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Examining the Relationship Between Research Climate and Faculty Productivity at an Emerging Academic Health Center in the Southeastern U.S.

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EXAMINING THE RELATIONSHIP BETWEEN RESEARCH CLIMATE AND FACULTY PRODUCTIVITY AT AN EMERGING ACADEMIC HEALTH CENTER IN THE SOUTHEASTERN U.S.

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ABSTRACT

Logistic regression analysis was utilized to determine the relationship between research productivity and the research climate, as measured by 155 clinical faculty survey responses, in an Academic Health System in the Southeastern U.S. Subscales addressing the institutional characteristics of goals, culture, mentoring, network, resources, time, communication, rewards, opportunities, and governance were used as independent variables. The dichotomous dependent variable was whether clinical faculty were productive in research as measured by IRB protocols.

Results indicated that a positive view of the research climate for networking and resources significantly improves the odds for clinical faculty showing increased research productivity. The study demonstrated an expanded application of organizational climate to higher education research. It also served as an organizational learning mechanism by which the Health System can work towards effective operations. Additionally, this study served to address the current issue facing higher education by which a call for increased research activity has been issued in the face of limited resources. By providing feedback to Health System leadership, the study results direct attention towards the areas of networking and resources as being most impactful on research productivity.

DEDICATION

I dedicate this effort to my family. To my father, Joe Walker, who taught me how to learn and has loved me unconditionally throughout. To Kerry who has been my constant champion. To my sister, Jacqueline, who is my biggest supporter and dearest friend. To my husband, Marcus, who is my strength and heart. And to my mom, Rita… you are loved and missed.

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CHAPTER ONE

INTRODUCTION

Faculty at academic health centers (AHCs) are charged with patient care, teaching, community service, and cutting-edge research (Stimpson, Li, Shiyanbola, & Jacobson, 2014). To keep pace with the demands for research and development in academic medicine, effective and efficient research infrastructure and practices are critical (Avins & Goldberg, 2007). An organizational culture specific to the pursuit of knowledge discovery through research evolves as these supports are developed (Parse, 2007).

Leadership at successful AHCs design and implement systems to support faculty research efforts and increase productivity (Hanover, 2014). For the purpose of this study, I use the term "the Health System" to refer to the academic health center under study. Like many established AHCs, the Health System, an emerging AHC in the Southeastern U.S., has worked to develop research-specific support structures. Examples of these research-specific supports include governing committees or advisory groups, communication channels such as a newsletter or social media, education opportunities teaching research skills and administrative procedures, research mentoring groups and researcher networking events, research goals and metrics related to productivity, research administration offices, and a system for allocating of internal resources to promote research activity (Krupat, Pololi, Schnell, & Kern, 2013).

In working to ensure effective operations, leadership may adopt organizational learning practices, which call for a cycle of feedback, reflection, and action (Carroll &

Edmondson, 2002). To advance cutting-edge medical research, AHCs must draw upon organizational learning principles and apply them to the research efforts (Dimario, 2012). One starting point is to understand faculty views of the research culture at the Health System so leadership can use these to evaluate and improve operations (Moutier et al., 2016). In this study, I use a climate survey to gather data about faculty perceptions on the research specific systems and practices and examine the relationship between those views and research productivity (Moutier et al., 2016; Bland, Center, Finstad, Risbey, & Staples, 2005).

Key Terms and Definitions

The key terms used in this study are defined as follows:

- *Academic Health Center (AHC):* An academic health center encompasses all the health-related components of universities, including their health professions schools, patient care operations, and research enterprise (AAHC, 2019).
- *Culture of research:* The underlying assumptions and beliefs shared by an organization that shape how knowledge creation through research is approached (Parse, 2007).
- *Organizational climate:* Shared perceptions of organizational policies, practices, and procedures, both formal and informal (Reichers & Schneider, 1990, p. 22).
- *Organizational culture:* The underlying beliefs, assumptions, values and ways of interacting that form the working environment in an organization (Schein, 2010).
- *Organizational learning:* The process within an organization of knowledge acquisition, information distribution, information interpretation and organizational

memory (Huber, 1991).

- *Protocol:* The precise and detailed design for conducting a research study; specifically, it is the study plan submitted to an Internal Review Board (IRB) for review (Sterling, n.d.).
- *Research:* Research is a systematic study directed toward fuller scientific knowledge or understanding of the subject studied; Research also refers to all research activities, both basic and applied, and all development activities that are performed by non-Federal entities. The term research also includes activities involving the training of individuals in research techniques where such activities utilize the same facilities as other research and development activities and where such activities are not included in the instruction function (eCFR, n.d.)
- *Research climate:* The shared perceptions of organizational policies, practices, and procedures, and structures specific to research-related activities (Schneider, Ehrhart, & Macey, 2013).
- *Research enterprise:* The workforce, resources, and activities associated with conducting research; often used to address the resulting economic benefits (Celeste, Griswold, & Straf, 2014)
- *Research portfolio:* A comprehensive record of research activity at an institution, or specific to an investigator, including IRB approved protocols, grant funded activity, and clinical trials.

Background of Problem

Several factors influence the problems of needing to increase faculty research productivity at an emerging AHC. First, researchers work under external pressures such as reduced funding as the government has decreased federal funding opportunities, and increased competition from other researchers, both domestic and foreign (NRC, 2012). Second, research does not happen in a vacuum, but rather is influenced by the culture and climate of the organization (Hanover, 2014). Third, a misalignment between research needs and institutional policies and procedures, may exist thereby creating barriers to research productivity (Krupat, Pololi, Schnell, & Kern, 2013). In my research, I employ a climate study as the tool by which feedback from the researcher community can be obtained.

Increasing research activities, including externally sponsored grants and contracts, active numbers of protocols, and top tier publications, is a goal of most universities. Research is a key method for bringing in revenue, offsetting costs, and attracting top faculty and students. According to a report from the National Research Council (NRC) (2012), the U. S. Congress views the nation's universities as suffering from the competitive research environment due to limited federal funding sources and an increased number of applicants, which places the nation's ability to maintain exemplary research productivity at risk. Likewise, the National Academies for Sciences (NAS) issued a call to academic institutions advising they better manage administrative activities and academics to increase research productivity and cost effectiveness. NAS recommended the government continue invest in research and administer those funds through more

efficient operating practices (NRC, 2012, p. 3). The government responded by consolidating the policies by which is administered research funding into the Uniform Guidance to create a more streamlined system (OMB, 2013). Higher education institutions must respond to this call by examining current practices and policies and gathering input from faculty so as to improve operations and promote a positive research environment.

Approaches to increasing research productivity at the institutional level are driven by incorporating best practices for creating a vibrant and sustainable culture of research (Hanover, 2014). Building capacity in faculty members, increasing the support from research administrators, and looking to collaborative partnerships are also areas related to increasing research capacity (Huenneke, Stearns, Martinez, & Laurilla, 2017; Chun, 2010; Haley & Champagne, 2017). Essential characteristics for facilitating research are found at all levels of the institution from leadership through faculty researchers to administration support staff, all who rely on communications, resources, and relationships to maintain research productivity (Hanover, 2014).

In working to grow the research enterprise, educational leadership can look to the institutional culture and climate as tools by which change can be effected. Tierney (1988) described organizational culture as a "useful concept for understanding management and performance in higher education" (p. 3). An understanding of organizational culture can benefit an institution seeking to improve administrative processes and practices, which, in turn, can increase productivity (Tierney, 1988). Tierney's framework for organizational culture included the environment, mission, socialization, information, strategy, and

leadership as essential concepts needing to be studied when assessing organization culture at an institution of higher education. Tierney (1988) further emphasized that interactions and communications between faculty, staff, administrators and other personnel inherently shape the ways they view their institution. Dill (1982) addressed how important it is to understand such cultures in the face of declining resources.

While organizational culture is useful in describing what the underlying values are, organizational climate examines how people view operational processes (Schein, 1990; Reichers & Schneider, 1990). More specifically, organizational climate theory addresses how to understand the ways employees view and attach meaning to the organizational structures and supports, such as those designed specific to research activities (Reichers & Schneider, 1990). Climate research also provides us a tool by which we can collect this data through the climate survey (Moutier et al., 2016).

Organizational learning theory examines the mechanisms by which institutional knowledge is created, transferred, applied, interpreted, and evaluated. As described by Kirwan (2013), learning can occur at the individual level through education opportunities and interpreting past experiences; through collaboration at the team level, which includes sharing of knowledge; and through strategic leadership and knowledge building systems at the organizational level. Organizational climate has been found to "affect the various dimensions of the learning organization" (Messarra & El-Kassar, 2013, p. 1).

Most healthcare organizations practice continuous learning through "complex interconnected, dynamic systems", using both formal and informal paths, which are interconnected with organizational change (Ratnapalan & Uleryk, 2014 p. 24). At AHCs,

faculty are expected to flourish under multiple missions including not only “improving the health of the population”, but also in scholarship through educating the future medical workforce, engaging in scientific research, and contributing to the literature through publications and so must continually adapt through creating a learning environment (Dimario, 2012, p. 99).

The mechanisms through which organizational learning occurs vary, but one model, as presented by Agyris (1977), described double-loop learning in which feedback is not only used to inform process change, but also to evaluate the basic assumptions under which processes are defined. I use the climate survey to gather feedback from faculty as evidenced in the Bland et al. (2005) study in which faculty perceptions are used to predict faculty productivity. Through this research study, I draw upon the findings, which may include single loop and/or double loop feedback, to provide implications for practitioners, which would include administrators at the AHC. Additionally, I provide implications for future research, which include examining the impact of incorporating feedback so as to change current processes or underlying paradigms.

Based on this background of the problem, I explore higher education leadership, specifically at an AHC, by tying together research activities, organizational climate and culture, and organizational learning. Through a climate survey I assess faculty perspectives on the research climate to determine if the research climate is related to faculty productivity. It is my intent to provide leadership feedback to be able to assess the current state of research how it relates to faculty’s ability to move forward with academic work. This also serves to further climate study research by using a climate survey focused

on the output of research where it has previously be used to address areas life safety, customer service, and quality (Schneider, Ehrhart, & Macey, 2013).

Problem Statement

The nation faces a call for higher rates of scientific discovery (health innovations, sustainable energy, cybersecurity and computer technologies) and funding support is tenuous (federal research and development funding is declining, state funding steadily eroding, industry partners dismantling corporate research laboratories), if not limited (RUFC, 2012). These conditions have created an increasingly competitive environment and universities are experiencing challenges meeting this demand for increased research productivity under the pressure of limited resources and ever-expanding regulations (RUFC, 2012). Faculty at academic institutions must balance the mission of teaching, research, service, while shouldering the responsibility for knowledge creation. For those at AHCs, patient care is an additional mission.

To build an environment conducive to research productivity, administration needs to understand how faculty view the research climate, which is comprised of aspects such as the how goals for research productivity as set; how policies and procedures governing research practices are created and implemented; how rewards for conducting research are provided, whether it be recognition or promotion; how faculty research interests align with departmental and institutional goals; and how resources including human resource, professional networking and mentorship support, and internal funding are allocated. Without a suitable research climate, faculty may fail to meet the demands for scholarly activity (Dundar & Lewis, 1998). Understanding faculty perspectives on these elements

of the research climate can shed light on issues which may be negatively affecting research productivity.

Purpose of the Study and Research Question

The purpose of this study was to examine the relationship between faculty perceptions of several institutional characteristics related to the research climate and faculty research productivity as indicated by number of approved protocols. Thus, I asked the following research question:

How do factors of the research climate (resources, rewards, goals, culture, communication, research emphasis, professional networking, and governance) impact faculty productivity at an academic health center?

H_0 = Research climate does not impact research productivity.

H_1 = Research climate does impact research productivity.

Delimitations

To define the boundaries of the proposed research study, I determined the following delimitations. First, the supporting framework for the study draws upon climate theory over culture theory, both inextricably linked. Culture theory would address the underlying beliefs and assumptions pertaining to the research enterprise and would be examined through interviews or other qualitative measures. Climate theory provides a tool to examine the current perceptions of the research enterprise to serve as a snapshot of baseline feedback to facilitate organizational learning. I have selected the following specific research climate elements for this study: resources, rewards, goals, culture, communication, research emphasis, professional networking, and governance. These as

are evidenced in the literature as being the most impactful on research productivity (Bland et al., 2005). These aspects are all identified as being on the institutional level, as opposed to those found on the individual or leadership levels. Again, these are the most impactful as determined in previous research and so I am employing them for this study (Bland et al., 2005).

I chose an emerging, private, not-for-profit AHC as the setting for this study. Previous research has been conducted at well-established academic institutions and I believe different challenges and opportunities exist at a newly formed institution. The site I have selected gained AHC recognition in 2013 from the Association of Academic Health Centers. Additionally, this institution is unique because its structure is formed with the health system as the central component and partnerships with three academic institutions whereas a typical AHC is formed by one academic institution and its hospital or health system. To sample a homogeneous population in terms of their role within the institution, the participants in the study includes physician faculty from the nine departments and excludes other research staff and research administration staff.

