MD-PhD (versus an MD) had positive effects. Although the present study did not examine the distribution of role groups within degrees and department types, it is likely that the PhD cohort is primarily comprised of Researchers and Jugglers, the two groups with the most negative effects on productivity (relative to Clinicians). Among Researchers and Jugglers, 10% and 16% hold only MD degrees respectively (see Table 3–9). These MDs then would contribute to the negative effect within these two groups. However, 32% of Teachers and 47% of Administrators are also MD faculty, yet these groups had less negative effects than Researchers and Jugglers. As mentioned, it is unknown if the productivity scale error (see *Limitations*) can explain these paradoxical effects on productivity. These findings highlight our assumptions related to the degree(s) faculty hold and the roles faculty play and demonstrate that the roles faculty play within the degree cohort are diverse.

Another set of findings is interpretively challenging. Although time spent engaged in patient care had a positive relationship with productivity, MDs reported lower productivity than their PhD colleagues. Similarly, time spent seeing patients had a negative effect on satisfaction and overall FV score; however, MDs reported higher levels of satisfaction and FV scores. The discrepancy between the findings of these variables perhaps highlights the erroneous assumption that all MDs are involved in patient care.

Role's most influential relationships. Thus far, discussion of the effects of role, department, and degree has included all effects (direct, indirect, and total), with some acknowledgement of differences in effect sizes. Although somewhat arbitrary, examination of only those total effects greater than 0.15 allows role's most influential effects to emerge. For comparison, department and degree failed to generate any effect sizes greater than this threshold. Of the percent time variables, only the patient care variable crossed this threshold; however, its negative effect on overall FV score (−0.20) was the highest among all the role variables (percent time and role groups). Notably, this effect is less than rank and is generally still considered a small effect (Cohen, 1988).

A number of relationships between role groups also crossed this 0.15 effect size threshold, and all included single activity Clinicians. However, because this study only examined 21 of the possible 36 role group comparisons, other relationships may also cross this threshold. Regarding comparisons between Clinicians and nonclinician role groups, two relationships stand out: those with Researchers and Jugglers. Clinicians reported that they were more productive relative to what was expected from them than Researchers and Jugglers, net the effects of other variables in the model. Clinicians also had lower overall FV scores than Researchers and reported higher levels of engagement than Jugglers (Figure 5–1). Thus, Researchers and Jugglers were primarily responsible for the lower productivity of nonclinicians (−0.12) when they were compared to clinicians in Model 2.1. However, given the aforementioned uncertainties related to the productivity scale for nonclinican faculty, it is unclear how meaningful these results are. None of the role group variables affected the predictive vitality constructs (PUCL and CLM), and none of the effects on the constituent constructs included significant indirect effects. Thus, these differences between Clinicians, Researchers, and Jugglers result from the direct effects of belonging to these role groups rather than from institutional (PUCL) or individual (CLM) predictive factors.

Regarding comparisons between single-activity Clinicians and other clinician roles, two relationships also stand out: those with Clinician-Jugglers and the combined cohort of MACs. Relative to both of these groups, single-activity Clinicians had lower FV scores. This aligns with the finding that spending more time seeing patients is related to lower FV scores (and to a lesser degree higher levels of productivity and lower levels of satisfaction). These relationships between single-activity Clinicians and MACs also led to the previously described claim that, among physicians, wearing more academic hats is associated with higher FV scores (and to a lesser degree higher levels of satisfaction and lower levels of productivity and engagement).

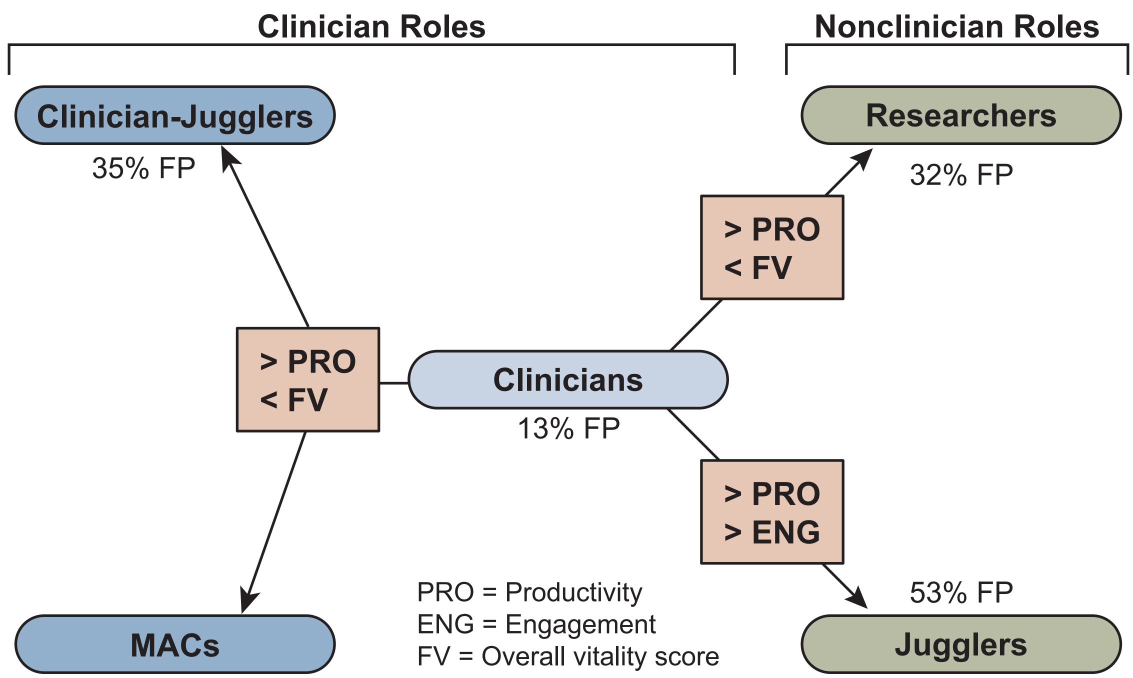


Figure 5–1. Role group relationships with total effect coefficients greater than 0.15. Squares and arrows indicate which vitality measures are involved and the direction of the each relationship. For example, Clinicians have lower overall faculty vitality scores than Researchers, Clinician-Jugglers, and Multiple-activity Clinicians (MACs). The percent of faculty in each role group holding the rank of full professor (FP) is also shown, except for the combined cohort of MACs.

Finally, because rank is the benchmark variable with the highest effect sizes, the percent of full professors in each of these key role groups have been included in Figure 5–1. It should be noted, however, that the effects of rank were controlled for, and the effects of all role groups are over and above the effects of all variables in the models, including rank. Jugglers had the highest percentage of faculty at the rank of full professor (53%), whereas single-activity Clinicians had the lowest (13%). Clinicians also had the highest percentage of faculty at the rank of assistant professor (60%). Administrators and Clinician-Administrators have high percentages of faculty at the rank of full professor (51% and 47% respectively), suggesting an expected relationship between leadership and higher rank (Tables 3–9 and 3–10).

As mentioned, Buckley, Sanders, Shih, and Hampton (2000) also described the tendency of Clinicians to have lower rank. They questioned if department or division chairs have a conflict of interest when performing annual reviews with faculty with large clinical responsibilities. These leaders have a financial interest in encouraging their clinical faculty to increase clinical productivity but little financial interest to invest in their scholarly activity or other activities that would enhance likelihood for promotion. These authors further question if it is fair for promotion criteria include national recognition and scholarly activity when the duties of clinical faculty focus so heavily on local service. They also reported that career development resources and mentoring for faculty who spend more than 50% of their time seeing patients were lacking. The role variable offers a clear means to study this cohort and track changes over time. Although the professional development scale was not included in this study, future research can examine such differences among role groups. However, regarding institutional support (PUCL), this research found no significant difference between Clinicians and any other role group.

Similar role groups. No significant differences emerged in any of the six FV constructs between the following three group pairs that all involve a teaching component: Clinicians and Clinician-Teachers, Researchers and Teachers, and Jugglers and Teachers. However, the general lack of significant differences found relative to the Teacher role group may be due, in part, to its low sample size, high standard errors, and thus higher proverbial “significance bar.” Nonetheless, the teaching component of faculty roles may not add a meaningful difference among faculty cohorts. Further, no significant differences emerged in any of the six FV constructs between Jugglers and Clinician-

Researchers. This study only ran three role groups as reference groups (Clinicians, Researchers, and Jugglers) and thus examined only 21 of the possible 36 role group comparisons, so other role group similarities may also exist.

Clinician groups. Clinicians (single-activity) reported higher levels of productivity than all other groups, with the exception of Clinician-Teachers. This finding is important because it includes most of their MAC colleagues and thus would not be affected by the limitation of the productivity items (see p. 175). Clinician-Researchers, Clinician-Administrators, and Clinician-Jugglers reported significantly lower levels of productivity but had higher overall FV scores than their single-activity Clinician colleagues. Thus, for faculty who spend at least 20% of their time seeing patients, these data demonstrate an association between participating in at least one additional activity and feeling less productive relative to expectations yet more vital. Clinician-Administrators and Clinician-Jugglers also report feeling less engaged but more satisfied. The highest effect sizes for all measured constructs occurred with Clinician-Jugglers, those clinicians who added two or three additional activities to their patient care responsibilities. The positive relationship between percent time spent in patient care and productivity and the negative relationship with satisfaction and overall FV score aligns with these role group findings because single activity Clinicians spend more of their time seeing patients.

Finally, Clinician-Researchers reported feeling less satisfied (direct effect only) than Researchers (their nonclinician research-focused colleagues), suggesting that the combination of both clinician and research responsibilities can compromise satisfaction. However, no other significant differences emerged between these two groups.

Administrative roles. Spending more time dedicated to administrative duties at the expense of the other activities was related to a slight but significant increase satisfaction and overall FV score but also a slight but significant decrease in productivity. These associations were also demonstrated when examining administrative role groups and also had slight but significant effect sizes. With respect to levels of satisfaction, Clinician-Administrators reported higher levels than their single-activity Clinician colleagues, though this may also be due to the effect of adding an additional role. Administrators reported higher levels of satisfaction than Clinicians, Researchers, and Jugglers. With respect to overall FV scores, both Administrators and Clinician-Administrators also scored higher than Clinicians.

Activity type versus number. The results of collapsing role groups by activity type (patient care and research) did not produce substantively different faculty cohorts. However, these models, along with Model 2, shifted attention toward the number of activities in which faculty engage or the number of academic hats they wear. This pattern of findings led to an exploration of the literature on job complexity, which is described later in this chapter.

Because of the numerous differences between Clinicians and nonclinician role groups it was thought that clustering groups to compare clinician to nonclinician roles would produce multiple significant differences. For example, when Researchers served as the reference group, not as many differences emerged as when Clinicians served as the reference group. This was primarily because far fewer significant comparisons emerged between Researchers and the other nonclinician roles. Further, comparing those faculty who generally do not see patients with those who do examined one of the fundamental ways we have conceptualized basic science versus clinical faculty. According the rubric, this model compared faculty who engaged in patient care less than 20% of their time (the combined nonclinician groups) to those who engaged in patient care 20% or more of their time (the combined clinician groups). The nonclinician group reported that they were less productive (−0.12) than the clinician group, net the other effects in the model. However, this was the only significant difference to emerge. Due to the error in the productivity scale this difference may or may not be meaningful. Importantly, the nuanced findings related to patient care time and separate role groups were lost this higher order model. Recall that every 10% increase in percent time engaged in patient care was associated with not only a 0.13 standard deviation increase in productivity but also a 0.11 standard deviation decrease in satisfaction and a 0.20 standard deviation decrease in overall FV score. The loss of these more refined findings suggests that faculty may be too complex for such a dichotomous cohort.

Clustering groups to compare research and nonresearch groups also failed to produce substantively different cohorts. This model combined Researchers and Clinician-researchers into a single cohort. The groups had similar vitality measures except Clinician-Researchers were slightly less satisfied than Researchers, an effect that was direct but not significant as a total effect. Thus combining these groups somewhat neutralized satisfaction scores; however, Clinician-researchers (n = 66) were a much smaller group than Researchers (n = 354). Controlling for all other measures in the model, the only difference to emerge was that the combined research group had slightly higher overall FV scores (0.06) than the combined nonresearch group. This finding aligns with the positive relationship between percent time spent in research and overall FV score (0.10).

Even though they represent major ways in which we have conceptualized basic science and clinical faculty, collapsing roles to form dichotomous clinician/nonclinician or research/nonresearch groups failed to create substantively different role cohorts. These findings align with those related to the percent time variables and support the following general assertions: (a) Time allocated to research is less influential on the vitality measures than time allocated to patient care, and (b) faculty may be too complex for dichotomous approaches to patient care and research roles. Because both of these models (2.1 and 2.2) yielded a significant difference in only a single vitality measure, they could have suggested that faculty were fairly homogeneous in terms of their experiences of vitality constructs. However, the comparisons of the nine role groups and other higher order models proved otherwise. The findings related to the nine role groups were not only more numerous but also more nuanced than these two more parsimonious models. In contrast, collapsing roles according to activity number rather than type yielded more useful data.