I considered research activity, productivity and turnover as potential outcomes variables; ultimately choosing productivity. Publications, grant proposals/awards, or number of protocols are each potential measures of research productivity. I chose to use the number of approved IRB protocols as my outcome variable indicator of research productivity. To conduct research at an approved IRB is required. Since the chosen research site is an emerging center, grant proposal and award activity for research is not yet matured so as to serve as the best measure of productivity. Similarly, using

publications as a measure may capture extraneous activity unrelated to research such as case reports.

Theoretical Framework

The conceptual framework used for this study relies on the tenets of both organizational learning theory and climate theory. Organizational theory assumes there are governing variables an institution relies on to guide its operations. This governance is comprised of action strategies to accomplish those overarching goals (Argyris, 1977). The outcomes of operations can be measured by a number of different variables and one key measure used to inform leadership of whether or not these strategies are on target or need to be refined is the use of feedback. Feedback can be described as either a single loop, which would inform current processes, or double-loop, which is a mechanism that might question the overall paradigm under which certain assumptions related to those organizational goals are made. In this proposed research, I draw upon organizational learning theory. An AHC is an organization that relies upon these same structures (goals, processes, outputs, feedback) to organize operations. As applied to this study, I focus on the practice of conducting research. Research, in and of itself, is both the process and output of an AHC and is conducted through its own allocated resources, policies, procedures, and goals.

Organizational climate describes the shared perceptions of employees on those same processes, policies and procedures (Reichers & Schneider, 1990). A climate survey is the mechanism I have selected to measure these various characteristics of the research division of the organization, which I refer to as the research enterprise. Climate theory

describes nine key dimensions of climate (Litwin & Stringer, 1968). I provide here a brief description of each of these elements. *Structure* refers to the physical and organizational structure, which may influence how work is performed or approached. Another factor is the level of autonomy an employee has in decision-making, referred to as *responsibility*. Next are the *challenges*, or the limits and risks when performing tasks and responsibilities. Another key factor is *rewards*, which are how leadership recognizes achievements and goal attainments and can also influence promotion. How employees relate to one another and the general level of collegiality is another element of the climate, termed *relationships*. Likewise, *cooperation* is an important element as it is how individuals perceive the level of teamwork and the nature in which it is conducted. Another important quality of organizational climate is how *conflict*, such as a diversity of opinions, is managed. *Identity* as belonging to a group within the organization is another feature of the climate. The organization's *standards* as reflected in policies and the degree of flexibility to which they are adhered are the final element of the climate.

Research Methods

A full explanation of the research methods is found in Chapter 3. Here, I provide a brief overview that sums up the key facets of the study. The study is based in the post-positivism research paradigm. This approach is centered on the importance of the researcher's objectivity and that the findings are generalizable, but also holds that "researchers modify their claims to understanding of truth based on probability, rather than certainty" (Mertens, 2015, p, 12). The study design is that of a quantitative work in which the independent variables are aspects of the research climate (resources, rewards,

goals, culture, communication, research emphasis, professional networking, and governance) and the dependent variable is productivity. The dependent variable is continuous based on the number of active protocols and the independent variables are also continuous.

The setting for the research is the Health System, an emerging AHC in the southeastern U.S. Those invited to participate in the study are Health System faculty who hold an appointment in the associated medical school. Of these, those I will include in the data analysis are faculty who respond that they either are currently involved in research or are interested in pursuing research in the future. It will be voluntary as to whether the participants respond to the survey invitation or not. The sample will be derived from those who do. Health System leadership endorse the survey and have committee to communicate with the faculty emphasizing the importance of the study and asking faculty to participate.

A climate survey created in and distributed through Qualtrics serves as the data collection instrument. The survey elements are based on a prior research study conducted by Bland et al. (2005) who examined the impact of individual, institutional, and leadership characteristics on research productivity. The Bland et al. (2005) research was conducted at an established AHC whereas my research is at an emerging AHC. The study populations are similar in that they are both clinical faculty. For both as well, the research instrument is a survey questionnaire using Likert scale responses.

My data analysis plan includes using multiple regression to predict productivity outcomes based on the research climate criterion variables. I chose SAS version 9.4 to

develop both the descriptive statistics on the demographic variables (home department, years employed at the Health System, years in research, researcher career stage) and inferential statistics on the independent and dependent variables. I used confirmatory factor analysis and Cronbach's alpha to test validity and reliability, respectively.

Limitations

The purpose of this research is to examining the relationship between research climate and faculty productivity as measured by IRB protocols approved. The limitations to this study can be categorized as relating to the methods or to the researcher. It is recognized these may influence the development of the study and so need to be carefully considered. Seven major areas of limitations exist connected to the current study. The study participants, Health System faculty, are asked for feedback consistently and so may be experiencing survey fatigue. This may result in a low response rate and a small sample size, which could potentially impact the identification of significant relationships from the data.

This study utilized survey questions found in the literature (Bland et al., 2005). A limitation is that only one study is found using these questions and so this research builds on that foundation. The survey instrument contained double-barreled questions. I revised minimally to remove those thought to be more detrimental to the responses, but retained the rest.

Data in this study include self-reported responses defining the number of approved protocols. Self-reported data may potentially be limited by misreporting due to understating or exaggeration of the numbers. Linear regression as a statistical analysis

method has its own limitations including the assumption of linearity, normality, and homoscedasticity (Statistics Solutions, 2016).

Significance of Study

Uncovering how faculty regard the institutional characteristics related to research through this process provides feedback that facilitates organizational learning. Reviewing this feedback provides an opportunity for the improvement of resource management, services offered, revised processes or policies, or increased opportunities so as to better support the research workforce. This, in turn, supports an effort to increase research productivity.

This research is important as institutions have been charged with the task of improving administration and academics processes so as to facilitate research. By gauging how faculty perceive these processes, administration can begin to revise or rethink how research activities are approached, whether it be the institutional conversation regarding research goals, the research administration support structure, departmental rewards and recognition, or how resources are allocated. The results of the climate survey provide insight as to areas needing attention.

This study is significant as well in that this work reinforces the use of a climate survey to measure employee perceptions and applies it to the topic of research specifically. This research is a next step in continuing the work of Bland et al. (2005) by focusing on a unique AHC model. This research also provides a practical application for climate theory and organizational learning theory while serving to address current issues in higher education.

Chapter Summary

In this chapter, I presented an introduction to the topic of this dissertation and provided background information to serve as context and to preview the supporting literature. I established the problem statement and the purpose of the study, which I framed within the delimitations. I also stated the research question and hypothesis while outlining the research methods.

CHAPTER TWO

LITERATURE REVIEW

In this chapter, I present a review of the literature upon which I propose to build my research. The purpose of my proposed study is to examine the relationship between the research climate at an emerging academic health center, as measured by faculty perceptions, and research productivity, as measured through approved protocols. Researchers have studied organizational culture and climate for decades and have examined their influences in the higher education setting and within academic health centers, specifically (Krupat, Pololi, Schnell, & Kern, 2013; Moutier et al., 2016; Dimario, 2012; Carroll and Edmondson, 2002).Understanding the relationship between the two including similarities, differences, and interactions, is essential for employing the climate survey as a tool to gauge the current perspectives on various components of the research enterprise.

Likewise, much literature is found on organizational learning theory and, specifically, its utilization within the healthcare industry and higher education. As its tenets such governing variables, action strategies, and results and consequences align with the model for this study, so too, the mechanism of feedback loops is inherently what this study seeks to provide both researchers and practitioners. To provide the setting for this study in the larger context of demands for research productivity on a national scale and at the institutional level, background information on the call for increased scholarly accomplishments in research and development and the complex system through which this is carried out is also described herein. The following review of the literature begins

with pertinent literature concerning Academic Health Centers and then the Health Center, which is the focus of this study. Then it is organized into three sections: organizational culture and climate theory, meeting the demand for research, and organizational learning theory.

Academic Health Centers

Academic Health Centers hold a mission of educating the future health professionals, leading basic and clinical biomedical research efforts, and providing advanced and complete patient care (Wartman, 2015). AHCs exist as one of two models: fully integrated under a single leadership or split in which the academic and hospital operations report to different leadership (Wartman, 2015). AHCs also support their constituent communities through social programs and other sponsored activities (Wartman, 2015).

Academic health centers' research enterprises are seen as having an important role in the changing face of healthcare and they are linked with the clinical enterprise and are considered vital to transformational patient care (Haley & Champagne, 2017). The Association of American Medical Colleges (AAMC) formed a task force to examine the research role of its constituent institutions with regard for the needs to employ and develop research talent, create the supportive infrastructure needed for success and dedicate the finances required to accomplish the goal of producing a robust research enterprise (Dickler, Korn & Gabbe, 2006).

Likewise, the Association of Academic Health Centers, which recognizes over 88 domestic and 46 international AHCs, has identified five needs related to the research

mission of its member organizations (AAHC, 2019). First, AHCs must design systems to capture the true cost of research so leaders can make informed decisions as to research-related resource allocation. Second, because external support for research activity is limited, AHCs must seek new sources and ensure increased accountability. Third, cost efficiencies must be realized through coordinating clinical and research operations. Fourth, leadership should consider shifting the paradigm under which research is conducted and managed. Finally, AHCs should look to peer institutions for benchmarking research productivity levels. Other research-related operational aspects needing attention at AHCs are recruitment and retention strategies, tenure and promotion practices, research administration and compliance operations, and improved productivity metrics (AAHC, 2019).

AHCs are facing serious challenges as healthcare costs rise, government funding for health care professional training programs is cut, and external support for research is limited (Stimpson, Li, Shiyanbola, & Jacobson, 2014). Additionally, faculty are pulled in so many directions they reported dissatisfaction and burnout (Pololi, Kern, Carr, Conrad, & Knight, 2009). AHC faculty have also reported the need for self-promotion, feeling alienated, and perceiving the culture as unwelcoming (Krupat, Pololi, Schnell, & Kern, 2013). To address these issues, leadership should increase the level of autonomy and integration across academic and provider roles (Stimpson, Li, Shiyanbola, & Jacobson, 2014). Engaging faculty in the governance structure, strategic planning process, and increasing communication are also recommended actions to mitigate the challenging climate within AHCs today (Stimpson, Li, Shiyanbola, & Jacobson, 2014).

To begin to shift practices and improve operations, learning is essential to operating in the changing environment of healthcare (Kraft, et al., 2017). Recommended processes are based on the academic functions of clinical care, education, and research with focuses on collaborative practice, interprofessional education, faculty development, knowledge translation, and collaborative research intended to lead to evidenced-based practice decisions for value driven care (King, Thomson, Rothstein, Kingsnorth, & Parker, 2016). Within the institution, the continuous learning environment impacts the research enterprise, which works to be responsive to demands for leading-edge research (Dimario, 2012). AHCs must work to recognize inconsistencies in the research climate so as to maximize learning (Dimario, 2012).

The Health System

The Health System is unique academic health center and while other AHCs may have certain perspectives, because of both its newness, having been recognized in 2013, and its unique organizational structure, a central health system with three clinical partners, it is warranted to study here specifically (Taylor, 2016). For AHCs in general, one potential method for strategic evaluation of the research enterprise is to use the DNA framework, which includes research faculty, research infrastructure and space, research centers and institutes, research focus areas, research teams, and research partnerships (Haley & Champagne, 2017).

Institutions with an emerging research culture may be challenged to engage top candidates who prefer established institutions with more name recognition so developing from within is a must (Browning, Thompson, &Dawson, 2014). Numerous mechanisms,

such as a governance structure, reward system, mentorship group, newsletter, and research meetings, intended to accomplish this have been developed and implemented at the Health System. Understanding how faculty perceive these elements of the research enterprise is a needed next step. Given the information provided in this and the previous review, it is recommended to gather data via a climate survey to serve as baseline, provide a tool to asses areas needing improvement, and from which barriers to conducting research can be identified (Martinson, Thrush, & Crain, 2013).

At the Health System, learning is embraced as is evidenced in the vision statement: Heal compassionately. Teach innovatively. Improve constantly. After embarking on its mission to become recognized as an academic health center through a unique model with three academic partners, fulfilled in 2013, the health system moved forward in creating a Health Sciences Center to have a home for the academic and research endeavors of the system. Its newest initiative is the creation of the Transformative Heath Institute, which focuses on bringing the many facets of the system together to receive feedback from faculty and staff and create responsive projects that promote learning to innovate practice, improve care team well-being, increase diversity, and encourage teaching and research excellence.

Organizational Culture and Climate

This study was situated within the concepts of organizational culture and climate. Therefore, it was necessary to examine those concepts both independently, to understand the generally accepted definition of each, the evolution of the constructs and the application to higher education, and the importance to informing this work as well as in

tandem since the concepts are inherently linked. I first examined the culture construct including definitions and evolution, with a focus on the concept of a culture of research, followed by a discussion of the literature surrounding climate, and then looked at the interactions between the two, with particular attention on the level of analysis issue and the idea of research as not only a process but also an outcome.

Organizational Culture

An organization's culture was defined by Schein and Schein (2017) as an accumulated knowledge formed through the problem solving processes of external adaptation and internal integration that becomes an established "system of beliefs, values, and behavioral norms that come to be taken for granted as basic assumptions" (p. 6). In drilling down to the world of academia, Kuh and Whitt (1988) defined culture as "persistent patterns of norms, values, practices, beliefs and assumptions that shape the behavior of individuals and groups in a college or university and provide a frame of reference within which to interpret the meaning of events and actions on and off the campus" (p. 6). While the notion of culture being shared is present in these definitions, other's work has challenged this notion offering that individuals have many distinct characteristics and so one culture for all is too basic of an assumption (Martin, 2002). For the purpose of this study, the earlier definitions were accepted.

Foundations of organizational culture. Culture is rooted in anthropology and was first tied to the study of organizations by Pettigrew (1979). Smircich (1983) further developed the idea by describing four main purposes of culture in an institution that include roles in reinforcing identity, facilitating commitment, enhancing stability, and

promoting sense-making, which serve to bond the individual actors in a social construct. Smircich (1983) also promoted the idea that culture is something an organization *is* rather than *has*. This approach supported the proposal that understanding an organization's culture necessitates a deep dive into the underlying structures (Reichers & Schneider, 1990). The converse of this approach rests on culture being something an organization *has* and so can be examined to identify those shared meanings created in response to external influence and internal integration, which are the underlying assumptions manifested in policies, procedures, and practices (Reichers & Schneider, 1990; Schein, 2010).

Culture as applied to higher education. Within a decade of the appearance of culture as a concept tied to organizational behavior, additional works appeared that discussed its application in the academic setting at colleges and universities (Tierney, 1988; Kuh & Whitt, 1988). Tierney (1988) used culture as a mechanism by which administrators can begin to understand how an institution responds to outside factors such as economic or political conditions as well as internal forces emanating from not only history and tradition but also current values and goals. Likewise, Kuh and Whitt (1988) viewed culture as being a function of those same historical and traditional influences as well as the behaviors of current institutional stakeholders. Additionally, academic culture was identified in relation to specific disciplines, the profession itself, and the departmental, college, institution, state or national scope (Kuh & Whitt, 1988; Tierney, 1988).

In considering the levels at which culture influences can be examined, it is important to note each of these may have a role to play in decision making in the face of some internal or external conflict (Tierney, 1988). Understanding cultural differences and the resulting impacts on relationships can bring about more informed and, presumably, better decision making (Tierney, 1988). As academic institutions have unique attributes, such as the tenure and promotion governance systems, the role of faculty in developing and maintaining culture merits research (Kuh & Whitt, 1988).

Culture is evidenced in an institution's artifacts, value and beliefs (Schein, 2010). Examples of manifestations found in artifacts include policies, procedures, mission and vision statements, common language, and ceremonies (Kuh & Whitt, 1988; Schein 1985). Values can be either implied or explicit and carry with them widely held feelings about institutional goals or activities (Kuh & Whitt, 1988). It is at this system level cultural values are examined (James, James, & Ashe, 1990). Norms are the third dimension upon which culture is examined and include unstated assumptions and expected behaviors upon which all other system processes are established (James, James, & Ash, 1990; Kuh & Whitt, 1988; Schein, 1985).

Culture of research. The concept of culture is specifically identified related to the process of conducting research and outputs of scholarly endeavors related to research (Hanover, 2014). An overarching organizational culture includes specific and unique cultural elements often organized into subsystems and those related to research can require qualified leaders dedicated to guiding the planning and development of research infrastructure and an institutional vision aspiring to academic endeavors (Parse, 2007;

Schneider et al., 2013). In academic medicine attention to building a research culture, such as is occurring at the Health System, requires "inventing new and extraordinary ways of thinking about the ordinary day-to-day activities of the system (Parse, 2007). In examining the subsystems at play in a research culture more, Dimond et al. (2015) referred to the needs for leadership support, collaborative learning,

Table 1.1

Comparison of Schein (2010) and Hanover (2014)

Schein (2010): Cultural embedding mechanisms	Hanover (2014): Elements of a culture of research
Formal statements of organizational philosophy, creeds, charters	Established research goals
What leaders pay attention to, measure, and control on a regular basis	Effective leadership
Deliberate role modeling, teaching, and coaching	Researcher education programs and support mechanisms
Organizational design and structure	Institutional centers of expertise
How leaders allocate rewards and status	Recognition and reward systems
Organizational systems and procedures	Facilitation of collaboration
How leaders allocate resources	Balance between demands for time

Challenges in studying culture arise from several issues including at which level of the organization culture exists, how pervasive across an organization culture is, that culture is often implicit and taken for granted, that historical occurrences become incorporated into culture and so are difficult to separate, that there is a political quality to the development of a culture, that multiple cultures can exist and impact one another, and

that all of these elements are interconnected (Pettigrew, 1990). To objectively examine how culture is perceived by the constituent members, we must look to the counterpart construct, climate, which is a manifestation of culture (Reichers & Schneider, 1990).

Organizational Climate

Organizational climate is generally defined as the "shared perceptions of organizational policies, practices, and procedures, both formal and informal" (Reichers & Schneider, 1990, p. 22). The construct is inextricably tied to organizational culture and they are seen as related process feeding into one another (Reichers & Schneider, 1990). In addition to being a manifestation of culture, climate is also the mechanism by which data on culture can be gathered and assessed (Reichers & Schneider, 1990).

Evolution of climate. Lewin, Lippitt, and White (1939) coined the term *climate* to describe the attitudes, feelings, and social processes that occurred among groups of boys at an American summer camp. Likert furthered work in this area with the development of the Likert scale, which was intended for use in measuring climate specifically (Ashkanasy et al., 2000). Litwin and Stringer (1968) proposed nine dimensions of organizational climate that can be used to organize a climate survey: structure, responsibility, challenges, reward, relationships, cooperation, conflicts, identity, and standards.

Focus areas in climate research. Climate can be conceptualized in terms of a specific focus area that can either be the process itself or the product or outcome of an organizational process. Schneider's early work focused on customer service as the outcome of a certain climate (Schneider, 1990). Research on the climate for safety and

justice are evidenced in the literature as well (Clarke, 2006; Colquitt, Noe, & Jackson, 2002). Climate studies were specifically situated in healthcare as well on the topic of safety (Singer et al., 2007).

Climate has been used to examine the culture of academic medicine at an academic medical institution (Moutier et al., 2016). Additional studies in academics centered on campus climates within departments and the climate for fostering research integrity (Sheridan et al., 2017; Wells et al., 2014). Research in these focus areas was driven towards an outcome variable. When they examined the effects of climate and organizational learning, Robin, Muller, and Tuner (2006) assessed teacher self-efficacy as the outcome variable of an assessment on organizational learning climate. Recent research on climate examined not only the impact of climate, but also the strength of climate (Meyer, Dalal & Hermida, 2010).

Research climate. Bland et al. (2005) created a model that includes institutional characteristics that were examined for ability to predict faculty research productivity. Alignment with Litwin and Stringer's (1968) nine factors of climate can be seen (Table 1.2). Viewed as elements contributing to the research climate in an institution, I use these as the basis of the climate survey for this study (Appendix A)

Table 1.2

Comparison of Litwin and Stringer (1968) and Bland et al. (2005)

Litwin and Stringer (1968) Nine factors of climate	Bland et al. (2005): Institutional characteristics that facilitate research productivity
Structure	Size, experience, expertise; Recruitment and selection
Responsibility	Decentralized organization; Assertive participative governance; Sufficient work time

Challenges	Culture
Reward	Rewards; Brokered opportunities
Relationships	Mentoring
Cooperation	Resources
Conflicts	Positive group climate
Identity	Communication with professional network
Standards	Clear, coordinating goals; Research emphasis

Culture and Climate Interactions

Climate and culture share both similarities and distinctions. They both are social processes that can be assessed on multiple levels and function to define ways in which organization members operate within and make sense of their environment (Reichers & Schneider, 1990). Where these constructs differ is culture is considered a higher order abstraction with climate serving as the underlying mechanism (Reichers & Schneider, 1990; Schneider, Gunnarson, & Niles-Jolly, 1994). Peterson and Spencer (1990) refer to climate as the "current patterns or atmosphere" while culture encompasses the "embedded or enduring" characteristics of an organization (p. 7).

Methods. Another distinction between the two constructs is found in the method used to conduct research on them. While culture lends itself more to qualitative work including interviews, observations, or participation, climate researchers mainly have used quantitative measures such as survey instruments to evaluate climate (Reichers & Schneider, 1990; Ashkanasy et al., 2000). To enhance the study of climate, Reichers and

Schneider (1990) recommend breaking free from using canned climate questionnaires in favor of one tailored to the institution under study and recognize research may be enhanced by qualitative data collection and analysis.

Levels of analysis. For climate and culture, as well as organizational learning, the level at which the construct is examined constitutes different approaches. Joyce and Slocum (1984) showed an individual has a personal perception which can be examined as psychological climate. At the organizational level, employees' perceptions are aggregated and are available for use as a reflection of how the overall attributes are received and interpreted (Joyce & Slocum, 1984).

Peterson and Spencer (1990) referred to climate as existing as an "intrinsic measure of participants' motivation" or an "extrinsic measure of organizational patterns that control member behavior" (p. 140). Schneider, et al. (2013) described this issue as involving the legitimacy with which individual perceptions can be aggregated to reflect an organization wide perception of climate. They went on to discuss the many studies performed in examination of this topic and state shared perceptions are indicated by mean responses with low variance (Schneider, et al, 2013). In organizational culture, the levels issue questions at which level in the organization culture can be examined, artifacts, beliefs, or assumptions, and on which layer or subsystem within the organization (Schein, 2010).

Meeting the Demands for Research

The following section is a review of the current literature related to the complexities of challenges facing the development of a research enterprise in an

academic organization and the development of both the research infrastructure and researchers themselves. This information is intended to support an understanding of how these challenges merit examining the perceptions of organizational climate by the individuals functioning in this environment.

Research is one of the three pillars of higher education along with instruction and service. In the current environment of reduced state funding and market pressures to keep tuition costs low, increasing research through a healthy research enterprise and successful sponsored programs applications is key to sustaining viable institutional operations (Browning, Thompson, & Dawson, 2017; Huenneke, Stearns, Martinez, & Laurilla, 2017). Research faculty and staff are the front line operators for the research enterprise at institutions of higher education and as such the development of both the research infrastructure and researchers themselves is crucial to meeting these demands (Bland et al., 2005).

Demands for Increased Research Activity in the Face of Competition

Federal funding for research and development activities fluctuates year to year, but is on an overall downward trend (NRC, 2012). While the budget was increased in 2016-2018, the National Institutes of Health have seen a decline in funding of 22% between 2003 and 2015, which lead to fewer grants, less scientific discoveries, and an increased potential for researchers to leave their respective fields (FASEB, 2018). To facilitate increased engagement in research activity, it is recommended sponsors such as the NIH limit the amount of funding awarded to individual scientists so as to increase the number of researchers engaged in general (FASEB, 2018).

At the same time the fact of limited funding and increased competition is being recognized, a call has been issued for academic institutions to improve operational efficiency to be able to do its part in meeting the scientific needs of the nation (NRC, 2012). Recognized as an integral part of the research partnership, universities are being asked to minimize costs, and increase productivity (NRC, 2012). Likewise, these institutions must communicate widely as to the important contributions being made in creating and disseminating new knowledge (NRC, 2012).

Impact on the University Research Enterprise

Research activity and its products are a distinguished component of American research universities and, subsequently, significantly impact the public rankings of institutions and their academic programs (Dundar & Lewis, 1998, Browning. Thompson, Dawson, 2014; Huenneke et al., 2017). For institutions to produce high quality, impactful research that meets national demands, research leadership, as a subset of educational leadership, is needed at the institutional level (Evans, 2012).

Incentive structures, governance regarding the tenure and promotion process, mentoring programs, and available resources each influence faculty's proclivity toward and aptitude for pursuing research endeavors. These approaches require a long-term commitment to the research enterprise and must be weighed carefully (Huenneke et al., 2017). Institutionally controlled factors impacting research includes the hiring process as bringing in faculty with strong research agendas and aptitude is one way to enhance overall research performance (Creswell, 1985). Likewise, the creation of research clusters, a critical review of organizational policies and procedures and a clearly

communicated message that research is a priority are seen as impacting the ability of the research enterprise to meet these demands (Huenneke et al., 2017).

Research administration supports. Additional influences on the development of a robust research enterprise pertain to the research administration support structures implemented by universities to facilitate research and, more specifically, research compliance. Chun (2010) advised that, in light of the economic pressures facing higher education institutions and the subsequent limited resources, strategic planning is imperative for well-trained support staff to be prepared to meet the demands of faculty research agendas. Best practices maintained through staff training and professional development, effective practices reflected in appropriate policies and procedures, and good customer service are required to support the research functions of an institution (Seligman, Codd, & Barbret, (2009).