Relationships between activity number and FV constructs. Although this study provides no evidence for a relationship between the number of activities that faculty engage in and their experiences of the PUCL and CLM constructs, several patterns emerged among the constituent vitality constructs and overall FV score. In order to clarify the analysis of these relationships, clinician roles were separated from nonclinician roles (Table 5–1). This separation is justified if we suppose that activity number is more important among clinician roles than nonclinician roles. Two findings from this study support this supposition. First, when comparing single-activity Clinicians to MACs, clear patterns emerged: MACs were less engaged and productive but more satisfied and had higher overall FV scores (with the exception of Clinician-teachers). The analogous finding among nonclinician faculty, however, was much less clear. Second, when examining all faculty, those who substantively engaged in more than one activity reported being less productive and less engaged than those who primarily focused on a single activity. Although no significant difference emerged for levels of satisfaction, multiple-activity faculty had higher overall FV scores. Smaller effect sizes and absence of a significant difference in satisfaction for this model suggest that the effects of engaging in multiple activities are larger for clinician than nonclinician role groups. Thus it seems that when examining multiple- versus single-activity faculty, separating nonclinicians and clinicians creates more meaningful cohorts.

Table 5–1

Relationship between number of faculty activities and vitality constructs

	Clinician role groups only (relative to Clinicians)		
FV Constructs	Single > Multiple	NS[a]	Multiple > Single
Productivity	C > CR, CA, CJ C > MACs	CT[b]	
Engagement	C > CA, CJ C > MACs	CT[b], CR	
Satisfaction		CT[b], CR	CA, CJ > C MACs > C
Overall FV Score		CT[b]	CR, CA, CJ > C MACs > C

	Nonclinician role groups (relative to Jugglers) and all faculty relative to MAFs)		
FV Constructs	Single > Multiple	NS[c]	Multiple > Single
Productivity	SAFs > MAFs	T[d], R, A	
Engagement	R > J SAFs > MAFs	T[d], A	
Satisfaction	A > J[e]	T[d], R SAFs	
Overall FV Score		T[d], R, A	MAFs > SAFs

Note. NS = Nonsignificant comparisons; T = Teacher; R = Researcher; A = Administrator; J = Juggler; C = Clinician; CT = Clinician-Teacher; CR = Clinician-Researcher; CA = Clinician-Administrator; CJ = Clinician-Juggler; MAC = Multiple-activity clinician; MAF = Multiple-activity faculty; SAF = Single-activity faculty.
[a]Comparisons are between the Clinician role group and other clinician role groups. [b]No significant difference was found between Clinicians and Clinician-Teachers among any of the vitality constructs. [c]Comparisons are between Jugglers and other nonclinician role groups or all multiple-activity faculty and all single-activity faculty. [d]No significant difference was found between Teachers and Jugglers among any of the vitality constructs. [e]This effect was significant as a direct effect but not as a total effect.

Examination of data from all models for relationships between activity number and vitality constructs supported two general assertions. First, as faculty increase the number of academic hats they wear, they tend to report lower levels of productivity and engagement but higher levels of satisfaction and have higher overall FV scores. Second, this relationship is much clearer and stronger among clinician role groups (i.e., faculty who spend at least 20% of their time seeing patients). This finding was especially interesting because collapsing role groups into clinician and nonclinician roles failed to reveal substantively different cohorts. The relationship between activity number and vitality requires further investigation because a number of relationships between clinician roles show no significant difference when this pattern suggests there should be. For example, no significant difference in levels of engagement or satisfaction emerged between Clinician-Researchers and Clinicians when the pattern suggests that Clinicians should be more engaged and less satisfied. It is unknown if these exceptions are related to the role variables, vitality constructs, or both. Further, more investigation is needed to parse out differences that occur along both dimensions of these comparisons: number of activities and clinician versus nonclinician roles. It is the combination of these dimensions that appears to be important.

Faculty time autonomy. This study assumes faculty autonomy is sufficiently high that choices related to time allocation are reflections of faculty preference rather than the demands of their leadership or institution. This assumption is also essential to linking behavioral choices to perceptions of self-efficacy and outcome expectations within SCCT. The following survey item examined time autonomy: “I have input into how I spent my time.” Its response set ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). The assumption proved to be reasonable in that 82% of participants either strongly or somewhat agreed with this statement. Time autonomy was included as a CLM item, not as a separate variable in the analyses. Although the assumption that faculty have autonomy with respect to how they spend their time was generally true for the entire sample, significant differences emerged when comparing time autonomy across various cohorts.

The general finding was that faculty involved in clinical and nonresearch work reported having less autonomy over how they spend their time than their nonclinical and research-focused colleagues. This was found in all cohort approaches: department, degree, and role; however, the role variable allowed more nuanced findings to emerge. Clinicians reported less control over their time than Clinician-Administrators or Clinician-Jugglers, suggesting that faculty hired to primarily see patients feel that they have less time autonomy than some of their physician colleagues who are also involved in other activities. Because nonresearchers reported less time autonomy than researchers, it was somewhat surprising to find no significant difference between Clinicians and Clinician-Researchers. The positive association of time autonomy with number of activities was not only true among some clinician roles but also when the entire sample was collapsed into single- and multiple-activity cohorts. Engaging in more activities was associated with having increased time autonomy, a relationship that is addressed within the job complexity literature.

Job Complexity Literature

A number of key findings that emerged in this study highlighted the importance of the number of activities in which faculty engage. These findings led to an exploration of the job complexity literature and the deliberate choice to use the terms *single-* and *multiple-activity roles* versus *simple* and *complex roles*. Further, it seemed inaccurate—if not pejorative—to label any roles of faculty in academic medicine as “simple.” Chung-Yan (2010) describes complex jobs as “characterized by ambiguity, difficulty, and lack of structure;" further, they are "mentally challenging and require the worker to use a number of complex skills" (p. 237). The complexity of these jobs demands novel and flexible approaches to problem solving as well as skills in discerning the advantages and disadvantages of multiple possible solutions. However, in much of this literature, the continuum of complexity spans from simple, routine, repetitive tasks to complex skills requiring nuanced problem solving abilities.

Job complexity is sometimes measured using a questionnaire. Chung-Yan (2010) and Chung-Yan and Butler (2011) used four items from the Work Design Questionnaire of Morgeson and Humphrey. A sample item is as follows: "The job requires that I only do one task or activity at a time" (p. 241). Shaw and Gupta (2004) assessed job complexity using three items from Cammann, Fichman, Jenkins, and Klesh: "My job is very complex;" "My job requires a lot of skill;" and "My job is such that it takes a long time to learn the skills required to do the job well" (p. 852). In contrast to questionnaires, Shalley, Gilson, and Blum (2009) chose to use a non-self-report method and coded jobs using the *Dictionary of Occupational Titles* substantive complexity score (Roos & Treiman, 1980). They described this score as measuring "whether jobs are autonomous in nature, whether the work is routine, and whether they allow for decision latitude" (p. 496). Defined in these terms, job complexity has only limited application to the present study. If job complexity were measured (regardless of how) for the nine faculty role groups, it is likely that all would score very high and with little variance. Nonetheless, the concepts of multiple-activity roles and complex jobs may be analogues in that they share an increased diversity in job performance. A brief review of this literature can provide another perspective to understand the role variable along the dimension of single- versus multiple-activity faculty.

Champoux (1980) extended the Hackman-Oldham job characteristics model of work motivation by describing the relationship between job scope (another term for job complexity) and affective states as an inverted "U." In other words, jobs overly narrow or broad in scope were associated with lower affective responses. Diminishing returns in psychological responses were described when job scope continued to increase.

When developing the Job Diagnostic Survey, Hackman and Oldham (1975) developed the idea of *growth need strength* (GNS) to describe a person's desire for growth. They found that "people high in growth needs tend to respond more readily to 'enriched' jobs than do people with little need for growth" (p. 169). They also found that high GNS was associated with stronger relationships between job dimensions and affective responses to these jobs. Shalley et al. (2009) describe those with high GNS as wanting "to learn new things, stretch themselves, and strive to do better in their jobs" (p. 489). They studied the associations between GNS, supportive work environments, job complexity, and levels of creativity. They found that job complexity did have moderating effects on these relationships. However, they unexpectedly found that those with high GNS, supportive work environments, and low job complexity were not remarkably less creative than those with high job complexity. Though conjecture at this point, it is reasonable to suspect that faculty who choose multiple-activity roles have higher GNS than those who choose single-activity roles. According to SCCT and Bandura's triadic reciprocal causation model, GNS can be seen as a personal factor that influences behavior and choice through self-efficacy and outcome expectations. The behavior to seek additional academic roles would then lead to outcomes in various performance domains and either positive or negative feedback. This feedback is both external (e.g., acceptance or rejection from significant mentors, peers, and leadership) and internal (e.g., sense of self-satisfaction and well-being).

Shaw and Gupta (2004) related job complexity, career fit, and well-being. They defined well-being as the absence of “somatic complaints and depression” (p. 849) and role complexity as previously described. They measured desire for job complexity by asking participants to draw an “X” on a line with two anchors describing tasks related to their preferred job, with one on each end: (*simple, all tasks are quite easy to do*) and (*extremely complex, every task is very difficult to do*). They found a positive relationship between well-being and congruity of desired and actual job complexity, whether they were both high or both low. This represents another aspect of “fit” (or misfit) between job preferences of the individual and actual job characteristics. The relationship of career fit relative to job complexity could be applied to the number of roles that medical faculty perform. Faculty who desire to wear the number of academic hats they actually wear would have greater fit, whether those hats are few or many. However, to assume that all faculty who currently have multiple-activity roles adopted them strictly by their own choice would likely be inaccurate. Lent (2013) wrote, “Throughout the choice process, people do not choose careers unilaterally; environments also choose people” (p. 123). The model shown in Figure 2–3 places this choice process in the complex arena of both proximal and distal influencers.

Chung-Yan (2010) studied the connection between job complexity and levels of autonomy and asserted the following:

> Job complexity can be engaging for workers assuming they are provided the resources to successfully complete their work. However, without sufficient resources job complexity becomes a roadblock, because the work can no longer be completed. (p. 240)

Chung-Yan used subscales from the Work Design Questionnaire (Morgeson & Humphrey, 2006) to assess job complexity, autonomy, job satisfaction, turnover intention, and psychological well-being. The conclusion was, “job complexity is not uniformly a motivator or a stressor, but shows features of both depending on the level of job autonomy” (p. 244). Job complexity was associated with positive outcomes, even with low levels of job autonomy; however, as job complexity increased, negative outcomes emerged. Increasing autonomy to match increasing complexity mitigated these negative outcomes, but, echoing Champoux’s work, this relationship was not linear. For example, at very high levels of job complexity, increasing job autonomy became less associated with improving outcomes because they eventually plateaued. Not surprisingly, Chung-Yan (2010) found the worst overall outcomes were associated with high job complexity and low job autonomy. One of the practical implications of this work for those in leadership positions at AMCs is that as the complexity of faculty work increases so too should levels of faculty autonomy. Acknowledging differences in definitions, the present study demonstrates that faculty with multiple-activity roles report having more input regarding how they spend their time, an aspect of job autonomy.

Chung-Yan and Butler (2011) generally found job complexity to be beneficial; however, this relationship is complex and moderated by individual factors such as a proactive personality. Using Bateman and Crant’s definition, they described proactive personality as “the extent to which individuals are prone to taking steps to bring about change or affect their surrounds” (p. 280). Of their findings, the most applicable to the present study was that some degree of job complexity benefits those with both high and low levels of proactive personality. However, when job complexity was "moderate to high," high levels of proactive personality were associated with more positive outcomes, whereas low levels of proactive personality were associated with more negative outcomes. This concept of a proactive personality and the CLM construct are analogues. The work of Dankoski et al. (2011) and the present study have demonstrated a positive relationship between CLM scores and vitality constructs. However, single- and multiple-activity faculty demonstrated no differences in CLM scores, neither in clinician nor nonclinician subgroups.

Although these job complexity studies examined a wide range of jobs, they did not focus on jobs as complex as those in academic medicine. Also, the measures and definitions of job complexity in this literature are not consistent and only somewhat analogous to the concepts of single- versus multiple-activity roles. For example, the single-activity roles of Teacher, Researcher, Clinician, and Administrator could score very high on a job complexity questionnaire because their work is mentally challenging, sometimes ambiguous, demands nuanced approaches to problem solving, requires high levels of skill and training, and can clearly be described as "complex." The multiple-activity roles of Jugglers and MACs would also score high on such scales. Whether they would score significantly higher or not requires further research. Nonetheless, the job complexity literature generally supports the following relationships found in this study: (a) clinician roles that include additional academic activities are associated with higher levels of satisfaction and (b) all multiple-activity roles (clinician and nonclinician) are associated with higher FV scores than single-activity roles. Further, the job complexity literature can provide additional theoretical frameworks for future research.

Implications

Understanding faculty. This study provides abundant data describing how demographic and role variables influence how faculty experience the vitality constructs described by Dankoski et al. (2011). Previously in this chapter, I reviewed role's most influential relationships by focusing on those with effect sizes greater than 0.15. Although this threshold is admittedly somewhat arbitrary, it allows the most influential relationships to emerge and thus indicate which faculty variables are the most meaningful relative to the vitality measures. With respect to demographic variables, rank was the only one also to cross this threshold and demonstrated that faculty with lower rank scored lower on all constituent outcome measures. With the exception of satisfaction, assistant professors scored lower than associate professors (relative to full professors), net the other effects in the models. When these data are combined with the most influential role group relationships (Figure 5–1), lower ranking single-activity Clinicians emerge as a particularly vulnerable cohort. Role data also show that the effects of belonging to the Clinician role group and allocating time for patient care (at the expense of other academic activities) do not significantly affect the institutional (PUCL) and individual (CLM) predictive faculty constructs. In other words, their influences on the constituent vitality constructs occur only as significant direct and total effects. The same is true for holding the rank of assistant professor, when compared to full professor. However, associate professors scored lower than full professors on the CLM construct, indicating that—net the other effects in the model—they have a less confident approach to managing their careers and life demands than full professors. Further, they indicate that they are less proactive and have less agency and autonomy. Thus, supportive development efforts for these faculty directed at these areas could be beneficial.

As mentioned, only 21 out of the 36 role group comparisons were evaluated in this study. Exploring all relationships may lead to additional role-specific implications. These analyses will be part of continuing this line of inquiry.

Theoretical implications. This study supports conceptualizing vitality as the synergistic effects of multiple constructs as described by Dankoski et al. (2011). However, this study also suggests that the conceptual model shown in Figure 2–7 may need to be modified.

The path analysis of this study described several previously unexplored relationships. For example, the linear regression models in the Dankoski et al. (2011) study were able to separately describe the relationships represented by straight arrows (beta coefficients) in Figure 4–2. These coefficients from the 2009 and 2011 data sets were compared previously. However, regression models were not able examine the relationships indicated by curved arrows (psi coefficients). Among the constituent vitality constructs, the relationships between satisfaction and productivity and satisfaction and engagement were significant but very small ($\psi = .09$, $p < .001$; $\psi = .03$, $p < .05$). In contrast, the relationship between productivity and engagement was significant and much larger ($\psi = .34$, $p < .001$), though still fell into the “medium” effects category described by Cohen (1988). As mentioned, this correlation makes intuitive sense in that higher levels of professional engagement are likely associated with higher productivity. This relationship, however, was stronger than the relationships between the CLM construct and all three constituent vitality constructs.

In addition, the PUCL construct offers a number of interpretative challenges. Perhaps most troubling was the unexpected negative effect it had on productivity. Coefficients with a sign opposite of expectations that cannot be explained suggest a need for further investigation and possible model modification. Also, the lack of a significant relationship between PUCL and engagement scores is difficult to explain because perceptions of a supportive climate and leadership would be expected to relate to levels of professional engagement. In the 2009 dataset, this relationship was significant but the smallest of the three constructs ($\beta = 0.17$, $p < .001$). Lastly, the relationship between the PUCL and CLM constructs ($\psi = .41$, $p < .001$) was medium to large. The magnitude of this coefficient, along with the unexpected negative coefficient for productivity and the nonexistent (to small) coefficient for engagement, all suggest a need to revisit the meaning of this construct and its relationships in the existing model.

Regarding the relationships depicted in the conceptual model shown in Figure 3–2, path F emerged as one of the strongest. The CLM construct had consistent, positive effects on productivity, engagement, satisfaction, and overall FV score, ranging from 0.24 to 0.37. The PUCL construct was less consistent, having a negative effect on productivity (−0.12), no effect on engagement, a strong, positive effect on satisfaction (0.57), and a small-to-moderate effect on overall FV score (0.24). Paths B and E represent significant but smaller relationships between demographics, role, and the constituent vitality constructs. Path C represents a number of significant relationships between demographics and the predictive vitality constructs, predominantly with CLM.

Path D was not supported, as no relationship between role and the predictive vitality constructs emerged, for either approach to role. Lastly, the model fit indices that were relatively free from biases indicated that the current model poorly fits the sample data of the present study.

Although this study suggests the need to reexamine the existing vitality model, it offers support for broadly conceptualizing vitality as the synergistic effects of productivity, engagement, and satisfaction rather than a narrow focus on one construct. The data clearly demonstrate that faculty can perceive themselves as more engaged and productive but less satisfied (and vice versa). This is evidenced by not only the very small relationships between satisfaction and productivity and satisfaction and engagement but also the patterns of findings among the role groups. Thus, these constructs should be studied separately and not assumed to function at equal levels among all faculty. Researchers who conflate productivity measures with satisfaction or vitality risk missing much of how faculty experience their professional lives.

Research implications. This study demonstrates that research of how medical school faculty experience the vitality constructs, as described in this paper, can benefit from including the role variable in both formats: percent time variables and role groups. The addition of percent time variables to the model was associated with a significant, though small, increase in ΔR^2 (1.8%) as was the addition of role groups (3.1%). The effect sizes of both role approaches were generally similar to department and degree but were larger for a number of comparisons; these are shown in Figure 5–1. Thus, the role variables demonstrated that, over and above the effects of other measures in the model (including department and degree), their effects on vitality measures were meaningful and worthy of inclusion in future research.

Aside from comparing effect sizes, I have argued for questioning the meaningfulness of both the department and degree variables due to the significant diversity and static nature of each cohort. The diversity of the department variable has led some researchers to exclude PhD faculty in clinical departments from study. Exclusion of this sizable cohort represents not only a research bias but also a disregard for their support and development. Other challenges of the department variable relate to inconsistencies or ambiguities in how “basic science” and “clinical” designations are made. Also, as organizational models evolve, some are implementing structural changes that affect these departmental designations, and some no longer include departments as the structural unit of AMCs. Thus, the challenges of the department variable are particularly formidable in multi-institutional research. However, within individual institutions, the department variable can be useful for faculty studies, especially for those related to institutional topics such as organizational structure, resource allocation, or other supportive measures. An advantage of the degree variable is its ability to capture the shared values and goals of MDs and PhDs that may be associated with the complex and lengthy socialization process of these cohorts. This variable, however, is based on a choice to attend medical or graduate school that occurred in the past—sometimes distant past—and may not represent important career choices made since that time, such as an MD’s decision to no longer see patients or a PhD’s transition from research to teaching or administration. Finally, neither department nor degree should be used as proxies for or conflated with basic science and clinical faculty terminology. This study clearly demonstrated that the results generated by the degree proxy can directly oppose those of the department proxy.

In contrast to department and degree, the role variables are, by definition, more similar than diverse and more dynamic than static. Grouping faculty by how they choose to spend their time creates cohorts of those who made similar behavioral choices, which are guided according to SCCT by perceptions of self-efficacy and outcome expectations. These choices can change over the career span, and asking faculty to report their time allocations from the previous year ensures that role variables are dynamic and reflect behavioral changes, if they occur.

Although both approaches to the role variable are valuable additions to the repertoire of faculty research variables, the percent time variables have several limitations. The first relates to an interpretability challenge of choosing a reference activity. This choice is necessary because the four variables must sum to 100 and thus colinearity concerns mandate that they cannot all be included in a model. If all medical school faculty participated in one of the activities, it could have served as a meaningful reference activity; however, this was not the case. Further, the highest mean time spent activity was patient care, making it a potentially favorable reference group choice. However, comparing changes in time spent in other activities relative to patient care would have been meaningless for faculty who do not—or cannot—see patients. Thus, four additional models were run, each with one percent time variable included in the model. As a result of this specification, these models are somewhat artificial, or at least overly simplified, in that they assume that time in one activity changes at the equal expense of the other three activities. The second disadvantage of the percent time variables is that they do not allow specific cohorts to be formed; however, they do help to explain some of the role group findings. The role groups allowed more nuanced insights to emerge and created functional groups of faculty who spend their time in similar ways. These cohorts are useful not only for development programs and interventions but also further study. As institutions continue to "unbundle" faculty roles and faculty become increasingly "differentiated" (Bland et al., 2006), the role variable can offer a simpler way to study these faculty cohorts and their professional experiences, especially across multiple institutions. Because exact academic tract definitions vary widely among AMCs, multi-institutional research involving tract as a variable is particularly challenging. In contrast, the time allocation rubric can be applied to self-reported time spent data, which is easy to collect. Finally, because significant differences in time autonomy emerged among role groups, future research of vitality models that include role should consider including time autonomy as a separate independent variable.

Practice implications. This research is too new and limited in scope to directly impact decisions and change policy today. However, with further research, this line of inquiry can ultimately have multiple practical implications. For example, this study reveals to policy leaders that Clinicians, the largest role group, spend at least 70% of their time seeing patients (M = 77%, SD = 9%). Similar time spent data for all role groups paint a clearer aggregate picture of the faculty that includes not only how they allocate their time but also how each mission of the institution is (or is not) being served. Policy leaders can benefit from this kind of research that helps them adjust hiring practices to best fit the evolving needs of the institution. This can also be accomplished through the continued development of academic tracks. Research involving the role variable can help leaders not only align academic tracks with the needs of the institution but also with reward structures.

More local leadership (e.g., department chairs) can use this research to manage faculty expectations as part of their efforts to retain and recruit faculty. For example, the vitality pattern of multiple-activity faculty may be particularly important for chairs who wish to better understand and manage the culture of their departments, especially as it relates to productivity expectations. Recognizing that multiple-activity faculty tend to view their productivity as lower than their single-activity colleagues can be a valuable insight. How faculty perceive their level of autonomy with respect to how they spend their time is also important. The differences that emerged on this item relative to role groups and the number of academic hats faculty wear can also inform institutional leaders. The role variable may prove to be especially important as chairs manage today's faculty who are becoming increasingly diverse and adopting nontraditional roles.

Finally, the insights related to how faculty spend their time and how they experience their professional lives can inform faculty development professionals to improve tailored supportive interventions. As mentioned, single-activity Clinicians had lower FV scores than most other groups, including their clinician colleagues involved in academic activities in addition to their patient care responsibilities. Single activity Clinicians also emerged as the role group with some of the highest effect sizes, suggesting that this group could benefit from targeted support. When designing courses, developers can consider grouping Clinicians with Clinician-Teachers because no significant differences emerged between these two groups. Acknowledging the limitation of the small group size of Teachers, it would be helpful to know that they can be grouped with Researchers or Jugglers because no significant differences emerged between these groups for any of the six FV constructs. This study also suggests that designers of interventions for those with multiple-activity roles should consider focusing on improving productivity and levels of engagement, perhaps through time management programs. Designers are also served by the knowledge that this group may be challenging to recruit due to their relatively higher levels of satisfaction (i.e., satisfied faculty members may not readily recognize that they could benefit from professional development efforts). Again, these findings are preliminary and further study is needed to inform future policy changes.

Recommendations for Future Research

This research has identified a number of directions for future study, including the following topics: the vitality model itself, a new approach to "career fit," the indirect effects associated with having a PhD, and specific role groups.

As mentioned, several findings related to the vitality model require further investigation and possibly model modification. Although model refinement was not the focus of this research, its findings provide direction for this future line of inquiry. As the survey instrument develops, LVPA versus OVPA can be used. A number of revisions have already been made to the instrument to try to address missing data (e.g., item analysis identified redundant items that have been eliminated to shorten survey duration). Further investigation and development of the professional development scale will also occur. Re-evaluation of the PUCL construct is necessary and may lead to either changing how the model is specified or how we conceptualize this construct. Further, fit indices indicate that that the model could benefit from less saturation and more parsimony.

The de facto manner in which this study assigned faculty to their roles based on estimated time spent data may not align with how faculty would self-identify their roles. Future research could compare how faculty self-identify their roles with how they spend their time. This comparison could generate a new approximation of "career fit" analogous to the approach of Shanafelt et al. (2009). Lowenstein et al. (2007) asked faculty to chose their role from among the following three choices: clinician researcher, primary researcher, and clinician-educator. However, as the present study shows, these choices are inadequate to capture the role complexity of medical school faculty. The concept of career fit can also be reflected by the degree of congruity between the actual number of academic hats a faculty member wears and the desired number of those hats. Improved understanding of the relationship between career fit (or misfit) and vitality would also be a valuable contribution toward supporting faculty.

More research is needed to understand several findings related to PhD faculty. Both the indirect effects of having a PhD (alone) on productivity, engagement, and satisfaction and its direct effects on PUCL and CLM scores suggest that the predictive vitality constructs may be especially important for this faculty cohort. The present study did not stratify PhDs according to department type; however, this would be useful given the suggestion of Bunton and Mallon (2006) that PhDs from clinical departments may feel that they do not have equal status with MD colleagues within their department. Also, the paradoxical relationships between percent time spent in patient care, productivity, and degree emerged as complex and require further study; future analysis of this dataset could address some of these questions.

A number of findings in this study suggest that the number of academic hats that faculty wear is as predictive of how faculty experience FV constructs as the role groups themselves. This pattern seems to be more prominent for clinician than nonclinician roles. Qualitative studies could address why this may be the case. More research is also needed to explore the combined role-related influences of clinician versus nonclinician *and* single- versus multiple-activity faculty. The concept of GNS from the job complexity literature can contribute to the future study of role variables through research that asks if multiple-activity faculty have higher GNS than single-activity faculty.

Synopsis and Strengths

The use of path analysis in this study represents a unique contribution to the study of medical faculty. As mentioned, there are a number of advantages that this kind of analysis can offer to faculty researchers. One of the most important is its ability to simultaneously analyze multiple, complex relationships and reveal both indirect and direct effects within a model. Research of the mediating effects of vitality's predictive constructs are important because they represent the institutional and individual factors that can be targeted by policy makers, local leadership, and faculty developers in their efforts to support faculty.