Partnership and collaborations. The role of partnerships and collaborations in facilitating research activities can be examined for both internal and external connections. Sponsors are not only funding sources, but also are key partners in driving research agendas and focus areas. Between-institution collaborations and intra-institutional partnerships in developing inter- and multi-disciplinary research are central drivers of research productivity and will play increasing role in the future (Haley & Champagne, 2017).

Researcher Development

Researcher development can be conceived of as occurring through proficiency in research activity or in terms of research productivity (Akerlind, 2007). Increasing

confidence, recognition, productivity, and sophistication have been shown as ways to understand the growth and development process (Akerlind, 2007). Training can occur at the graduate program level, but proficiency comes from practice and so otherwise these skills may fade without use (Creswell, 1985). Pressure to publish or accomplish other scholarly activities may originate in the rewards and recognition systems of an institution (Creswell, 1985; McGrail, Rikard, & Jones, 2006).

Programs to increase physician capacity for research and to offset potential barriers to conducting research include education on the supports available, dedicated time for research, communication as to the value of research and its importance in fulfilling the organization's mission, and research skill building such as medical writing (Basu Ray, et al., 2012). Addressing such needs can result in not only increased research interest, but also activity resulting in publications, presentations, and other scholarly efforts (Basu Ray, et al., 2012).

Intrinsic motivation is an influencer of a researcher's development (Creswell, 1985). Inclinations towards research may be influenced by a researcher's discipline, type of institution, career stage, and balance with other responsibilities such as teaching, service or patient care, for those at academic health centers (Creswell, 1985). Increased motivation towards research productivity can be facilitated through mentoring programs, encouraging faculty to invest time in research that is inherently of interest to them, and recognizing efforts put towards these endeavors (Leech & Haug, 2015).

Climate as a Measure of the Culture of Research

To meet the demands for research activity, institutions must provide the needed resources for faculty to flourish in the face of competition and limited funding (Dundar & Lewis, 1998). Faculty operate within an institutional culture, which comprise its shared beliefs, norms, and assumptions, especially at the department level (Dundar & Lewis, 1998). In order to meet the needs of faculty, we must understand their perceptions of the research environment including the values expressed, supports offered, and opportunities afforded. A positive department climate has been shown to be associated with increased research productivity (Sheridan et al., 2017). As stated by Creswell (1985), "creating an attitude and atmosphere in a department of a college that values research" can reinforce and stimulate faculty research (p. 8).

While an institution and faculty may have shared values, for example clinical care, quality education, and community service, if faculty do not perceive the institution as sharing that value, though espoused, an incongruence may exist that goes unidentified and can negatively impact an organization (Pololi, Kern, Carr, Conrad, & Knight, 2009). Therefore, academic medical institutions need to address the potential perceived lack of alignment with institutional behaviors (Pololi et al., 2009).

Organizational Learning Theory

An organization must improve its business processes by learning new ideas to be called a learning organization (Garvin, 1993). Organizational learning is an imperative for businesses that need to stay competitive (Tsang, 1997). As the research environment is extremely competitive, effective research organizations must embrace the qualities of

organizational learning (Dimario, 2012). In fact, one of "the most noted reasons for campuses to learn is to be responsive to environmental needs and pressures such as dwindling resources" (Kezar, 2005, p. 1).

Organizational Learning

Huber (1991) referred to organizational learning as occurring if an organization acquires, distributes, or interprets information and if through this process some spectrum of its behaviors is changed. An additional component of organizational learning is organizational memory, which is "the means by which knowledge is stored for future use" (Huber, 1991, p. 89). It is here experiences are incorporated into systems of beliefs and become institutional cultures that manifest as procedural operations at the organizational level (Levitt and March, 1988). One mechanism of evaluating organizational learning is the assessment of the climate in which learning can occur (Nikolova, Van Ruysseveldt, De Witte, & Dam, 2014).

Some debates around organizational learning ask if learning can occur at the group level as well (Agyris & Schon, 1996; Kezar, 2005). This levels issue has also been seen in the discussion of organizational climate and culture. Another topic of discussion with organizational learning is the question of to what extend does learning occur, whether it is new ideas/knowledge, new practices, or full change implementation (Huber, 1991; Garvin, 1993).

Organizational learning starts at the individual level and learners must consider options and make choices as to their motivation to learn, which is often driven by practical needs (Kirwin, 2013). The concept of adult learning, or andragogy, as defined

by Knowles (1990), is based on the assumption adult learners are independent, have a wealth of experiences to draw from, exhibit a readiness to learn oriented towards their role, are problem centered, and are internally motivated. As such, principals upon which learning should be framed include explanation of the reason for learning, a task-oriented approach, understanding of diverse backgrounds, and empowerment of self-direction (Knowles, 1990).

An additional element essential to learning is the idea of self-efficacy, which impacts motivation, learning aptitude, and performance (Bandura, 1986). High levels of self-efficacy are associated with continued learning applications and position employees to better solve problems and remain productive (Kirwan, 2013). Organizational climate has been shown to contribute to the organizational learning environment which impacts self-efficacy (Tobin, Muller, & Turner, 2006; Jaafari, Karami, & Soleimani, 2012).

Additional theories of influence. Organizations operate in a circle of influence from both internal and external factors, to which they not only have to adapt, but also through which they have the ability to control their own outcomes (Senge, 1990). Senge (1990) described this interrelated nature of business processes and the impact of learning on overall change as *systems thinking*. To create an environment in which learning can occur, a shared vision must be present with clear goals being communicated to all, a flexible and adaptable learning structure to facilitate knowledge transfer across the organization must exist, and a climate of learning based on personal mastery so employees are empowered to continuously learn must be perceived (Kirwin, 2013).

Educational organizations have been described as loosely coupled systems (Weick, 1976). Operating as such allows institutions to be more flexible and nimble to changes in the environment and perhaps realize economic benefits from local adaptations (Weick, 1976). Employees functioning under a loosely coupled system may benefit from a greater sense of self-efficacy as there is room for an increased self-determination (Weick, 1976).

Academic institutions are also considered large, complex systems, as are organizational learning systems and AHCs, specifically, and must manage the issues that arise within such (Kezar, 2005; Dimario, 2012; Ghili, Nazarian, Tavana, Keyvanshokouhi, & Isaai, 2013). Complexity can be magnified when there are many variables, there is a time lag between issue and recognition or feedback, or when the consequences are muted and not recognized (Senge, 1990).

Another way of conceiving of the academic research institution, and the research enterprise within specifically, is that of an open system (IOM, 2002). This open system consists of complex adaptive processes that interact with the internal and external environment (IOM, 2002; Dimario, 2012; Martinson, Thrush, & Crain, 2013). Operating under an open system framework, an organization must employ organizational learning strategies to be able to review system processes in light of the external interactions (NDU, n.d.).

Feedback loops. These learning strategies involve gathering information about processes after the fact. At the individual level, feedback enables behaviors changes and can have a positive impact (Kirwin, 2013). Argyris (1977) described two types of

learning mechanisms at the organizational level. Single-loop learning occurs in organizations when processes are called into question, but allowed to persist with corrections or modifications (Argyris, 1977). Double-loop learning occurs when individuals in the organization question the underlying governing value or the impetus for conducting such operations so as to potentially bring about a paradigm shift (Argyris, 1983). The double-loop process actually challenges the norms, assumptions, and underlying beliefs (Argyris, 1977).

Models. One model of organizational learning comes from Crossan, Lane and White (1999). It depicted learning as occurring at three levels: individual through intuiting and interpreting; group via integrating, and organization with institutionalizing. Another model, based on Argyris' (1977) work in double-loop learning, is more applicable to this project (Figure 1.1). In this model governing variables are those underlying assumptions and beliefs in an organization that set about processes. Action strategies are the processes that become routine procedures documented by policies that form how the organization operates. Outcomes from such processes include results and consequences. Single-loop feedback informs problem solving while double-loop learning involves reevaluating and reframing goals (Argyris, 1977).

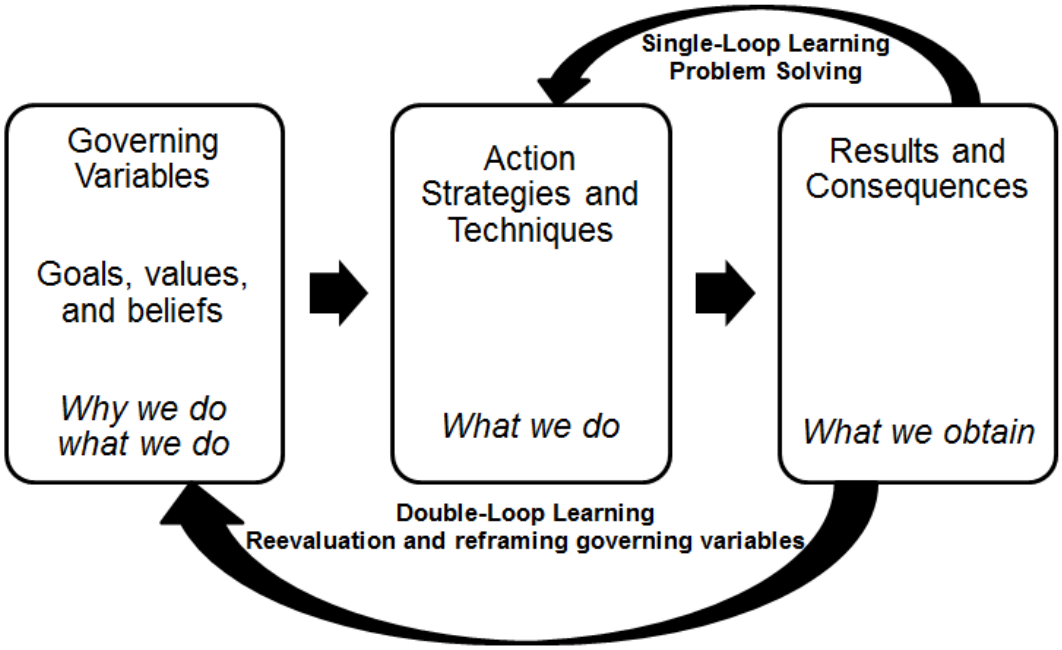

Figure 1.1. Learning model. This figure depicts Argyris' (1977) components of organizational learning. Adapted from: http://www.invistaperforms.org/double-loop-learning-leadership-development/

Organizational Learning in Health Care

The concept of the learning organization is very familiar in healthcare and prevalent in the literature (deBurca, 2000; Carroll & Edmondson, 2002; Nembhard, Cherian, & Bradley, 2014; Ratnapalam & Uleryk, 2014). In 2013, the Institute of Medicine (IOM) stated that continuous learning needs to be the focus of health systems moving forward. AHCs, benefit from a climate that "encourages, facilitates, and rewards learning" and offers employees the opportunity to "practice new skills and competencies" (deBurca, 2000, p.457).

Carroll and Edmondson (2002) described the ways in which organizational learning, through processes of action and reflection, can support the improvement of two key focus areas: safety and quality. They encourage health system leaders, from executive to informal, to not only share the vision of learning culture, but also to implement systems to reinforce learning behaviors (Carroll & Edmundson, 2002). Two mechanisms use by which learning can be approach is incorporating best practices and creating self-generated solutions (Nembhard, et al., 2014).

A Conceptual Model

To frame a study, key elements need to be defined so as to be able to make judgements on their use in both the literature and how they are employed consistently through the anticipated study (Check & Schutt, 2012). A conceptual model incorporates the components of a research study and presents them in an organized manner showing the interactions at play between them. The research enterprise in any academic institution is comprised of numerous actors including internal structures, processes, and resources; external environmental factors and influences; and expected outcomes and outputs, as well as, the loop through which feedback is obtained.

A model describing the interactions at work in the research organization, based on open systems theory, is found in the literature (IOM, 2002). This model has been adopted, modified, and employed to inform the instrument development and framework for the proposed research. It is formatted to address the research enterprise as a whole retaining the qualities of both open systems and the feedback loops found in the learning organization (Figure 1.2).

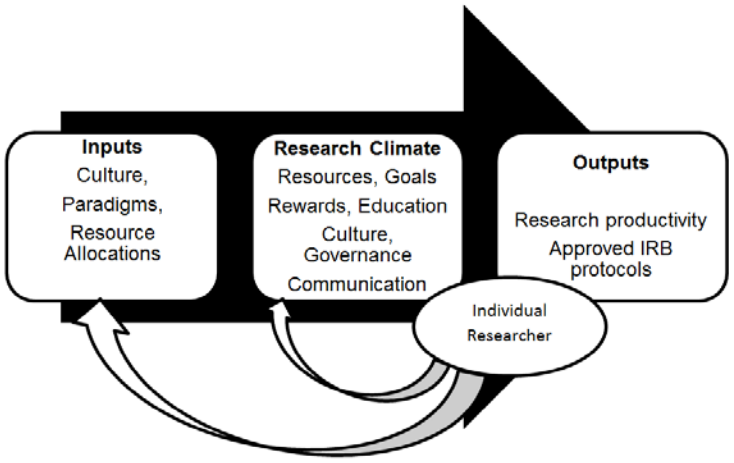

Figure 1.2. Conceptual model. This figure illustrates the elements included in the research study and connections between them.