The initial relationships between vitality constructs studied by Dankoski et al. (2011) were based on a single AMC. A risk of any single institutional study is that it is limited to the culture and climate—both institutional and societal—of that AMC. Thus, policies, philosophies, values, and historical events unique to that institution or its location may influence the relationships being explored. This study expanded their work to include four geographically diverse AMCs. Although a wider array of medical schools should be the goal of future investigation, the present study represents an important first step in this direction.

The title of this study asks the following question: *Does time matter?* As is the case with most social research questions, the answer is *it's complicated*. Although this study is the first of its kind and much more investigation is needed, these initial analyses suggest a number of key findings. First, how faculty spend their time is a valuable and significant addition to faculty vitality models. Second, when examining the percent of time spent in single activities, time engaged in patient care and administrative duties are the most influential on vitality constructs, specifically productivity, satisfaction, and overall FV score. Although these relationships are helpful, they are somewhat artificial, or at lest overly simplified, because they assume that faculty increase (or decrease) time spent in one activity at the equal expense of the remaining three. Third, role groups allowed more nuanced analyses and revealed that some of the strongest relationships occurred between Clinicians and Researchers, Jugglers, Clinician-Jugglers, and the combined cohort of MACs. Fourth, the number of activities that faculty participate in is as important a predictor of how faculty experience vitality as their role groups. This is particularly important for those faculty who wear many academic hats because this research suggests that although they tend to feel more satisfied than their single-activity colleagues they also feel less engaged and less productive. Fifth, the patterns that emerged among single- versus multiple-activity faculty were much more evident in clinician than nonclinician roles. This was true even though the general comparison of clinician versus nonclinician roles was of limited predictive value.

Finally, this research demonstrates that the faculty descriptors of “basic science” and “clinical” have not only outlived their usefulness but also incur several important risks. When researchers fail to explicitly define these terms, they risk disseminating conflicting results that misrepresent faculty. Further, the terms force today’s complex composition of medical faculty into two overly simplified groups, each heavily burdened with many assumptions. The traditional proxies for these cohorts, department type and degree earned, have been shown to have a number of interpretive challenges. These relate primarily to their static nature that is tethered to the past and to the growing diversity of their cohorts. However, due to the historical privilege of “basic science” and “clinical” terminology it is unlikely to slip into obscurity any time soon. Nonetheless, it is past time to recognize the risk its continued use poses to advancing our understanding of faculty. The behavior-based role variables shift from a focus on simple traits to more complex attributes. Because they group faculty according to similar time allocation choices, role variables offer an alternative that is more current, dynamic, and directly applicable to supporting faculty. Further, role variables represent data that are easy to collect and compare across multiple institutions.

Appendix A

AAMC Departmental Designations and Faculty Counts 2011

Basic Science Departments	
Anatomy	1,747
Biochemistry	2,722
Microbiology	2,079
Pathology-Basic*	1,867
Pharmacology	1,985
Physiology	1,817
Other Basic Sciences	5,115
Total	**17,332**
Clinical Departments	
Anesthesiology	6,812
Dermatology	1,021
Emergency Medicine	3,221
Family Medicine	4,569
Internal Medicine	33,329
Neurology	4,427
OB/GYN	4,869
Ophthalmology	2,549
Orthopedic Surgery	2,785
Otolaryngology	1,666
Pathology-Clinical*	3,807
Pediatrics	17,004
Physical Medicine	1,277
Psychiatry	9,426
Public Health	1,022
Radiology	8,271
Surgery	11,934
Other Clinical Sciences	1,052
Total	**119,041**

* Some medical schools include pathology with basic sciences; others include it with the clinical sciences.

Source: AAMC Faculty Roster, Updated 1/2012
(Rowe & Wisniewski, 2012)

Appendix B

Representativeness and Distribution Data for Sample Demographics

Distribution of Faculty by School and Gender: Sample vs. Institution/School

	Sample			Institutional/School[a]		
Institution/School	Female (%)	Male (%)	Total	Female (%)	Male (%)	Total
IUSM	239 (35.3)	439 (64.7)	678	635 (34.5)	1,203 (65.5)	1,838
Penn State	77 (32.4)	161 (67.6)	238	276 (29.6)	658 (70.4)	934
UAMS	148 (36.0)	263 (64.0)	411	451 (38.5)	724 (61.5)	1,172
UIC	73 (42.9)	97 (57.1)	170	377 (37.0)	641 (63.0)	1,018
Total	537 (35.9)	960 (64.1)	1,497	1,739 (35.0)	3,226 (65.0)	4,962

Note. IUSM = Indiana University School of Medicine (all regional campuses); UIC = University of Illinois College of Medicine at Chicago; Penn State = Penn State College of Medicine; UAMS = University of Arkansas for Medical Sciences.

[a]Data from AAMC Faculty Roster 2011, accessed via the Faculty Administrative Management Online User System (FAMOUS).

Distribution of Faculty by School and Race: Sample vs. Institution/School

	Sample				Institutional/School[a]			
Institution/School	White (%)	Asian (%)	URM (%)	NR (%)	White (%)	Asian (%)	URM (%)	NR (%)
IUSM	500 (73.7)	93 (13.7)	45 (6.6)	40 (5.9)	1,179 (65.6)	256 (14.3)	86 (4.8)	275 (15.3)
Penn State	175 (73.5)	28 (11.8)	16 (6.7)	19 (8.0)	584 (64.2)	75 (8.3)	25 (2.8)	225 (24.8)
UAMS	285 (69.3)	68 (16.6)	46 (11.2)	12 (2.9)	676 (59.5)	99 (8.7)	64 (5.6)	298 (26.2)
UIC	103 (60.6)	32 (18.8)	18 (10.6)	17 (10.0)	517 (53.6)	176 (18.2)	50 (5.2)	222 (23.0)
Total	1,063 (71.0)	221 (14.8)	125 (8.4)	88 (5.9)	2,956 (61.5)	606 (12.6)	225 (4.7)	1,020 (21.2)

Note. URM = underrepresented minority (URM for sample includes the following: Black, Hispanic, Multiple races, Native American, and Other); IUSM = Indiana University School of Medicine (all regional campuses); UIC = University of Illinois College of Medicine at Chicago; Penn State = Penn State College of Medicine; UAMS = University of Arkansas for Medical Sciences.

[a]Data from AAMC Faculty Roster 2011, accessed via the Faculty Administrative Management Online User System (FAMOUS).

Distribution of Faculty by School and Rank: Sample vs. Institution/School

Institution/School	Sample				Institutional/School[a]			
	Full (%)	Assoc (%)	Assis (%)	Other (%)	Full (%)	Assoc (%)	Assis (%)	Other (%)
IUSM	163 (24.0)	191 (28.2)	316 (46.6)	8 (1.2)	379 (20.6)	421 (22.9)	1,027 (55.9)	11 (0.6)
Penn State	76 (31.9)	67 (28.2)	91 (38.2)	4 (1.7)	272 (29.1)	229 (24.5)	323 (34.6)	110 (11.8)
UAMS	134 (32.6)	105 (25.5)	154 (37.5)	18 (4.4)	289 (24.7)	239 (20.4)	490 (41.8)	154 (13.1)
UIC	54 (31.8)	57 (33.5)	58 (34.1)	1 (.6)	239 (23.5)	221 (21.7)	514 (50.5)	44 (4.3)
Total	427 (28.5)	420 (28.1)	619 (41.3)	31 (2.1)	1,179 (23.8)	1,110 (22.4)	2,354 (47.4)	319 (6.4)

Note. IUSM = Indiana University School of Medicine (all regional campuses); UIC = University of Illinois College of Medicine at Chicago; Penn State = Penn State College of Medicine; UAMS = University of Arkansas for Medical Sciences.

[a]Data from AAMC Faculty Roster 2011, accessed via the Faculty Administrative Management Online User System (FAMOUS).

Distribution of Faculty by School and Department Type: Sample vs. Institution/School

Institution/School	Sample				Institutional/School[a]			
	BSD (%)	CD (%)	Other (%)	Total	BSD (%)	CD (%)	Other (%)	Total
IUSM	71 (10.5)	581 (85.7)	26 (3.8)	678 (100)	206 (11.8)	1,504 (86.1)	37 (2.1)	1,747 (100)
Penn State	18 (7.6)	203 (85.3)	17 (7.1)	238 (100)	166 (18.1)	746 (81.4)	5 (0.5)	917 (100)
UAMS	49 (11.9)	358 (87.1)	4 (1.0)	411 (100)	158 (15.2)	826 (79.6)	15 (1.4)	1,038 (100)
UIC[b]	30 (17.6)	132 (77.6)	8 (4.7)	170 (100)	216 (21.8)	807 (81.4)	8 (0.8)	992 (100)
Total	168 (11.2)	1,274 (85.1)	55 (3.7)	1,497 (100)	746 (15.9)	3,883 (82.7)	65 (1.4)	4,694 (100)
All U.S. Medical Schools					17,356 (12.6)	119,295 (86.5)	1,274 (0.9)	137,925 (100)

Note. BSD = basic science department; CD = clinical department; IUSM = Indiana University School of Medicine (all regional campuses); UIC = University of Illinois College of Medicine at Chicago; Penn State = Penn State College of Medicine; UAMS = University of Arkansas for Medical Sciences.
[a] AAMC Faculty Roster, December 31, 2011 (American Association of Medical Colleges, 2013); AAMC Data Book includes a list of which departments are considered basic science versus clinical (see Appendix A); some discrepancy may exist between their designations versus those made for the sample. [b] Data from AAMC Faculty Roster is from all University of Illinois College of Medicine campuses, not just the Chicago campus.

Distribution of Faculty by School and Degree: Sample vs. Institution/School[a]

	Sample			Institutional/School		
Institution/School	MD (%)	PhD (%)	MD-PhD (%)	MD (%)	PhD (%)	MD-PhD (%)
IUSM	446 (65.8)	198 (29.2)	34 (5.0)	1,238 (68.4)	453 (25.0)	119 (6.6)
Penn State	155 (65.1)	73 (30.7)	10 (4.2)	591 (70.9)	203 (24.4)	39 (4.7)
UAMS	248 (60.3)	143 (34.8)	20 (4.9)	723 (65.8)	298 (27.1)	78 (7.1)
UIC	86 (50.6)	78 (45.9)	6 (3.5)	591 (59.0)	342 (34.2)	68 (6.8)
Total	935 (62.5)	492 (32.9)	70 (4.7)	3,143 (66.3)	1,296 (27.3)	304 (6.4)
All U.S. Medical Schools				88,577 (64.8)	32,401 (23.7)	10,131 (7.4)

Note. IUSM = Indiana University School of Medicine (all regional campuses); UIC = University of Illinois College of Medicine at Chicago; Penn State = Penn State College of Medicine; UAMS = University of Arkansas for Medical Sciences.

[a]Data from AAMC Faculty Roster 2011, accessed via the Faculty Administrative Management Online User System (FAMOUS); percentages adjusted to remove other degrees (e.g., Masters, etc.).

Appendix C

2011 IUSM Faculty Vitality Survey Codebook

The following pages contain the core and demographic items of the IUSM Faculty Vitality Survey and their response sets. Each item's variable name is also included. The variable names in Table 3–13 match those of the codebook but include a prefix to indicate on which scale they loaded.

Item #	*Variable*	*Variable Label*	*Response Values and Labels*

Many of the following items inquire about your experiences, perceptions, and satisfaction with the academic environment in what you consider to be your primary unit; that is, the unit you feel most closely affiliated.

Question 1. Please consider the following options and identify one as your primary unit:

Item #	Variable	Variable Label	Response Values and Labels
1a.	primary		1 = School 2 = Department 3 = Division 4 = Regional Center 5 = Other

Question 2. Consider your work over the last academic year, approximately what percentage of your time was devoted to activities related to the following areas (Must add to 100%):

Item #	Variable	Variable Label	Response Values and Labels
2a.	teach	Teaching	0-100%
2b.	research	Research	
2c.	clwork	Patient care/clinical work	
2d.	admin	Administrative duties (including committee service)	

Question 3. Consider your experiences over the last academic year and rate to what extent you agree with the following statements.