Research is a process that starts with inputs including the culture, share beliefs concerning research, paradigms, the current system view of research, and resource allocations, which includes both human resources and financial support. As the process moves forward it encounters the organizational structures and processes that govern or support the research activities of the organization. How elements such as leadership practices, governance and support structures, communication systems, education programs, and research specific policies and procedures are perceived impacts the conduct of research and, therefore, overall research productivity (Martinson et al., 2013; Thrush, et al., 2014).

Outputs form the right boundary of the model and these are tangible products such as publications, grant awards, or approved IRB protocols. Included in the model are the feedback loops to the research processes and to the overarching assumptions under which research is incorporated in the mission and vision of the system. Influences from

the external environment and the internal system are also included. Finally, the researchers are included as individual qualities such as motivation and self-efficacy may moderate the process. Underlying all of this is the culture of research and the perceptions of the researchers in interpreting the research climate.

Chapter Summary

In this chapter, I addressed the important aspects of the literature that pertain to the proposed research study. Organizational climates can be assessed on one particular aspect such as that of research using a climate survey to gather data on employee perceptions related to that topic. As higher education in academic health centers face pressures not only from the changing face of healthcare, but also in the demand for increased research activity, understanding faculty perspectives is an imperative to be able to align policies, procedures, goals and the like to promote productivity in research. Organizational theory provides us a model to assess current practices to obtain feedback so as to inform administration and the literature.

In reviewing these areas, I found a need to expand on the work by Bland et al. (2005), and so designed this research study that draws upon the validated survey tool to examine the impact of research climate on a population at an emerging academic health center as it is unique from that of an established academic health center and especially so at one with a unique model such as the Health System.

CHAPTER THREE

RESEARCH METHODS

Within this chapter, I describe the elements that comprise my dissertation research study to include the proposed study's problem and purpose, a description of the study site and sample, as well as the methods to be used in gathering and analyzing data. I also describe the study context and limitations of the research and myself as researcher. Finally, I provide insights on my positionality.

Study Overview

In this study, I used a research climate survey of the faculty at an emerging academic health center in the southeastern U.S. to better understand how the faculty view the existing research practices and support structures. The intent of this work was to further this field of study and to provide leadership feedback through which it can improve, which is imperative to operating as a learning organization. This study relied on a post-positivist research paradigm and was undertaken with the goal of explaining the relationship between the variables in question (research climate) and the output measure (productivity) through quantitative analysis using multiple regression.

This study builds on the research conducted by Bland et al. (2005). The purpose of the work was to identify and confirm individual, institutional, and leadership characteristics associated with faculty research productivity. The study site was an established AHC, University of Minnesota Medical School – Twin Cities. The study sample consisted of full time equivalent faculty. The research instrument was a survey

questionnaire using Likert scale responses. The institutional based survey questions examine aspects of organizational climate related to research.

Problem of Practice

Academic institutions face a call to increase research and improve administrative practices to better facilitate research (NRC, 2014). These same institutions also face the external pressures of increased competition, greater compliance regulations and limited resources (RUFC, 2012). Within the institution, academic health center faculty are asked to contribute to the research mission of the institution in addition to their responsibilities towards patient care, teaching and service (Stimpson, Li, Shiyanbola, & Jacobson, 2014). Most academic health centers operate within an organizational learning framework, which is key to effective operations (Avins & Goldberg, 2007).

A learning organization that has a goal of meeting the demand for increased research and improved research-related process, , such as the Health System under study, must first understand how faculty view the current internal environment for research and its impact on productivity. This affords leadership the opportunity to review the practices and paradigms that govern research activities (Dimario, 2012).

Purpose of the Study

The purpose of this study was to examine the relationship between faculty perceptions of institutional characteristics related to the research climate and faculty research productivity as indicated by obtainment of an approval IRB protocol. This research furthered the work of Bland et al. (2005) by applying the model developed through their research to an emerging academic health center rather than an established

one. Further, this study contributed to climate research by applying the climate survey in this way.

Research Methods

In the following section, I define the key elements of my research study including the research questions, hypothesis, participants and setting. I also define my conceptual frame work and provide context in which the study is focused. Finally, I specify the data collection process and analysis plan.

Research Question

How do factors of the research climate (resources, rewards, goals, culture, communication, research emphasis, professional networking, and governance) impact faculty productivity at an academic health center?

H_0 = Research climate does not impact research productivity.

H_1 = Research climate does impact research productivity.

Conceptual Framework

For this study, I drew from organizational learning theory. An AHC that is a learning organization improves its processes by acquiring and interpreting information about its operations to remain competitive (Garvin, 1993; Tsang, 1997; Dimario, 2012; Huber, 1991). This study provided the Health System a means to gather feedback to inform organizational learning and permit leadership to understand how its practices can impact the goal of producing research.

In this study, I also looked to organizational culture and climate theory to define the many facets of the Research Division and it supporting processes and structures.

Litwin and Stringer's (1968) nine climate factors have been shown to align with the Bland et al. (2005) institutional characteristics (resources, rewards, goals, culture, communication, research emphasis, professional networking, and governance) (Table 2). Additionally, I employed the survey instruments, called a climate study, developed based on organizational climate theory as a tool to assess employee perceptions on the key elements of the topic at hand, research (Litwin and Stringer, 1968; Schneider, 1990). Using these frameworks acknowledged that organizational learning and organizational climate are entrenched in an academic health center (Moutier et al., 2016; Kraft, et al., 2017).

Study Context and Focus

I pursued this study to better understand how the facets of research climate can impact faculty productivity. I chose the setting of an emerging academic health center, as found in the Health System, as it is unique amongst other established academic health centers in that most of its institutional policies, procedures, and practices have been established within the past 6 years. Additionally, the Health System has a unique structure formed with the health system as the central component with three associated academic partners while other AHCs are comprised of on academic institution paired with a partner health system under the same governance.

I defined the central population under study faculty with a clinical appointment in the medical school, as they are the main researchers within the institution. The sample could have been expanded to include all physicians, staff, including non-faculty employees such as research administration staff, or limited to a subset of faculty such as

found within one department. Including all clinical faculty both increased the potential for responses and better met the needs of the research question. The research question itself was delimited in that I could have asked additional related questions categorizing the faculty into departments, length of time at the Health System, years in research, etc. or expand the productivity measure to include other forms such as publications, grant activity, or intellectual property, but did not.

To frame the study, I selected both organizational learning and climate theory. I chose quantitative analysis for my method. A qualitative study in which interviews were conducted could have been selected drawing upon culture theory, but the proposed work fit better with my research paradigm alignment of post-positivistic. Narrowing down within this framework, characteristics from various levels within the institution could be examined such as individual, institutional, leadership, but the institutional characteristics were pulled out as it drove to the heart of the research question.

Study Site

I selected an academic health center in the southeastern U.S. as the site for this study, referred to as the Health System. This site is a newly forming AHC, recognized as such in 2013. The Health System is comprised of an integrative healthcare delivery system and three, separate academic partners including a medical school. The Health System considers patient care as the driver of operations and relies on academics and research to support the teaching and research mission while advancing care and contributing to the scientific community. Activities related to research and scholarship are referred to as the Research Division, which extends across all nine departments and

supporting units, with an academic vice chair serving as the leadership contact within departments. At the institutional level, there is a Chief Academic Officer, Chief Science Officer, Medical Research Director, and multiple research administration offices.

The Health System defined seven strategies to direct activities towards meeting Research Division goals. The first strategy is to engage investigators and ensure productive, collaborative partnerships. Providing research education that prepares institutional academicians, clinicians and students to successfully engage in health sciences research follows. Third, the Health System commits to supporting health sciences research through a responsive and efficient administrative structure. Ensuring all research conducted meets acceptable standards of quality and compliance is another lead initiative. A commitment to communicating the scholarly mission, vision, and impact of Health System throughout the organization, with university partners, and among the national academic/ research community is the fifth strategy employed. Another key mission is creating a plan to support research and scholarship that fuels innovation and accelerates business development. Finally, the Health System embraces establishing an interinstitutional team to explore the feasibility of expanded research facilities within the Health System complex.

Participants

The population in this study were faculty at the Health System. As the Health System is a physician lead organization, this population includes executive leadership, such as the Chief Academic Officer, department chairs, academic vice chairs, as well as

clinical faculty. Non-probability sampling was used as this research is exploratory and targets those in the population with an affinity towards research activity (Daniel, 2012).

For the sample, the primary inclusion criteria was being a physician with a clinical appointment and secondary inclusion criteria screened to those that responded positively to being currently involved in or having interest in leading research activity within the health system. Exclusion criteria consisted of those who are not interested in/motivated towards/ doing research or those individuals who do not have a clinical appointment. To determine the appropriate sample size, a power analysis was conducted using Cohen's (1992) tables. For a medium effect size, 107 participants are needed.

To enhance recruitment, two strategies were employed. First, the initial email with survey link was issued from the Chief Science Officer and Chief Medical Officer so the importance of this study was emphasized to the faculty. I promoted the study and its component survey through the research division communications and at departmental meetings.

Data Collection Instrument

This study employed a researcher created climate questionnaire, based on the model created by Bland et al. (2005), to assess what types of research support structures most influence the climate for faculty to be productive in research. The climate survey is an established tool for assessing employee perceptions of various elements of an organizational (Wells et al., 2014). The survey consisted of several dimensions institutional research resources (education, communication, polices/procedures, support staff), departmental research norms (value of research, departmental practices, supports),

barriers (as evidenced in the literature as key elements for creating a culture of research (Martinson, Thrush, & Crain, 2013; Bland et al, 2005). The productivity question assessed if a faculty member had obtain an approved IRB within the past year. The survey questions are included in Appendix A.

Data Collection Procedures

The survey was developed using Qualtrics. Likert scale responses were used to gather perceptions on the various survey elements. I designed an introductory email, included in Appendix C, which explained the study, its research question and overall goal, and contact information. Utilizing direct email, I sent a communication to the proposed population inviting them to participate in the research study and providing them access to the secure, online, web-hosted survey. Participants had a three week window in which to complete the survey and reminders were sent periodically to those who had not yet done so. An automatic thank you notification was sent via Qualtrics to those who complete the survey.

Data Analysis Plan

Data were analyzed using SAS, version 9.4. Data were coded, as needed. Descriptive statistics were run including mean and frequency counts. Regression, as described below, was used to assess impact of the continuous, independent variables on researcher productivity.

Variables. The continuous, independent variable consisted of the institutional characteristics of the research climate including: recruitment, resources, rewards, goals, climate, culture, communication, research emphasis, professional networking, mentoring,

opportunities, size, time, and governance. Research productivity served as the dependent variable and was measured by self-report of the number of approved IRB protocols a faculty members obtained within the past year.

Analysis. To examine the research question, I used multiple regression as it is the appropriate method to examine the impact of the multiple independent predictor variables on the dependent outcome variable (Statistics Solutions, 2016). Data were analyzed using SAS. Descriptive statistics were run including mean, standard deviation, minimum, maximum, skew and kurtosis for each variable. The major assumptions of the linear regression were assessed. These included the reliability measure of the instrument, ensuring only relevant variables are included in the model; linearity as assessed by review of scatterplots; normal distribution as evaluated by reviewing skew and kurtosis; and homoscedasticity of errors as evaluated by a review of plotting the residuals with the predicted values. Significance was evaluated using a p-value of 0.05. The standard regression coefficients were calculated, which indicated that a 1 standard deviation change in each variable will lead to an x standard deviation change in the research productivity score.

Reliability and validity. Reliability for the survey elements was analyzed using Cronbach's alpha. If reliability was low, factors can be removed and the analysis can be rerun to obtain a higher value. Validity was evaluated using a confirmatory factor analysis to ensure the survey elements are grouping together as intended.

Limitations of the study. As this researcher worked in the field of research administration, bias in the study design, data collection and analysis, and reporting of

findings and conclusions are a limitation but were controlled for through efforts to minimize threats to validity by drawing upon survey elements from Bland et al., 2005.

Positionality

While positionality is commonly addressed in qualitative work, it is not as often seen in quantitative studies, but, as Jafar (2018) considered, for quantitative studies positionality also defines how the research is bounded and so impacts its outputs. Through my development in the doctoral program, I was challenged to determine my understanding of the creation of knowledge and the research process. I recognized I subscribe to the post-positivist research paradigm not only because I believe we can determine what is actually occurring in an objective manner, but also that my role as a researcher is inherently impacted by my role as a practitioner.

At the time of the study, I served a research administrator who worked at the Health System with leadership to design the processes, policies, and community in which research was performed. During my tenure in this role, I contributed to the development of communication strategies such as the research division newsletter, quarterly and annual reports, and the research division advisory group meeting. Likewise, I helped develop and implement training mechanisms such as the research education series, research grant rounds program, and annual research showcase, which includes a poster presentation. I served in governance roles as a member of the scientific advisory committee and defined policies on a number of institutional practices related to sponsored programs management, incentive funds, and seed grant programs. I contributed to building a network by participating in the research mentorship group and engaging at

various functions such as the spring and fall mixer and research events hosted by our partner organizations. I developed the strategic plan for one unit of the research division and contributed to the overall strategic planning process. I and my team provided concierge support services to faculty and staff interested in pursuing extramural funding through the identification of, application for, and management of external grants. I worked to reinforce best practices every day as I supported the faculty and staff in their research endeavors.