Item #	Variable	Variable Label	Response Values and Labels
3a.	engage	Colleagues are fully engaged in their work in my primary unit	5 = Strongly agree 4 = Somewhat agree 3 = Neither agree nor disagree 2 = Somewhat disagree 1 = Strongly disagree 9 = Not applicable/I don't know
3b.	facdev	Opportunities for faculty development are offered by my primary unit	
3c.	fairmec	Fair mechanisms for acknowledging achievements are in place in my primary unit	
3d.	women	Women have equal opportunity for advancement as men in my primary unit	
3e.	minorty	Minority faculty are provided equal opportunities for advancement as White faculty in my primary unit	
3f.	recruit	Effective recruitment strategies are in place for attracting the best talent to my primary unit	
3g.	share	There is a shared vision in my primary unit	

Item #	*Variable*	*Variable Label*	*Response Values and Labels*
3h.	netwrk	My primary unit is comprised of a well-developed network of colleagues	
3i.	value	My contributions are valued by the leaders in my primary unit	
Question 4. Consider your experiences over the last academic year and rate to what extent you agree with the following statements.			
4a.	retain	Effective strategies to retain productive faculty are employed by leaders of my primary unit	
4b.	achiev	Faculty achievements are often recognized by the leaders of my primary unit	
4c.	inclusv	An inclusive environment is created by the leaders of my primary unit	
4d.	conflct	Conflict is effectively handled by the leaders of my primary unit	5 = Strongly agree 4 = Somewhat agree 3 = Neither agree nor disagree 2 = Somewhat disagree 1 = Strongly disagree 9 = Not applicable/I don't know
4e.	empowr	Faculty feel empowered to act by the leaders of my primary unit	
4f.	opinon	My opinons are routinely socilited by the leaders of my primary unit	
4g.	within	The leaders of my primary unit are highly regarded by others **within** the unit	
4h.	outside	The leaders of my primary unit are highly regared by others **outside** the unit	
4i.	statusqo	The leaders of my primary unit are willing to challenge the status quo	
4j.	improve	The leaders of my primary unit provide me guidance to improve	
Question 5. Consider your experiences over the last academic year and rate to what extent you agree with the following statements.			
5a.	assist	I ask for assistance when I needed it	
5b.	blance	I balance personal and professional demands	
5c.	complx	I am able to negotiate in complex situations	5 = Strongly agree 4 = Somewhat agree 3 = Neither agree nor disagree
5d.	driven	I am internally driven	

Item #	Variable	Variable Label	Response Values and Labels
5e.	acplans	I have a plan for achieving my academic career goals	2 = Somewhat disagree 1 = Strongly disagree 9 = Not applicable/I don't know
5f.	change	I have a tolerance for change	
5g.	input	I have input into how I spent my time	
5h.	mentor	I sought out a mentor	

Question 5. Consider your experiences over the <u>last academic year</u> and rate to what extent you agree with the following statements (cont.)

Item #	Variable	Variable Label	Response Values and Labels
5i.	seeopp	I personally see more opportunities than challenges	5 = Strongly agree 4 = Somewhat agree 3 = Neither agree nor disagree 2 = Somewhat disagree 1 = Strongly disagree 9 = Not applicable/I don't know
5j.	bound	I set appropriate boundaries to maintain productivity	
5k.	feedbck	I routinely solicit feedback on my professional growth	
5l.	leave	I considered leaving academia	

Question 6. Over the <u>last academic year,</u> about how many times have you participated in professional development activities (e.g., workshops, conferences, online tutorials) related to the following areas?

Item #	Variable	Variable Label	Response Values and Labels
6a.	tenure_pd	Promotion and tenure	1 = 0 2 = 1-3 3 = 4-6 4 = 7-9 5 = More than 10 9 = Not applicable/I don't know
6b.	tchlrn_pd	Teaching and learning	
6c.	resrch_pd	Research	
6d.	lead_pd	Leadership	
6e.	womn_pd	Advancement of women	
6f.	minrty_pd	Advancement of underrepresented minorities	
6g.	div_pd	Other diversity issues	

Item #	*Variable*	*Variable Label*	*Response Values and Labels*
Question 7. To what extent are you currently engaged in the following activities?			
7a.	prof_org	Professional organization(s) in your field	
7b.	mentcoll	Mentoring colleagues	
7c.	comtee	Committee work at the school or campus level	4 = Very much 3 = Quite a bit 2 = Some 1 = Very little 9 = Not applicable/I don't know
7d.	collab	Collaborations with colleagues in my primary unit	
7e.	serve	Serving as a mentor to learners	
7f.	fd_act	Faculty development activities	
Question 8. Given the expectations in your primary unit, how do you currently rate yourself?			
8a.	clprod	Clinical productivity (RVUs) benchmarks	
8b.	exfund	Securing external funding	
8c.	teacheval	Teaching evaluations	
8d.	publs	Number of peer-reviewed publications	5 = Well above 4 = Slightly above 3 = At expectations 2 = Slightly below 1 = Well below
8e.	prsent	Number of peer-reviewed conference presentations	
8f.	learner	Number of learners with whom I interact	
8g.	service	Participation in university/department/school service	

Item #	*Variable*	*Variable Label*	*Response Values and Labels*
8h.	organz	Participation in professional organizations in my field	
8i.	rsc_prac	Translating research into practice	

Question 9. Consider your experiences over the <u>last academic year</u> and rate your level of satisfaction with the following items.

Item #	*Variable*	*Variable Label*	*Response Values and Labels*
9a.	promote	Efforts to promote diversity in my primary unit	5 = Very satisfied 4 = Somewhat satisfied 3 = Neither satisfied nor dissatisfied 2 = Somewhat dissatisfied 1 = Very dissatisfied 9 = Not applicable/I don't know
9b.	sensecom	Sense of community in my primary unit	
9c.	promtenure	Promotion and tenure process	
9d.	overprod	My overall level of productivity	

Question 10. Overall, how satisfied are you with your career?

Item #	*Variable*	*Variable Label*	*Response Values and Labels*
10a.	overall		5 = Very satisfied 4 = Somewhat satisfied 3 = Neither satisfied nor dissatisfied 2 = Somewhat dissatisfied 1 = Very dissatisfied 9 = Not applicable/I don't know

Item #	*Variable*	*Variable Label*	*Response Values and Labels*

Response to the following demographic items will only be reported in the aggregrate and no individual respondent will be identifiable.

Question 11. Department:

11a.	dept_iusm	1 = Anatomy and Cell Biology 2 = Anesthesia 3 = Biochemistry and Molecular Biology 4 = Cellular and Integrative Physiology 5 = Dermatology 6 = Emergency Medicine 7 = Family Medicine 8 = Laboratory Animal Resource Center 9 = Medical and Molecular Genetics 10 = Medicine 11 = Microbiology and Immunology 12 = Neurological Surgery 13 = Neurology	14 = Obstetrics and Gynecology 15 = Ophthalmology 16 = Orthopedic Surgery 17 = Otolaryngology- Head and Neck Surgery 18 = Pathology and Laboratory Medicine 19 = Pediatrics 20 = Pharmacology and Toxicology 21 = Physical Medicine and Rehabilitation 22 = Psychiatry 23 = Public Health 24 = Radiation Oncology 25 = Radiology	26 = Surgery 27 = Urology 28 = Medical Libraries 29 = Medical Sciences Program 30 = Did Not Answer

Question 12. Division (item given if selected Medicine; Pediatrics; or Surgery as Department)

12a.	divs_iusm	1 = Med-Biostatistics 2 = Med-Cardiology 3 = Med-Endocrinology 4 = Med-Gastroenterology 5 = Med-General Internal Medicine & Geriatrics 6 = Med-Hematolog-Oncology 7 = Med-HLA Laboratory 8 = Med-Infectious Diseases 9 = Med-Nephrology 10 = Med-Pulmonary 11 = Med-Rheumatology 12 = Peds-Adolescent Medicine 13 = Peds-Allergy and Clinical Immunology	14 = Peds-Cardiology 15 = Peds-Child Development 16 = Peds-Child Protection Program 17 = Peds-Developmental Pediatrics 18 = Peds-Endocrinology 19 = Peds-General and Community Pediatrics 20 = Peds-Hematology-Oncology 21 = Peds-Indiana Children's Health Services Research 22 = Peds-Intensive Care 23 = Peds-Neonatal-Perinatal Medicine 24 = Peds-Pulmonary 25 = Peds-Ryan White Center for Pediatric Infectious Disease	26 = Surgery-Cardiothoracic 27 = Surgery-Pediatric 28 = Surgery-Plastic 29 = Surgery-Transplant 30 = Surgery-Vascular 31 = I am not a member of these divisions

Question 13. Enter the number of years as faculty at your current insitution:

13a.	samefac	Write-in

Item #	Variable	Variable Label	Response Values and Labels
13b.	samefac2 (recode)		1 = Less than 5 years 2 = 6 - 10 3 = 11 - 15 4 = 16 - 20 5 = More than 20

Question 14. Enter the number of years as faculty at any other insitution:

Item #	Variable	Variable Label	Response Values and Labels
14a.	otherfac		Write-in
14a.	otherfac2 (recode)		1 = Less than 5 years 2 = 6 - 10 3 = 11 - 15 4 = 16 - 20 5 = More than 20

Question 15. Degrees (check all that apply):

Item #	Variable	Variable Label	Response Values and Labels
15a.	deg_DDS	DDS	1 = Checked 2 = Not checked
	deg_MD	MD	
	deg_PhD	PhD	
	deg_MBA	MBA	
	deg_MPH	MPH	
	deg_MA_MS	MA/MS	
	deg_MLS	MLS	
	deg_BSN	BSN	
	deg_MSN	MSN	
	deg_oth	Other	

Item #	*Variable*	*Variable Label*	*Response Values and Labels*
	deg_oth2	Other	Write-in
Question 16. Track:			
16a.	tenure		1 = Tenure track 2 = Clinical (non-tenure track) 3 = Lecturer 4 = Academic Specialist 5 = Research/scientist track 6 = Librarian 7 = Other
Question 17. Faculty Rank:			
17a.	rank		1 = Assistant 2 = Associate 3 = Full Professor 4 = Other
Question 18. Race/Ethnicity:			
18a.	race		1 = American Indian or other Native American 2 = Asian, Asian American, or Pacific Islander 3 = Black or African American 4 = White (non-Hispanic) 5 = Mexican or Mexican American 6 = Puerto Rican 7 = Other Hispanic or Latino 8 = Mulitracial 9 = Other 10 = I prefer not to respond
Question 19. Employment Status:			

Item #	*Variable*	*Variable Label*	*Response Values and Labels*
19a.	empstat		1 = Full-Time 2 = Part-Time
Question 20. If you have any additional comments you would like to make, please type them in below:			
20a.	add_com		Write-in

Appendix D

Histograms and Normal Q-Q Plots for Faculty Vitality Scales

Figures D–1 through D–6 show the histograms and normal Q-Q plots for the PUCL, CLM, PRO, ENG, SAT and FV scales.

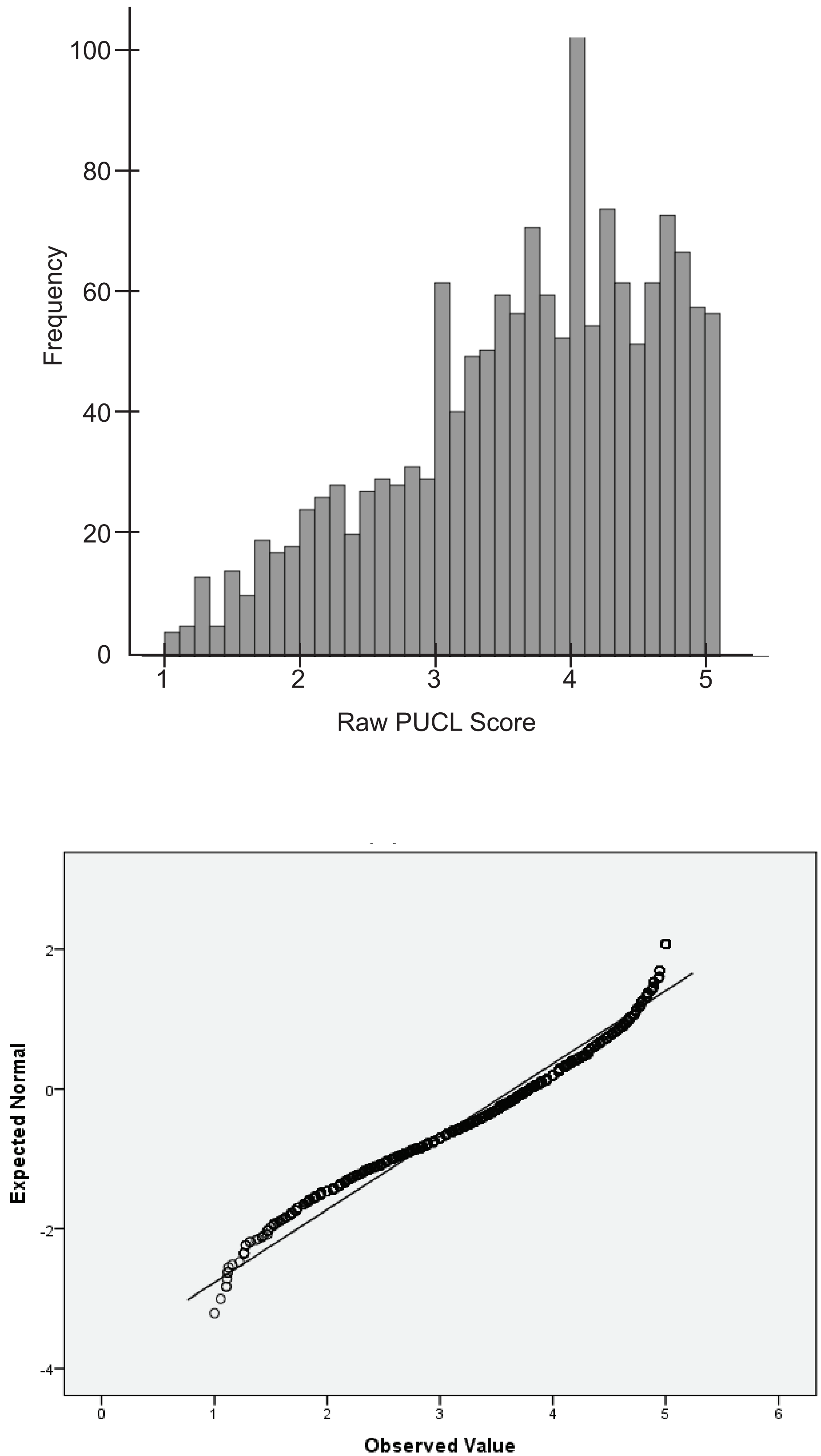
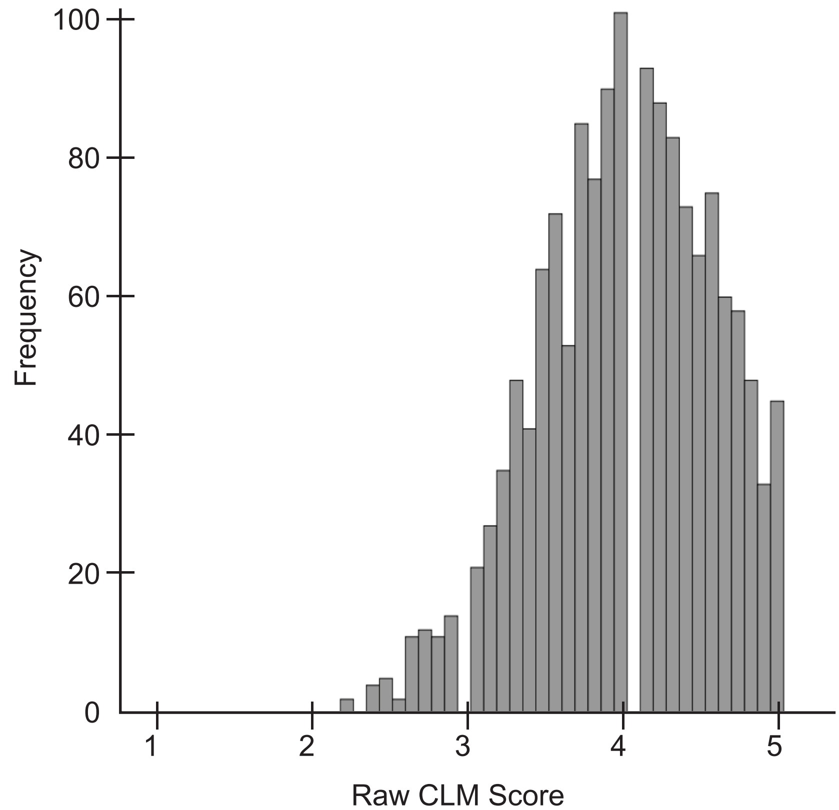