Having a better understanding of how this research climate was perceived was valuable to me as a practitioner and as a researcher. The environment within the institution, the interactions between faculty, and the allocation of resources each impact the ability of a faculty member to be productive. By understanding the perception of faculty as measured by a climate survey, administrative leaders can better refine the policies and procedures, allocate resources, and facilitate an environment conducive for research. I worked to identify the relevant characteristics to know where to concentrate efforts.

Chapter Summary

This chapter presented a description of the methods I used in this quantitative study. I also presented information on the participants I included and the study setting. To frame the study, I identified the supporting theories and research evidenced in the literature on which this work will be based.

CHAPTER FOUR

ANALYSIS AND FINDINGS

The purpose of this study was to examine the relationship between various institutional characteristics of the research climate and faculty research productivity. The measure used for productivity was approved IRB protocols. Specifically, I sought to answer the question:

How do factors of the research climate (resources, rewards, goals, culture, communication, research emphasis, professional networking, and governance) impact faculty productivity at an academic health center?

H_0 = Research climate does not impact research productivity.

H_1 = Research climate does impact research productivity.

For data collection, I created a climate survey based on the Bland et al. (2005) study, which asks questions on the faculty perceptions of the institutional research climate. I also included with questions as to the respondent's interest in pursuing research, department, length of time at Health System, researcher career level, and hours spent on research. Finally, I ask for the respondent's number of active protocols as an assessment of research productivity, which serves as the dependent variable.

Responses from faculty affirmed they work at the Health Center, hold a clinical faculty appointment at the medical school, and were currently engaged in or have interest in future research endeavors were included. Data were coded for entry into the statistical software. To analyze the data, I used SAS, version 9.4. First, I ran descriptive statistics for each variable and will provide a description of each and the results below. Next, I ran

a multiple regression using the key institutional characteristics of the research climate. In this chapter, I present the data, analysis and findings for my study.

Summary of the Data

Data were collected via an online Qualtrics survey. My initial list of clinical faculty participants included 726 email addresses. When issued via Qualtrics, sixteen of those emails did not go through. I received 201 responses to the survey. The overall response rate was 28%. Based on the study criteria, four additional responses were excluded because the individual stated he/she did not work for the Health System and 17 responded they were not clinical faculty. Additionally, I removed 65 responses from participants who did not completely answer the survey questions. My rationale for doing so is that empty responses would be excluded from the regression by SAS. My final list of complete responses totaled 155. Of those, 115 stated they had interest in or were currently working in research and 40 did not/were not. All were included in the analysis.

Demographics of the Sample

Of the 155 responses included in the study, all departments were represented except Pathology (Table 4.1). With 55% (n=86) majority of responses were from the departments of Internal Medicine, Pediatrics, and General Surgery. The majority of respondents had been with the Health System for five years or more (Table 4.2). Most of the respondents identified as being in the New / Early Stage, 54% (n=84) with only 32% (n=50) identified as Mid-Career and 14% (n=21) identified with being at an Advanced Stage.

Table 4.1

Frequency and Percent of Participants by Department

Department	*Frequency (%)*
Pediatrics	35 (23)
Internal Medicine	19 (29)
Surgery - General	22 (14)
Obstetrics and Gynecology	17 (11)
Emergency Medicine	15 (10)
Anesthesiology	9 (6)
Family Medicine	9 (6)
Psychiatry / Behavioral Medicine	6 (4)
Radiology	5 (3)
Surgery - Orthopaedics	5 (3)
Corporate	3 (2)

Note: N=155

Table 4.2

Participants by Years Employed at Health System

Years Employed at Health System	*Frequency (%)*
Less than one year	13 (7)
One to less than 3 years	27 (15)
Three to less than 5 years	40 (22)
Five to less than 10 years	33 (18)
Ten years or more	72 (39)

Note: N=155

When the reported number of hours spent on research per week were examined, the majority of participants reported being involved in research activities for less than two hours each week, 63% (n=97). Twenty two percent (n=34) responded spending

between 2 and 6 hours per week. Only 15% (n=24) spent more than 6 hours per week on research activities (Table 4.3).

Table 4.3

Hours per Week Spent on Research

Hours per Week	*Frequency (%)*
Less than 2 hours	9 (6)
Two to less than 4 hours	24 (15)
Four to less than 6 hours	33 (21)
Six to less than 8 hours	28 (18)
Eight to less than 10 hours	61 (38)
More than 10 hours	5 (3)

Note: N=155

Finally, survey respondents were also asked on how many active protocols were they currently an investigator or had they been an investigator within the past year (Table 4.4). This data served as the dependent variable. Of the 155 participants, 38% (n=59) reported no protocol activity at all. Eighty respondents reported having between 1 and 5 active protocols and 16 individuals reported involvement with 6 or more. The data showed two participants reported involvement with 20 active protocols.

Table 4.4

Frequency and Percent of Protocols by Participants

Number of Protocols	*Frequency (%)*
0	59 (38)
1	25 (16)
2	20 (13)
3	12 (8)
4	8 (5)

5	15 (10)
6	4 (4)
7	1 (1)
8	1 (1)
10	6 (6)
12	1 (1)
15	1 (1)
20	2 (2)

Note: N=155

Descriptive Statistics

Here I provide descriptive statistics for the dependent and independent variables. Initially, I provide the measures of central tendency, skew, kurtosis, and minimum and maximum values, as appropriate. The dependent variable had a mode of zero and proved to be both skewed and leptokurtic with values outside the normal range. The independent variables were generally within normal ranges, although approximately 10 variables showed some degree of skewness and one was leptokurtic. Next, I provide the analysis of assumptions for multiple regression. The section that follows will detail the results of the regression analysis.

Dependent Variable

The descriptive statistics for the dependent variable were analyzed using SAS, version 9.4. The dependent variable, NumbProtoc, indicates the number of protocols on which an investigator was associated in the past year. The mean, standard deviation, median, mode, minimum, maximum, skew, and kurtosis are presented in Table 4.5. The

distributions for the number of protocols was somewhat flat. A normal range for skew and kurtosis is -1 to 1 and -2 to 2, respectively.

Table 4.5

Descriptive Statistics for Number of Protocols

Group	*M*	*Med*	*Mode*	*SD*	*Min*	*Max*	*sk*	*Ku*
Number of Protocols	2	1	0	3.46	0	20	2.58	8.75

Note: N=155

Independent Variables

The independent variables and subscale grouping used in this study are as follows (Bland et al., 2005):

- Recruitment and Selection (Recruit): Great effort is expended to recruit and hire members who have the training, goals, commitment, and socialization that match the institution.
    - Talent: Recruitment strategies in place to attract best talent
- Clear Coordinating Goals (Clear): Visible, shared goals coordinate members' work.
    - Vision: Commonly held vision for research activity
    - Relate: How personal goals relate to department vision
    - Direction: Confidence in direction the department is heading
- Research Emphasis (Emphasis): Research has greater or equal priority than other goals.
    - ExpRsch: High expectation for faculty to be productive in research
    - ExpFund: High expectation for faculty to obtain external funding
    - Reward: The reward system matches departmental goals for research

    - Align: Priorities match the stated goals
- Research Culture (Culture): Members are bonded by shared, research-related values and practices, have a safe home for testing new ideas.
    - Opp: Excellent opportunities to pursue research interests
    - Product: Faculty are productive in research efforts
    - Success: Faculty are successful at obtaining external funding for research
- Size, Experience, Expertise (Size): Members offer different perspectives by virtue of differences in their degree levels, approaches to problems, and varying discipline backgrounds; the group is stable, and its size is at or above a "critical mass."
    - Number: Enough faculty to accomplishment research goals
- Positive Group Climate (Climate): The climate is characterized by high morale, a spirit of innovation, dedication to work, receptivity to new ideas, frequent interactions, high degree of cooperation, low member turnover, good leader/member relationships, and open discussion of disagreements.
    - Climate: Would choose to be in same department again
- Mentoring (Mentoring): Beginning and midlevel members are assisted by and collaborate with established scholars.
    - FormMent; Formal mentor assigned
    - InfMent: Current or previous informal mentor
    - Feedback: Constructive feedback on research provided
    - ExpPC: Understand expectation related to patient care

    - ExpTch: Understand expectation related to teaching
    - ExpRsch: Understand expectation related to research
    - Career: Clear picture of academic career in five years
    - Plan: Well defined plan for achieving academic goals
- Professional Network (Network): Members have a vibrant network of colleagues with whom they have frequent and substantive (not merely social) research communication, both impromptu and formal, in and outside of the institution.
    - DeptNet: Network of research colleagues in department
    - IntNet: Network of research colleagues in institution
    - ExtNet: Network of colleagues outside institution
    - ConvoDept: Conversations about research had in department
    - ConvoSchool: Conversations about research had in school
    - ConvoUniv: Conversations about research had in university
- Resources (Resources): Members have access to sufficient resources such as funding, facilities, and especially humans (e.g., local peers for support, research assistants, technical consultants).
    - Resources: Access to resources to conduct research
    - Travel: Access to resources to travel to research conferences
    - Space: Access to space to conduct research
    - Equipped: Research space is well equipped
    - Skills: Faculty skills are appropriate to accomplish research goals
    - Value: Feeling of appreciation for work in research

- Sufficient Work Time (Time): Members have significant periods of uninterrupted time to devote to scholarly activities
    - Adequate: Have time to conduct research
    - Personal: Personal system to commit time to research activity
    - Input: High degree of input as to how time is spent
- Communication (Comm): Clear and multiple forms of communication such that all members feel informed.
    - Comm: Mechanism exists to communicate about research and scholarly activities
- Rewards (Rewards): Research is rewarded equitably and in accordance with defined benchmarks of achievement; potential rewards include money, promotion, recognition, and new responsibilities.
    - Nonmonetary: Mechanism exists for nonmonetary recognition of achievement in research
    - Monetary: Mechanism exists for monetary recognition of achievement in research
    - Comp: Compensation if fair for work done
- Brokered Opportunities (Brokered): Professional development opportunities are routinely and proactively offered to members to assure their continued growth and vitality.
    - New: Growth opportunities exist for new faculty members
    - Midcareer: Growth opportunities exist for midcareer faculty members

- Senior; Growth opportunities exist for senior faculty member
- Women: Growth opportunities exist for women

- Assertive Participative Governance (Governance): Clear and common goals, assertive and participative leadership where active participation of members is expected, and effective feedback systems are utilized.
  - Visible: Research vision is kept visible.
  - Ethics: Expected ethical standards in research are made clear

The descriptive statistics for the independent variables were also examined and the mean, standard deviation, minimum, maximum, skew and kurtosis are shown in Table 4.6. The acceptable ranges of skew (-1 to 1) and kurtosis (-2 to 2) were met for most variables. Scatterplots of each pair of variables were examined and the relationships appeared linear.

Table 4.6

Descriptive Statistics for the Research Climate Characteristics

Group	*M*	*SD*	*Min*	*Max*	*Sk*	*Ku*
Talent	.54	.50	0	1	-0.14	-.2.00
Vision	.52	.50	0	1	-.09	-.202
Relate	.56	.50	0	1	-.25	-1.96
Direction	.70	.46	0	1	-.09	-1.21
ExpRsch	.38	.49	0	1	.50	-1.78
ExpFund	.22	.42	0	1	1.32	-0.25
Rewards	.22	.42	0	1	1.37	-0.13
Align	.23	.42	0	1	1.28	-.37
Opp	.58	.50	0	1	-.33	-1.92
Product	.26	.44	0	1	1.08	-0.85
Success	.16	.37	0	1	1.86	1.48
Number	.45	.50	0	1	.20	-1.99
Climate	.8	.40	0	1	-1.51	.30
FormMent	.13	.34	0	1	2.23	3.03
InfMent	.51	.50	0	1	-.04	-2.02
Feedback	.55	.50	0	1	-0.20	-1.99

ExpPC	.79	.41	0	1	-1.42	.00
ExpTch	.75	.43	0	1	-1.16	-0.67
ExpRsch	.49	.50	0	1	.04	-2.02
Career	.81	.39	0	1	-1.62	.63
Plan	.67	.47	0	1	-0.73	-1.48
DeptNet	.51	.50	0	1	-0.04	-2.02
IntNet	.43	.50	0	1	.28	-1.95
ExtNet	.48	.50	0	1	.07	-2.02
ConvoDept	.33	.47	0	1	.73	-1.48
ConvoSchool	.16	.36	0	1	1.85	1.48
ConvoUniv	.16	.37	0	1	7.86	1.48
Resources	.68	.75	0	1	.55	-1.72
Travel	.47	.50	0	1	.12	-2.01
Space	.34	.46	0	1	.67	-1.57
Equipped	.33	.47	0	1	.73	-1.48
Skills	.46	.50	0	1	.17	-2.00
Value	.36	.48	0	1	.61	-1.65
Adequate	.23	.42	0	1	1.28	-0.37
Personal	.30	.46	0	1	.86	-1.27
Input	.52	.50	0	1	-0.09	-2.02
Comm	.70	.46	0	1	-0.86	-1.27
Nonmonetary	.46	.50	0	1	.17	-2.00
Monetary	.28	.45	0	1	1.00	-1.00
Comp	.66	.48	0	1	-0.67	-1.57
New	.61	.49	0	1	-0.47	-1.80
Midcareer	.62	.49	0	1	-0.50	-1.77
Senior	.59	.49	0	1	-0.36	-1.90
Women	.66	.47	0	1	-0.70	-1.52
Visible	.65	.48	0	1	-0.64	-1.61
Ethics	.71	.46	0	1	-0.93	-1.14

Note: N=155

Nonparametric Tests

As the number of variables could negatively impact the regression due to the sample size (n=155), I looked next to nonparametric t-tests of the outcome and each predictor variable. A nonparametric test is useful in understanding relationships with small sample sizes and non-normal data (Fields & Miles, 2010). Likewise, nonparametric tests can be useful when the preference is for outliers to not be removed. This analysis

revealed 21 statistically significant relationships. The nonparametric Wilcoxon results are presented in Table 4.7.

Table 4.7

Comparison of Number of Protocols with Climate Characteristics

Group		*N*	*M*	*SD*	*Median*	*IQR*	*T test p-value*	*Wilcoxon p-value*
Talent	0	72	2.4	4	1	3.5	.97	.31
	1	83	2.4	2.9	1	4		
Vision	0	74	2.0	3.1	1	3.0	.14	.16
	1	81	2.8	3.7	1	3.0		
Relate	0	68	1.5	2.1	1	2.0	.00	.00
	1	87	3.1	4.1	2	5.0		
Direction	0	46	2.0	2.6	1	3.0	.34	.42
	1	109	2.6	3.7	1	4.0		
ExpRsch	0	96	2.2	2.9	1	2.4	.35	.79
	1	59	2.7	4.2	1	4.0		
ExpFund	0	120	2.4	3.3	1	3.0	.80	.79
	1	35	2.5	4.0	1	5.0		
Rewards	0	121	2.4	3.4	1	3.0	.96	.95
	1	34	2.4	3.8	1	4.0		
Align	0	119	2.4	3.6	1	3.0	.71	.24
	1	36	2.6	2.9	1.5	4.5		
Opp	0	65	1.6	3.1	0.0	2.0	.01	.00
	1	90	3.0	3.6	2.0	3.0		
Product	0	114	2.7	3.8	1	4	.08	.09
	1	41	1.6	2.1	0	3.0		
Success	0	130	2.5	3.3	1	4.0	.65	.16
	1	25	2.1	4.1	0	3.0		
Number	0	85	2.1	3.4	1	3.0	.22	.06
	1	70	2.8	3.5	2.0	4.0		
Climate	0	31	2.0	2.6	1.0	4.0	.49	.69
	1	124	2.5	3.6	1.0	3.5		
FormMent	0	135	2.4	3.6	1.0	3.0	.82	.58
	1	20	2.3	2.3	1.5	4.0		
InfMent	0	76	1.8	3.2	1.0	2.0	.03	.00
	1	79	3.0	.6	2.0	5.0		
Feedback	0	70	2.3	3.6	1.0	3.0	.71	.33
	1	85	2.5	3.3	1.0	4.0		
ExpPC	0	33	2.7	4.1	2.0	3.0	.60	.80
	1	122	2.3	3.3	1.0	4.0		
ExpTch	0	39	2.8	4.8	1.0	3.0	.37	.86

	1	116	2.3	2.9	1.0	4.0		
ExpRsch	0	96	2.2	2.9	1.0	3.0	.35	.79
	1	59	2.7	4.2	1.0	4.0		
Career	0	29	2.3	4.2	1.0	2.0	.86	.33
	1	126	2.4	3.3	1.0	4.0		
Plan	0	51	1.9	3.4	1.0	2.0	.20	.07
	1	104	2.7	3.5	1.5	4.0		
DeptNet	0	76	1.6	2.5	2.0	4.0	.00	.00
	1	79	3.2	4.1	2.0	4.0		
IntNet	0	88	1.7	32.9	1.0	2.0	.00	.00
	1	67	3.4	3.9	2.0	5.0		
ExtNet	0	80	1.4	2.0	1.0	2.0	.00	.00
	1	75	3.5	4.3	2.0	5.0		
ConvoDept	0	104	1.7	2.8	1.0	2.0	<.0001	<.0001
	1	51	4.0	4.1	3.0	4.0		
ConvoSchool	0	130	2.1	3.5	1.0	3.0	.03	.00
	1	25	3.8	3.1	4.0	4.0		
ConvoUniv	0	130	2.1	3.5	1.0	3.0	.02	.00
	1	25	3.8	3.1	4.0	4.0		
Resources	0	130	2.1	3.5	1.0	3.0	.00	.00
	1	25	3.9	3.0	4.0	3.0		
Travel	0	98	1.7	2.9	1.0	2.0	.00	.00
	1	51	3.6	4.0	3.0	4.0		
Space	0	102	1.7	2.4	1.0	2.0	.00	.00
	1	53	3.8	4.6	3.0	3.0		
Equipped	0	104	1.7	2.4	1.0	2.0	.00	.00
	1	51	3.8	4.6	3.0	4.0		
Skills	0	84	1.8	2.7	1.0	3.0	.03	.03
	1	71	3.1	4.1	2.0	4.0		
Value	0	100	1.7	2.8	1.0	2.0	.00	<.0001
	1	55	3.7	4.1	2.0	4.0		
Adequate	0	119	1.8	2.8	1.0	2.0	<.0001	<.0001
	1	36	4.6	4.4	4.0	4.5		
Personal	0	108	1.8	3.0	1.0	2.0	.00	<.0001
	1	47	3.9	4.0	3.0	4		
Input	0	74	1.7	3.1	2	5	.02	.01
	1	81	3.0	3.7	2.0	5.0		
Comm	0	47	1.8	3.0	0	2.0	.14	.04
	1	108	2.7	3.6	2.0	4.0		
Nonmonetary	0	84	2.0	2.9	1.0	2.5	.08	.03
	1	71	3.0	3.9	2.0	4.0		
Monetary	0	112	2.0	2.9	1.0	3.0	.01	.01
	1	43	3.5	4.5	3.0	4.0		
Comp	0	53	2.2	3.4	1.0	3.0	.63	.75

	1	102	2.5	3.5	1.0	4.0		
New	0	60	1.8	2.7	0.5	2.0	.06	.02
	1	95	2.8	3.9	2.0	4.0		
Midcareer	0	59	1.8	2.9	0.0	2.0	.10	.02
	1	96	2.8	3.7	2.0	4.0		
Senior	0	64	2.4	3.7	1.0	3.0	.98	.57
	1	91	2.4	3.3	1.0	4.0		
Women	0	52	2.5	4.5	1.0	2.5	.75	.17
	1	103	2.3	2.8	1.0	4.0		
Visible	0	54	2.0	2.8	1.0	3.0	.28	.25
	1	101	2.6	3.8	2.0	4.0		
Ethics	0	45	1.2	2.1	0.0	2.0	.00	.00
	1	110	2.9	3.8	2.0	5.0		

Note: N=155

Subscale Data Analysis

To further address that the small sample would present a challenge when fitting the regression module, I grouped the variables by subscale as defined by Bland et al. (2005). I examined the correlations using the nonparametric correlation test, Spearman Rank Order Correlation Coefficients run with all the variables in the subscale grouping to measure the strength and direction of association between the variables (Fields & Miles, 2010). The descriptive statistics and p-values are provided in Table 4.8. This step was used to reduce the potential number of variables in the regression model. Out of this analysis, 10 subscales were selected for inclusion in the regression model.

Table 4.8

Subscale Statistics and Correlation Coefficients

Subscale	M	SD	Median	Min	Max	p-value	R
Recruit_full	0.54	0.50	1.00	0.00	1.00	0.31	0.82
Clear_full	1.79	1.21	2.00	0.00	3.00	0.03	0.17
Emphsis_full	1.06	1.29	1.00	0.00	4.00	0.63	0.04
Culture_full	1.01	0.94	1.00	0.00	3.00	0.20	0.10
Size_full	0.45	0.50	0.00	0.00	1.00	0.06	0.15
Positive_full	0.80	0.40	1.00	0.00	1.00	0.68	0.03

Mentoring_full	4.59	2.11	5.00	0.00	8.00	0.12	0.13
Network_full	2.08	1.93	2.00	0.00	6.00	<.0001	0.42
Resources_full	2.32	2.14	2.00	0.00	6.00	<.0001	0.40
Time_full	1.06	1.13	1.00	0.00	3.00	<.0001	0.36
Comm_full	0.70	0.46	1.00	0.00	1.00	0.04	0.17
Rewards_full	1.39	1.03	1.00	0.00	3.00	0.02	0.19
Brokered_full	2.48	1.69	3.00	0.00	4.00	0.07	0.15
Governance_full	1.36	0.80	2.00	0.00	2.00	0.01	0.21

Note: N=155

Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) was conducted using SAS, 9.4 to assess the subscale constructs as measured by the specified independent variables. The fit summary statistics showed the model fit chi-square is 1493.92(df = 853, p=<.0001), which shows a lack of statistical significance. Chi square can be highly sensitive to sample size and as this study only yielded 155 responses as compared to the standard 200 (Kenny, 2015). The root mean square error of approximation (RMSEA) is 0.07, which is in line with the conventional 0.08 value for a good model fit (Kenny, 2015). The standardized root mean squared residual (SRMR) is 0.11, which is a greater than the conventional 0.08 value for a good model fit. As with the chi-square statistic, impacts on the measures of fit could be attributed to the sample size, which can inflate numbers. Bentler's comparative fit index is 0.79 as compared to the 0.90 cut off, this may be considered a poor fitting model, but the number of parameters may be impacting this index (Kenny, 2015).

Cronbach's Alpha

To test the reliability of the data and subscale grouping, an analysis using Cronbach's alpha was conducted. Typically, a Cronbach's alpha of 0.70 is considered an acceptable value, but when the constructs to be measured are diverse or numerous, as is

the case in this study, values below 0.70 can be expected (Fields & Miles, 2010). The results are included in the Table 4.9. For those subscales with only one element, the result is shown as not applicable.

Table 4.9

Cronbach's Alpha by Subscale Grouping

Subscale	N	α
Recruit_full	1	N/A
Clear_full	3	0.77
Emphsis_full	4	0.72
Culture_full	3	0.54
Size_full	1	N/A
Positive_full	1	N/A
Mentoring_full	8	0.74
Network_full	6	0.81
Resources_full	5	0.82
Time_full	3	0.75
Comm_full	1	N/A
Rewards_full	3	0.56
Brokered_full	3	0.89
Governance_full	2	0.62

Note: N=155

Testing the Research Hypothesis

As was established in the Methods chapter previously, I chose multiple linear regression as the model to address the research question: How do factors of the research climate (resources, rewards, goals, culture, communication, research emphasis, professional networking, and governance) impact faculty productivity at an academic health center? Based on the outcome of the nonparametric tests, the subscales included in the regression were: clear_full, culture_full, mentoring_full, network_full,

resources_full, time_full, comm_full, rewards_full, brokered_full, and governance_full. Those excluded were: recruit_full, emphasis_full, and positive_full.

Multiple regression analyses are based on several assumptions. The data were screened and an assessment of each assumption was made. While nothing in the design would raise question as to the assumption of independence, an examination of scatterplots revealed the potential for the assumption of a linear relationship to be violated. To examine the homoscedasticity assumption, the residuals were plotted with the predicted values. This assumption also appeared to have issues as there was clustering rather than the expected random pattern. To address the assumption of collinearity, the variance inflations were examined. The values were 1.89, 1.41, 1.73, 1.78, 1.78, 1.65, 1.35, 1.80, 1.71, and 1.97 for Clear, Culture, Mentoring, Network, Resources, Time, Comm, Rewards, Brokered, and Governance, respectively. These values average to approximately 1.71 suggesting this assumption had not been violated.

Outliers were screened for using studentized residuals and Cook's *D*. I ran the model both with the outliers removed (numbprotoc < 15), but the outcome distribution normality issues persisted. The model with the full data set showed show significance for mentoring, network, and resources. When run the outliers removed, the model appeared very sensitive as the statistically significant predictors jumped to include time and not resources. In summary, based on the screening of the data, it did not appear appropriate to proceed with the linear regression.