Figure D1. Histogram and normal Q-Q plot of raw PUCL scores (N = 1,497)



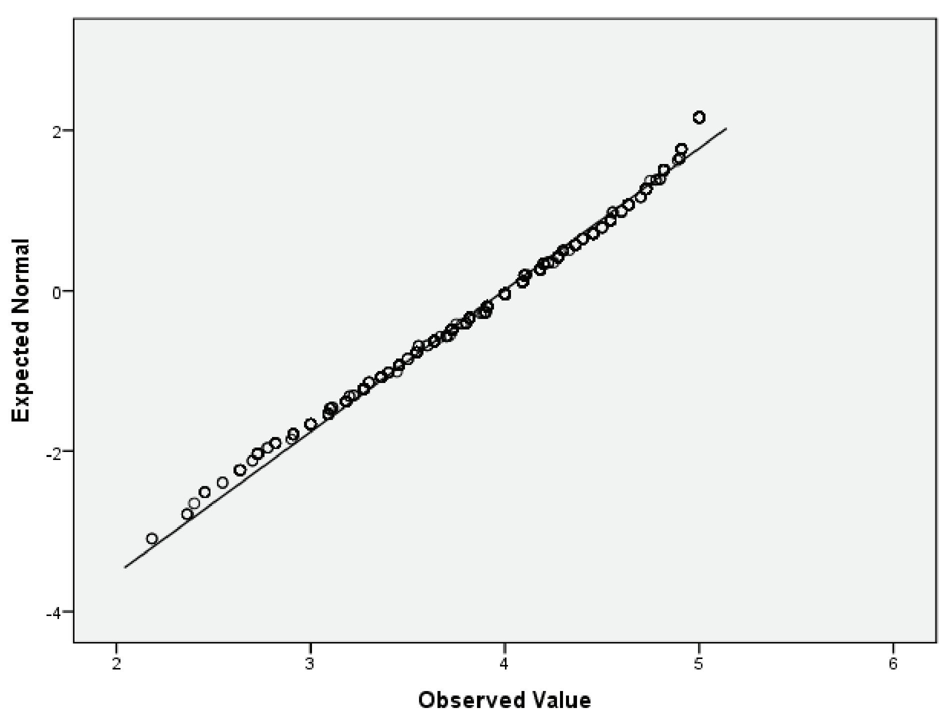


Figure D2. Histogram and normal Q-Q plot of raw CLM scores (N = 1,497)

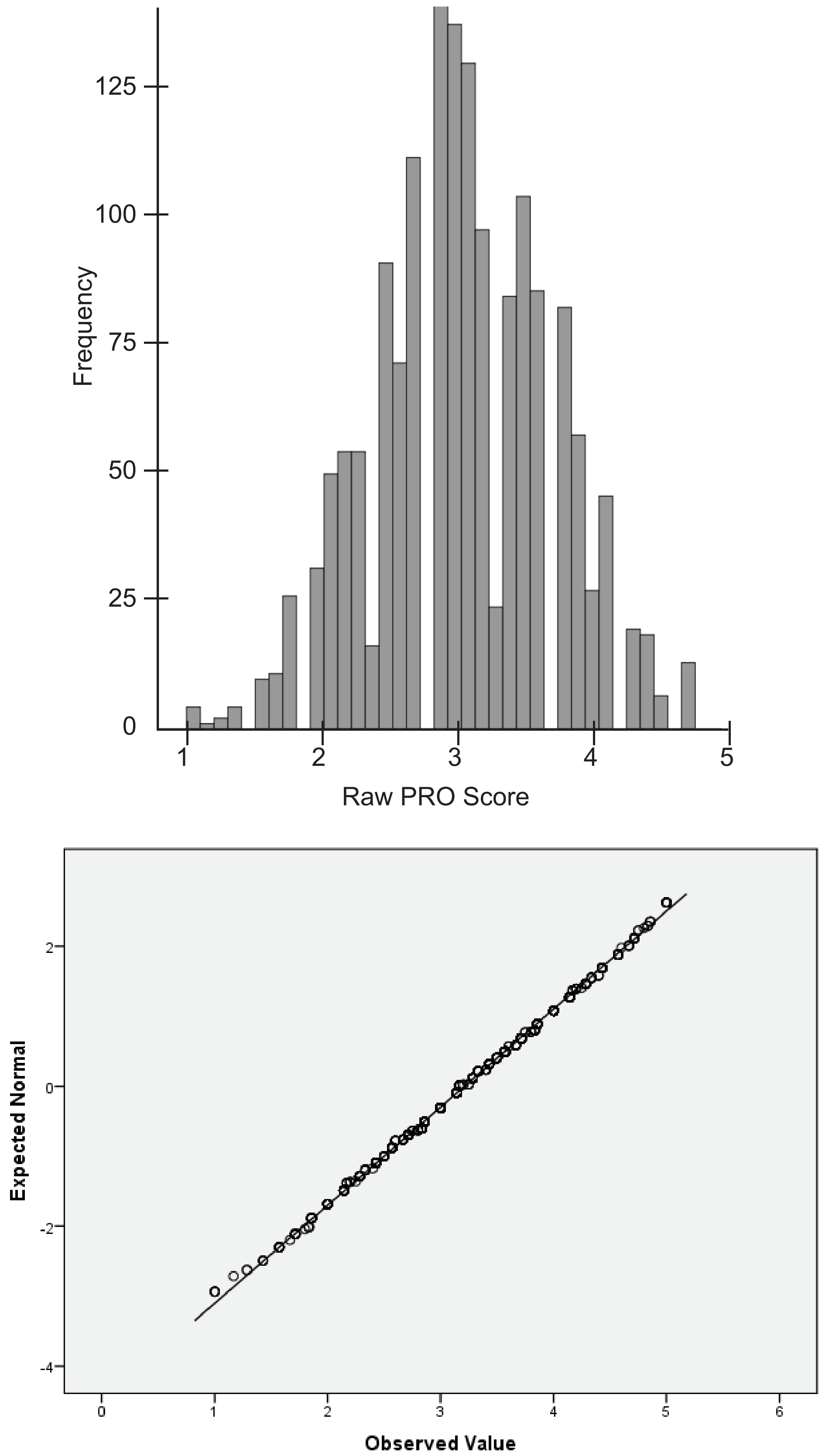
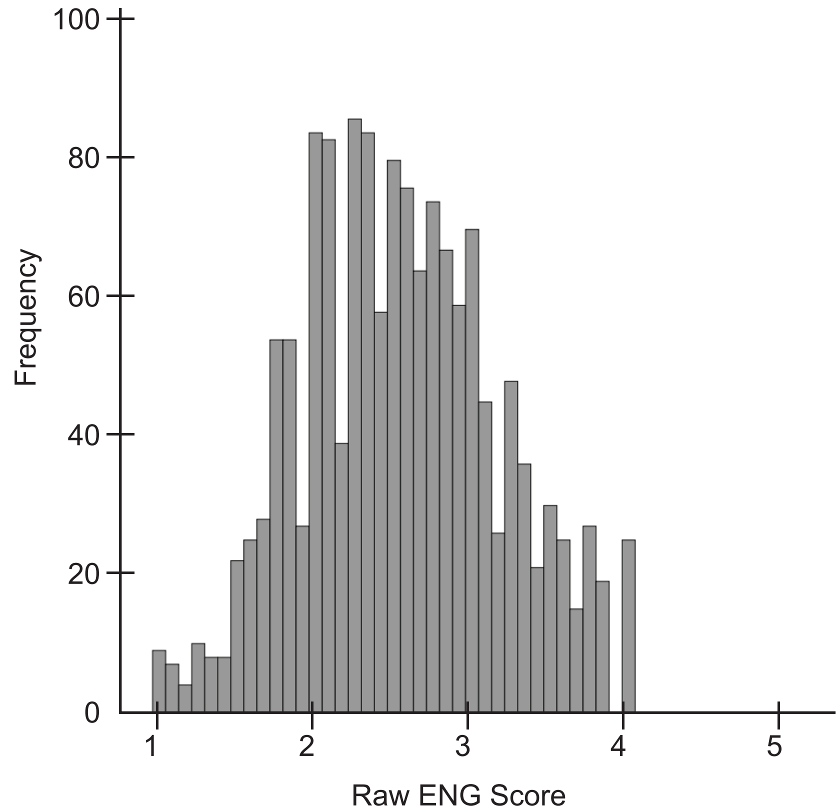


Figure D3. Histogram and normal Q-Q plot of raw PRO scores (N = 1,497)



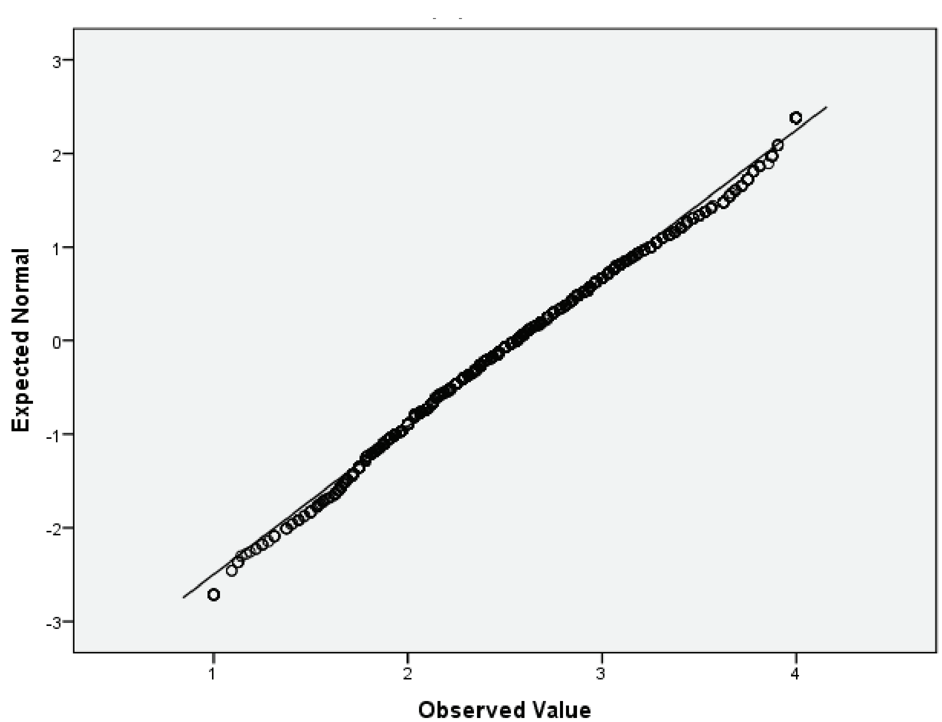
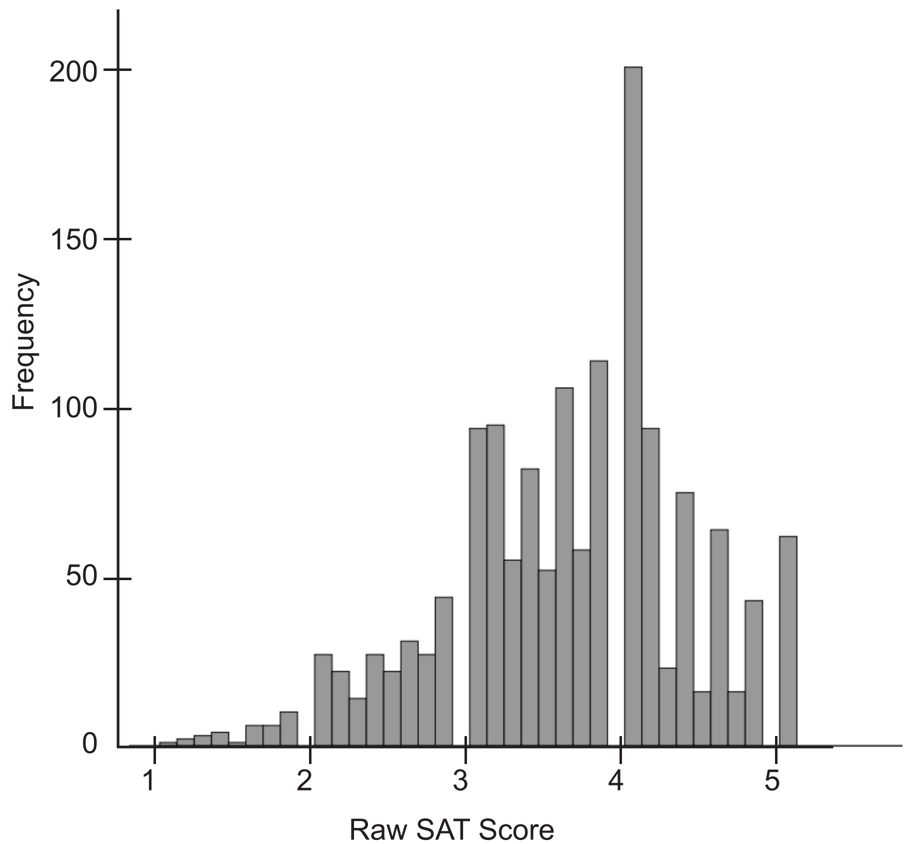


Figure D4. Histogram and normal Q-Q plot of raw ENG scores (N = 1,497)



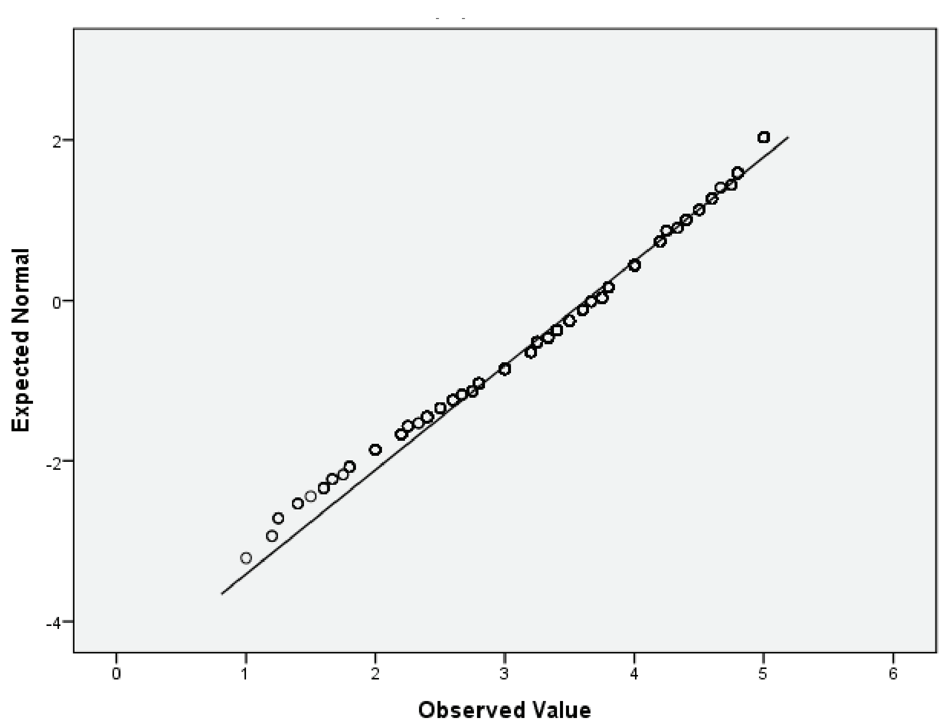
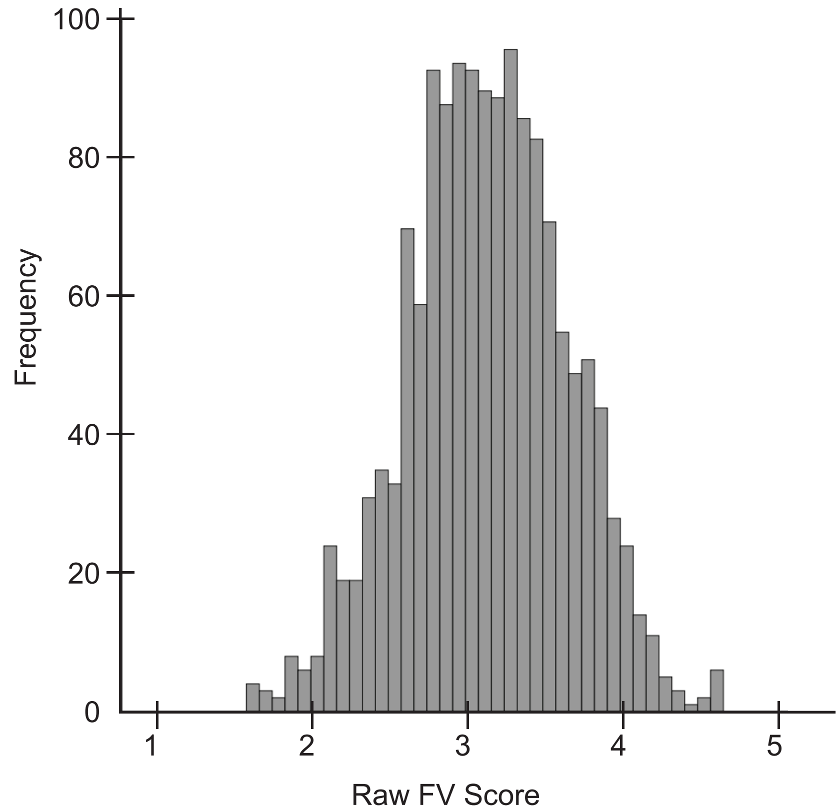


Figure D5. Histogram and normal Q-Q plot of raw SAT scores ($N = 1,497$)



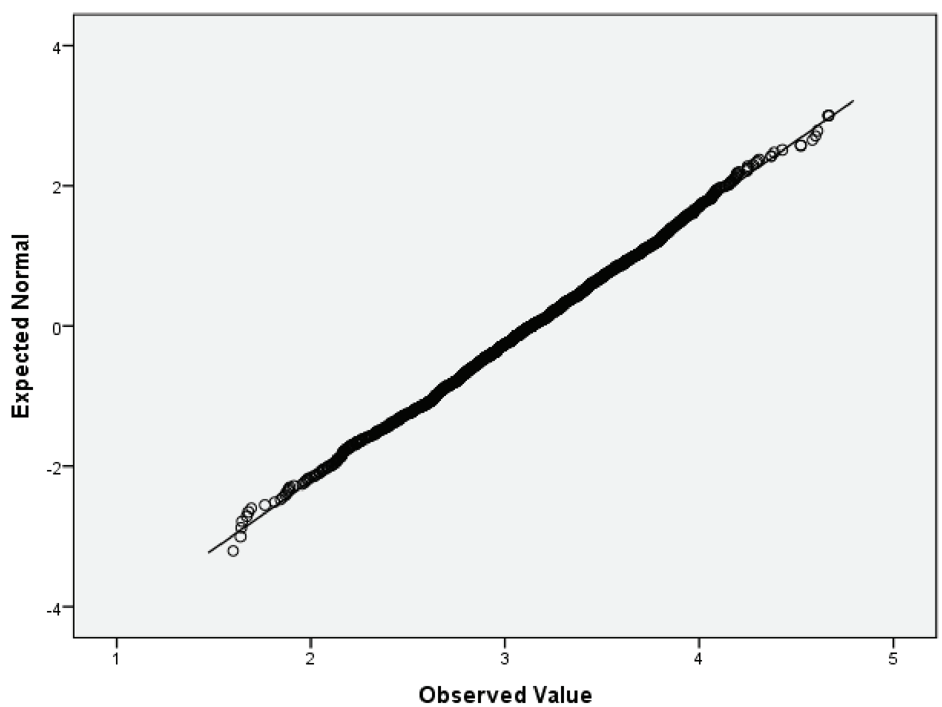


Figure D6. Histogram and normal Q-Q plot of raw FV scores (*N* = 1,497)

Appendix E

Additional Standardized Direct, Indirect, and Total Effect Coefficients Tables

Table E–1 contains the all standardized direct, indirect, and total effect coefficients of all faculty demographics and role variables in Model 1. Table E–2 contains the same data for Model 2.

Table E–3 contains the standardized direct, indirect, and total effect coefficients of the role group variables for Model 2 in which Researchers served as the reference group. To facilitate reading this table, all nonsignificant coefficients have been removed, and effect sizes have been color-coded as described in Figure 4–1. Table E–4 contains the same data for Model 2 in which Jugglers served as the reference group.

Table E–1

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Female[a]						
Direct	−0.036	0.040	−0.040	−0.018	0.010	−0.005
Indirect			0.016*	0.013	−0.011	0.006
Total			−0.024	−0.005	−0.001	0.001
Asian[a]						
Direct	0.022	0.100***	−0.012	−0.044	−0.004	−0.032
Indirect			0.026***	0.033***	0.036	0.042**
Total			0.014	−0.012	0.033	0.010
URM[a]						
Direct	0.043	0.090***	0.034	0.000	−0.005	0.004
Indirect			0.020**	0.029***	0.046*	0.043**
Total			0.054*	0.030	0.041	0.048*
NR[a]						
Direct	−0.103***	−0.030	−0.015	0.013	−0.034	−0.019
Indirect			0.004	−0.010	−0.066***	−0.036**
Total			−0.011	0.003	−0.100***	−0.054*
Associate Professor[a]						
Direct	−0.049	−0.106***	−0.110***	−0.140***	−0.108***	−0.163***
Indirect			−0.024**	−0.035**	−0.053*	−0.051**
Total			−0.134***	−0.174***	−0.162***	−0.213***

Table E–1 continues

Table E–1 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Assistant Professor[a]						
Direct	0.006	0.027	−0.203***	−0.286***	−0.167***	−0.304***
Indirect			0.007	0.009	0.010	0.011
Total			−0.195***	−0.277***	−0.157***	−0.292***
Other Rank[a]						
Direct	0.030	−0.004	−0.081**	−0.108***	−0.042*	−0.101***
Indirect			−0.005	−0.001	0.016	0.006
Total			−0.086**	−0.110***	−0.026	−0.096***
Nontenure[a]						
Direct	−0.022	−0.068*	−0.111***	−0.075**	−0.012	−0.098***
Indirect			−0.017*	−0.022*	−0.029	−0.030
Total			−0.128***	−0.098**	−0.041	−0.128***
Other Tenure[a]						
Direct	−0.001	−0.039	−0.052	−0.031	−0.034	−0.068**
Indirect			−0.011	−0.013	−0.010	−0.014
Total			−0.063*	−0.043	−0.044	−0.082**
Part−time[a]						
Direct	0.011	0.006	−0.022	−0.084***	0.016	−0.046*
Indirect			0.000	0.002	0.008	0.005
Total			−0.022	−0.082**	0.024	−0.041

Table E–1 continues

Table E–1 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
PU−School[a]						
Direct	−0.080**	0.011	0.013	0.048*	0.029	0.033
Indirect			0.013	0.004	−0.043*	−0.015
Total			0.026	0.052*	−0.014	0.018
PU−Regional Center[a]						
Direct	0.002	0.011	−0.042	−0.064**	−0.008	−0.047*
Indirect			0.003	0.004	0.004	0.005
Total			−0.039	−0.060*	−0.004	−0.043
PU−Division[a]						
Direct	−0.042	−0.110***	0.000	−0.022	−0.009	−0.015
Indirect			−0.026***	−0.036***	−0.050**	−0.050***
Total			−0.026	−0.058*	−0.059*	−0.065**
PU−Other[a]						
Direct	0.002	−0.011	−0.016	−0.028	−0.005	−0.021
Indirect			−0.003	−0.004	−0.001	−0.003
Total			−0.019	−0.032	−0.006	−0.024
Basic science dept[a]						
Direct	0.001	−0.046	−0.103***	−0.073**	−0.009	−0.084***
Indirect			−0.013	−0.015	−0.010	−0.017
Total			−0.117***	−0.088**	−0.019	−0.101***

Table E–1 continues

Table E–1 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Other dept[a]						
Direct	0.023	0.003	0.004	0.004	0.006	0.004
Indirect			−0.002	0.001	0.014	0.006
Total			0.002	0.005	0.020	0.010
PhD[a]						
Direct	−0.067	−0.082*	0.106**	−0.032	−0.069**	−0.066*
Indirect			−0.015	−0.027*	−0.058*	−0.046*
Total			0.091*	−0.059	−0.127***	−0.112**
MD−PhD[a]						
Direct	0.021	−0.006	0.060*	0.007	0.006	0.030
Indirect			−0.004	−0.002	0.011	0.003
Total			0.056*	0.005	0.016	0.033
% Time Teaching[b]						
Direct	−0.009	0.009	−0.036	0.020	−0.001	0.012
Indirect			0.004	0.003	−0.003	0.001
Total			−0.032	0.023	−0.004	0.013
% Time Research[b]						
Direct	0.058	0.070	−0.017	−0.029	−0.014	0.057
Indirect			0.013	0.023	0.050	0.040*
Total			−0.004	−0.006	0.036	0.097**

Table E–1 continues

Table E–1 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 1A and 1B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
% Time Patient Care[b]						
Direct	−0.022	−0.054	0.137***	0.036	−0.088***	−0.176***
Indirect			−0.013	−0.018	−0.026	−0.025
Total			0.125**	0.018	−0.113**	−0.201***
% Time Administration[b]						
Direct	−0.006	−0.029	−0.070**	−0.008	0.085***	0.092***
Indirect			−0.007	−0.009	−0.011	−0.012
Total			−0.078**	−0.018	0.074**	0.080**
PUCL			−0.123***	0.002	0.572***	0.240***
CLM			0.287***	0.325***	0.240***	0.367***
Squared multiple correlations	0.031	0.055	0.142	0.212	0.547	0.437

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score; URM = Underrepresented minority (includes the following: Black, Hispanic, Multiple races, Native American, and Other); NR = No response or unknown; PU = Primary academic unit.

[a] Values from model that included % time spent in patient care (values from other models were similar). [b] Although the table includes all percent time variables, separate models were run—each with only one percent time variable included—to avoid multicollinearity concerns associated with the requirement that the four variables sum to 100.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table E–2

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Female						
Direct	−0.036	0.042	−0.036	−0.010	0.008	−0.015
Indirect			0.016*	0.013	−0.010	0.007
Total			−0.019	0.004	−0.002	−0.008
Asian						
Direct	0.020	0.099***	−0.013	−0.050*	0.000	−0.028
Indirect			0.026***	0.032***	0.035	0.041**
Total			0.012	−0.018	0.035	0.014
URM						
Direct	0.044	0.089***	0.030	−0.006	−0.003	0.008
Indirect			0.020**	0.029***	0.047*	0.043**
Total			0.050	0.023	0.043	0.052*
NR						
Direct	−0.103***	−0.031	−0.011	0.015	−0.033	−0.018
Indirect			0.004	−0.010	−0.066***	−0.036**
Total			−0.008	0.005	−0.099***	−0.053*
Associate Professor						
Direct	−0.052	−0.111***	−0.109***	−0.150***	−0.097***	−0.157***
Indirect			−0.025**	−0.036***	−0.057*	−0.053**
Total			−0.135***	−0.186***	−0.153***	−0.210***

Table E–2 continues

Table E–2 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Assistant Professor						
Direct	0.002	0.019	−0.212***	−0.316***	−0.147***	−0.291***
Indirect			0.005	0.006	0.006	0.007
Total			−0.207***	−0.310***	−0.141***	−0.283***
Other Rank						
Direct	0.029	−0.007	−0.081**	−0.115***	−0.038	−0.099***
Indirect			−0.006	−0.002	0.015	0.004
Total			−0.087**	−0.117***	−0.023	−0.095***
Nontenure						
Direct	−0.015	−0.069*	−0.124***	−0.086**	−0.028	−0.102***
Indirect			−0.018*	−0.022*	−0.026	−0.029
Total			−0.142***	−0.108***	−0.054	−0.131***
Other Tenure						
Direct	−0.004	−0.040	−0.056*	−0.037	−0.030	−0.058**
Indirect			−0.011	−0.013	−0.012	−0.016
Total			−0.067*	−0.050	−0.042	−0.074**
Part−time						
Direct	0.012	0.004	−0.024	−0.091***	0.019	−0.038
Indirect			0.000	0.001	0.008	0.004
Total			−0.024	−0.089***	0.026	−0.034

Table E–2 continues

Table E–2 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
PU−School						
Direct	−0.077**	0.015	0.015	0.056*	0.025	0.038
Indirect			0.014	0.005	−0.041*	−0.013
Total			0.028	0.060*	−0.016	0.026
PU−Regional Center						
Direct	0.005	0.013	−0.041	−0.060*	−0.009	−0.042*
Indirect			0.003	0.004	0.006	0.006
Total			−0.038	−0.055*	−0.003	−0.036
PU−Division						
Direct	−0.043	−0.111***	−0.001	−0.028	−0.001	−0.011
Indirect			−0.026***	−0.036***	−0.052**	−0.052***
Total			−0.027	−0.065*	−0.053*	−0.062*
PU−Other						
Direct	0.002	−0.011	−0.014	−0.028	−0.006	−0.020
Indirect			−0.004	−0.004	−0.001	−0.004
Total			−0.018	−0.031	−0.007	−0.024
Basic science dept						
Direct	0.002	−0.047	−0.097***	−0.070*	0.004	−0.060**
Indirect			−0.014	−0.015	−0.010	−0.017
Total			−0.111***	−0.086**	−0.006	−0.077**

Table E–2 continues

Table E–2 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Other dept						
Direct	0.025	0.002	0.015	0.013	0.017	0.019
Indirect			−0.002	0.001	0.015	0.007
Total			0.013	0.013	0.032	0.026
PhD						
Direct	−0.079	−0.087*	0.121**	−0.038	−0.021	0.029
Indirect			−0.015	−0.029*	−0.066*	−0.051*
Total			0.105*	−0.067	−0.088	−0.023
MD−PhD						
Direct	0.017	−0.007	0.063*	0.005	0.015	0.038
Indirect			−0.004	−0.002	0.008	0.001
Total			0.059*	0.003	0.023	0.039
Teachers						
Direct	0.013	0.025	−0.058*	−0.006	−0.006	0.018
Indirect			0.006	0.008	0.013	0.012
Total			−0.052	0.002	0.008	0.030
Researchers						
Direct	0.053	0.053	−0.172***	−0.054	−0.051	0.108**
Indirect			0.009	0.017	0.043	0.032
Total			−0.163***	−0.037	0.094*	0.140***

Table E–2 continues

Table E–2 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Jugglers						
Direct	0.016	0.030	−0.165***	−0.101**	0.013	0.052
Indirect			0.007	0.010	0.017	0.015
Total			−0.158***	−0.091**	0.030	0.067*
Administrators						
Direct	−0.001	−0.005	−0.057*	−0.056*	0.073***	0.070***
Indirect			−0.001	−0.002	−0.002	−0.002
Total			−0.059*	−0.058*	0.071*	0.068**
Clinician-Teachers						
Direct	0.009	0.000	−0.024	0.001	0.010	0.025
Indirect			−0.001	0.000	0.005	0.002
Total			−0.025	0.001	0.015	0.027
Clinician-Researchers						
Direct	0.027	0.014	−0.063*	−0.026	−0.018	0.087***
Indirect			0.001	0.005	0.019	0.012
Total			−0.062*	−0.022	0.001	0.099***
Clinician-Administrators						
Direct	0.011	0.002	−0.057*	−0.077**	0.077***	0.087***
Indirect			−0.001	0.001	0.007	0.003
Total			−0.058*	−0.076**	0.084**	0.091***

Table E–2 continues

Table E–2 (continued)

Standardized direct, indirect, and total effect coefficients for faculty demographics and role variables (Models 2A and 2B; N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Clinician-Jugglers						
Direct	0.019	0.007	−0.104***	−0.086**	0.080***	0.181***
Indirect			0.000	0.002	0.012	0.007
Total			−0.105***	−0.084**	0.092**	0.188***
PUCL			−0.121***	0.003	0.571***	0.236***
CLM			0.286***	0.324***	0.244***	0.372***
Squared multiple correlations	0.032	0.055	0.152	0.224	0.556	0.451

Note: PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score; URM = Underrepresented minority (includes the following: Black, Hispanic, Multiple races, Native American, and Other); NR = No response or unknown; PU = Primary academic unit.

$^*p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Table E–3

Standardized direct, indirect, and total effect coefficients for department type, degree, and role group subanalysis (Model 2, with Researchers as reference group for role group variables, N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Basic science dept						
Direct			−0.097***	−0.070*		−0.060**
Indirect			.	.		.
Total			−0.111***	−0.086**		−0.077**
PhD						
Direct		−0.087*	0.121**	.	.	.
Indirect			.	−0.029*	−0.066*	−0.051*
Total			0.105*	.	−0.088*	.
MD-PhD						
Direct			0.063*			
Indirect			.			
Total			0.059*			
Teachers[a]						
Direct						
Indirect						
Total						
Jugglers[a]						
Direct				−0.066*		
Indirect				.		
Total				−0.067*		

Table E–3 continues

Table E–3(continued)

Standardized direct, indirect, and total effect coefficients for department type, degree, and role group subanalysis (Model 2, with Researchers as reference group for role group variables, N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Administrators[a]						
Direct					0.052**	
Indirect					.	
Total					.	
Clinicians[a]						
Direct			0.185***		.	−0.116**
Indirect			.		.	.
Total			0.175***		−0.102*	−0.151***
Clinician-Teachers[a]						
Direct			0.062*			
Indirect			.			
Total			.			
Clinician-Researchers[a]						
Direct					−0.042*	
Indirect					.	
Total					.	
Clinician-Administrators[a]						
Direct					0.050*	
Indirect					.	
Total					.	

Table E–3 continues

Table E–3(continued)

Standardized direct, indirect, and total effect coefficients for department type, degree, and role group subanalysis (Model 2, with Researchers as reference group for role group variables, N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Clinician-Jugglers[a]						
Direct						0.082*
Indirect						.
Total						.
PUCL			−0.121***	.	0.571***	0.236***
CLM			0.286***	0.324***	0.244***	0.372***
Squared multiple correlations	0.032	0.055	0.152	0.224	0.556	0.451

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.

[a]This subanalysis of Model 2 uses Researchers (n = 354) as the reference group instead of Clinicians.

*p < .05. **p < .01. ***p < .001.

Table E–4

Standardized direct, indirect, and total effect coefficients for role variables with Jugglers as reference group (N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Teachers						
Direct						
Indirect						
Total						
Researchers						
Direct				0.102*		
Indirect				.		
Total				0.104*		
Administrators						
Direct					0.065**	
Indirect					.	
Total					.	
Clinicians						
Direct			0.275***	0.168**		.
Indirect			.	.		.
Total			0.264***	0.152**		-0.112*
Clinician-Teachers						
Direct			0.103**	0.079*		
Indirect			.	.		
Total			0.097**	0.071*		

Table E–4 continues

Table E–4 (continued)

Standardized direct, indirect, and total effect coefficients for role variables with Jugglers as reference group (N = 1,497)

Independent Variables	PUCL	CLM	PRO	ENG	SAT	FV
Clinician-Researchers						
Direct						
Indirect						
Total						
Clinician-Administrators						
Direct			0.077*		0.067**	
Indirect			.		.	
Total			0.071*		.	
Clinician-Jugglers						
Direct			0.131**			0.107**
Indirect			.			.
Total			0.121*			.

Note. PUCL = Primary unit climate and leadership; CLM = Career and life management; PRO = Productivity; ENG = Professional engagement; SAT = Career satisfaction; FV = Overall faculty vitality score.
*$p < .05$, **$p < .01$, ***$p < .001$.

Appendix F

Formula for Hotelling's *t*-Test

The following formulas were described by Steiger (1980) and then Van. The Hotelling-Williams test statistic (HW) is calculated as follows and compared using a Student's *t* distribution with (N – 3) degrees of freedom.

$$HW = (r_{ZX} - r_{ZY})\sqrt{\frac{(N-1)(1+r_{XY})}{2D(N-1) \div (N-3) + r_A^2(1-r_{XY})}}$$

$$D = (1 + r_{ZX}^2 - r_{ZY}^2 - r_{XY}^2) + 2r_{ZX}^2 r_{ZY}^2 r_{XY}^2$$

$$r_A = 0.5(r_{ZX} + r_{ZY})$$

Model 1B: R = .426
Model 2B: R = .441
Correlation between models: r = .946, p < .001
N = 1,497

Appendix G

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Indiana University, earned at IUPUI (Indianapolis)
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Master of Science, Medical Illustration — 2000
Medical College of Georgia School of Graduate Studies
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Bachelor of Science, Physician Assistant — 1996
Preceptorship in Plastic and Reconstructive Surgery
Louisiana State University Medical Center
School of Allied Health Professions
Shreveport, Louisiana

Bachelor of Science, Preprofessional Studies (Pre-med) — 1990
University of Notre Dame
Notre Dame, Indiana

Professional Organizations

American Association for the Advancement of Science — 2011–present
American Association of Anatomists — 2010–present
Association of Medical Illustrators — 1999–2007
American Association of Physician Assistants (AAPA) — 1994–1996
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Teaching

Graduate Teaching Assistant: Gross Anatomy, Neuroscience and Clinical Neurology, Basic Histology — 2011–2012
Indiana University School of Medicine

Service

Basic Science Curricular Reform Team — 2011–2012
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The Vesalius Trust Board of Governors — 2001–2007

Professional Experience

Educational Research Systems, Inc. — 2000–2009
Executive Director, Creative Services
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