Logistic Regression

Due to the inability to rely on the linear regression, I chose to examine the research question using a logistic regression as it is the appropriate method to examine the impact of the independent predictor variables on the dichotomous dependent variable (productive versus non-productive). Logistic regression evaluates the odds of being associated with being productive based on the combination of predictor variables (faculty perceptions on the institutional research climate characteristics) (Statistics Solutions, 2016). In other words, it tells us the probability of productivity occurring given the known values of the climate factors (Fields & Miles, 2010).

The analytical output consisted of a regression model including the overall evaluation of whether the model is statistically significant (null hypothesis is rejected), the overall percent of correct predictions, and a table stating the predicted values of the dependent variable. The dependent variable, productivity, was divided into non-productive (0 protocols) or productive (>0 protocols). Then, the major assumptions of the logistic regression were assessed. These included a dichotomous dependent variable, a linear relationship between the odds ratio and the independent variable and no multicollinearity in the independent variables (Statistical Solutions, 2016). The integrity of the model was protected from overfitting by only including the planned variables in the analysis. A chi square goodness of fit test was used to determine if the model fits the data.

The logistic regression was conducted predicting productivity as measured by number of protocols from the climate subscales clear coordinating goals, research culture,

mentoring, professional network, resources, time, communication, rewards, brokered opportunities, and assertive participative governance. The likelihood ratio chi-square of 31.00 with a p-value of 0.0006 tells us our model as a whole fits significantly better than an empty model. The Score and Wald tests are equivalent tests of the same hypothesis tested by the likelihood ratio test and these tests also indicate the model is statistically significant (0.00 and 0.01, respectively).

The obtained prediction equation was

$$\hat{Y}_{NUMBPROTOC} = -0.44 + 0.01 * \text{CLEAR} + *-0.32 * \text{CULTURE} + -0.11 * \text{MENTORING} + 0.36 * \text{NETWORK} + 0.23 * \text{RESOURCES} + 0.17 * \text{TIME} + 0.41 * \text{COMM} + -0.29 * \text{REWARDS} + 0.11 * \text{BROKERED} + 0.19 * \text{GOVERNANCE}$$

The regression coefficients for Network and Resources are statistically significance, while the others are not (Table 4.10). Thus, for every one unit change in Network the log odds of being productive (versus non-productive) increases by 0.36. Likewise, for every one unit change in Resources the log odds of being productive (versus non-productive) increase by 0.23.

Table 4.10

Analysis of maximum likelihood estimates

Subscale	Estimate	SE	Wald Chi-Square	p-value
Clear_full	0.01	0.21	0.00	0.97
Culture_full	-0.32	0.24	1.74	0.19
Mentoring_full	-0.11	0.12	0.88	0.35
Network_full	0.36	0.13	7.05	0.01
Resources_full	0.23	0.12	3.80	0.05
Time_full	0.17	0.21	0.62	0.43
Comm_full	0.41	0.44	0.84	0.36
Rewards_full	-0.29	0.25	1.35	0.26

Brokered_full	0.11	0.14	0.60	0.44
Governance_full	0.19	0.31	0.37	0.54

Note: N=155; The dependent variable is coded so 0 = not productive and 1 = productive.

Another way to examine the effect of the logistic regression is the odds ratio, which indicates the change in odds for the outcome based on the change in the predictors (Fields & Miles, 2010). If the odds ratio estimate is greater than 1, the odds of the outcome occurring increase as the predictors increase. For this model, the odds ratio for network and resources are 1.43 and 1.26, respectively. This means the odds of being productive are 1.43 times higher and 1.26 times higher among faculty who agree with a favorable climate for network and research, respectively, as compared to faculty who do not. The confidence intervals for network and resources were 1.10 to 1.86 and 1.00 to 1.59, respectively. Odds ratios and confidence intervals are included in Table 4.11.

Table 4.11

Odds Ratio Estimates and Wald Confidence Intervals

Subscale	Estimate	95% Confidence Limits	
Clear_full	1.01	0.67	1.51
Culture_full	0.73	0.46	1.17
Mentoring_full	0.90	0.72	1.13
Network_full	1.43	1.10	1.86
Resources_full	1.26	1.00	1.60
Time_full	1.18	0.78	1.80
Comm_full	1.50	0.63	3.59
Rewards_full	0.75	0.47	1.22
Brokered_full	1.11	0.85	1.43
Governance_full	1.21	0.66	2.23

Note: N=155; The dependent variable is coded so 0 = not productive and 1 = productive.

Chapter Summary

In summary, to address the research questions, I conducted a multiple linear regression, but, due to risk from violating the assumptions, I chose to conduct a logistic regression as the final method by which the regression model was fitted and statistical significance of the subscales was evaluated. The 155 complete survey responses were used as the data set. The independent variables were coded as 0 = agree and 1 = disagree while 0 = nonproductive and 1 = productive was used for the dependent variable. The logistic regression model was statistically significant and the model proved resources and network to be statistically significant with a high degree of confidence.

CHAPTER FIVE

DISCUSSION AND CONCLUSIONS

In the previous chapter, I provided a description of the data and the results of the study based on the statistical analysis. In this chapter, I review the study purpose, research questions, analysis and results followed by a discussion of the findings and implications for both practice and future research. I also include the limitations I identified during the study. I conclude by synthesizing the accomplishments of this research.

Overview of the Study

To evaluate the relationship between institutional climate factors and research productivity, I relied upon a non-experimental quantitative research design through which I issued a climate survey to Health System faculty. This study served as a mechanism by which organizational learning could be operationalized with the intention of addressing issues facing higher education such as the call for increased research activity in the face of limited resources. My research question was as follows:

How do factors of the research climate (recruitment, resources, rewards, goals, culture, communication, research emphasis, size, time, climate, mentoring, professional networking, opportunities, and governance) impact faculty productivity at an academic health center?

H_0 = Research climate does not impact research productivity.

H_1 = Research climate does impact research productivity.

The data collected included 155 clinical faculty responses to a climate survey that I modeled after the Bland et al. (2005) study. The study was administered at an emerging academic health center in the Southeastern U.S. To analyze the data, I conducted a logistic regression using SAS, version 9.4.

Summary of the Findings

To address the research question, a regression model was fitted with the subscale variables clear goals, research culture, mentoring, network, resources, time, communication, rewards, opportunities, and governance. Based on the nonparametric tests, the variables of recruiting and selection, research emphasis and positive climate were excluded. The regression model proved to be significant ($\chi^2 = 31$, $p < 0.0006$). The regression variables that proved to be statistically significant included network ($p < 0.01$) and resources ($p < 0.05$). The odds ratio shows for network the odds of faculty being productive are 43% greater as faculty agree with the network subscale factors. Likewise, for resources the odds ratio indicates there is a 26% chance faculty will be productive if they agree with the factors pertaining to resources.

Discussion of the Results

Previous researchers (Bland et al., 2005) investigated how institutional characteristics related to the research climate impacted faculty productivity. A goal of my research was to apply this model to understand the relationship in the Health System setting. In this section, I discuss the implications of the findings.

The findings resulting from the research questions indicate a positive and significant relationship between the individual network and resources climate factors and

research productivity. As these subscales are each comprised of several factors, all of which proved statistically significant in the nonparametric t-tests, I address each of those items in this discussion. Then, I connect the findings back to the conceptual framework and the supporting literature.

Professional network. The Professional Network subscale included questions to faculty concerning whether or not they agree that they have a well-developed network of colleagues in the department, institutional, or outside of the institution. Hanover (2014) discussed various mechanisms by which institutions can support network development such as hosting conference and symposiums or developing relationships with partner institutions, professional associations, and government entities (p. 16). Likewise, Haley and Champagne (2017) described research partnerships with local organizations, other academic institutions, affiliate hospitals and research institutes, and corporate partnerships as essential to strengthening research capabilities and resulting in an expanded network for faculty (p. 7). Similarly, Parse (2007) addressed the need for faculty to create and maintain professional networks with colleagues in specific areas tied to the research process so even those with minimal research skill can be successful in scholarly endeavors (p. 197).

Having a network of colleagues to discuss research projects with is a key focus of the Health System as it was formed under the unique model with the three academic partners. The institution hosts conferences and symposiums numerous times throughout the year. Likewise, Quarterly and annual research events have also been created to

provide researchers the opportunity to meet one another and discuss potential ideas and, hopefully, build research activity.

The subsequent section of questions under the Professional Network subscale pertain to whether or not faculty agree that they have substantive conversations concerning research with colleagues at least weekly. Having a professional network, as in knowing names and contact information, is one thing, but actively working that network is different. As Creswell (1985) stated, a productive researcher is one who maintains regular and close contact with colleagues on and off campus who conduct similar research (p. 8). Putting the network to work and cultivating relationships provided much needed support and advice while potentially challenging the stalled researcher to move forward. A lack of colleague support has been shown to act as a barrier to conducting research and impeding research productivity (Alghanim & Alhamali, 2011).

The factors concerning conversations with colleagues pertaining to research is also focused at the department and institutional levels. Both are shown as significant and at the institutional level (across the medical school and across the institution) can refer to whether cross-sectional collaboration is occurring. As Haley and Champagne (2017) discussed, inter- and multi-disciplinary research are becoming increasing important drivers of research and have serious impacts on productivity .

Resources. The Resources subscale is made up of six factors: resources, travel, space, equipped, skills, and value. The first question asks faculty if they have access to the things they need to conduct research such as research personnel, computers, library materials, and data analysis support. The Health System has worked through its

collaborative partners to promote access to research support staff including a dedicated data support core that houses multiple statisticians available at no cost, library staff to support literature searches and other needs, research administration support, and access to software licenses and other computing needs.

Institutional support of indirect critical resources is essential to promoting faculty research productivity (Dundar & Lewis, 1998). For example, the Health System's unique model provides access to graduate and post-graduate students who can serve as research assistants on projects. Dundar and Lewis (1998) stated that the number of graduate students was positively associated with departmental research productivity (p. 625). Hanover (2014) also stated that to build a positive research culture, faculty should be sponsored to go to conferences, which ties directly back to the question concerning whether or not faculty have adequate resources for travel to research-based conferences.

The climate survey went on to ask about dedicated research space equipped to meet the researchers' needs, which was shown to be a significant factor in productivity. Haley and Champagne (2017) defined research infrastructure and space as one of their six key areas for strategic initiative regarding increasing research activity (p.4). Specifically, Haley and Champagne (2017) recognized not only is traditional bench or lab space important, but rather in the academic health setting incubator space is also valuable. The Health System maintains such units on two of its campuses.

Another factor contributing to the significance of the resources subscale is whether faculty have the skills to accomplish the research goals. Hanover (2014) stated that the allocation of resources including training for faculty with limited experience in

research and scholarship activities in imperative when seeking increased productivity. These trainings should be aligned with research motivation to gain the most benefit (Hanover 2014). The Health System provided free tuition for faculty and staff wanting to complete a certificate program on clinical and translational research through one academic partner.

The final subscale factor addressed whether faculty feel valued for their work in research. I found this factor more difficult to interpret. Value can be tied to both internal confidence and self-efficacy as well as external recognition (Akerlind, 2008, p. 247). It makes sense that someone who felt unvalued or undervalued could have less of a proclivity for being active in research.

Connection to prior research. The Bland et al. (2005) article had different findings from this study. The sample for that work consisted of faculty at an established academic health center. The faculty included in my study are at an emerging academic health center. The two types of establishments have distinct characteristics. The Health System under study had a unique structure by which faculty have a central mission of patient care and the academic appointment at the medical school may or may not be personally recognized as important. Appointment type, rank, and emphasis on faculty output may be different under this structure than that of an established health center. The Bland et al (2005) article found that an internal network was not necessary for research productivity, while an external network is necessary. In my study, I found both are important, which makes sense as there is a smaller cadre of faculty interested in research at the Health System and so having that internal network may be essential to creating and maintaining

the supports needed for accomplishing research activity. The internal network not only consists of relationships between researchers, but also connections to the research support staff such as grant writers, grant coordinators, study coordinators, contract specialists, statisticians, data report writers, IRB coordinators, research librarians, and others. A one on one relationship is important as well as regular trainings, educations opportunities, and communications between these groups.

Connection to theoretical framework. In this study, I used organizational learning theory, which examines the mechanisms by which institutional knowledge is created, transferred, applied, interpreted, and evaluated, as part of the underlying framework. I took a position of curiosity and asked whether the work being done by leadership to create a multitude of research supports in the Health System was actually being perceived as something of value or not by the clinical faculty. Administrative leadership can often assume what has been created must be a good fit for the needs of the faculty. Rather than just creating and implementing various resources, administrators need to ask if it really works, which is what I have tried to accomplish via this research project. As Krupat, Pololi, Schnell, and Kern (2013) stated, a misalignment between administration and faculty can actually lead to barriers preventing research productivity when the intent is to foster a positive research environment. Organizational learning relies on gathering feedback, so as to either improve processes or challenge the assumptions under which processes are defined to effect a paradigm shift, as a key tenet.

Additionally, I drew upon others work in organizational climate to this study and used a climate survey to assess faculty perceptions (Reichers & Schneider, 1990;

Schneider, 1990; Moutier et al., 2016; Sheridan et al., 2017; Wells et al., 2014; Bland et al., 2005). While climate theory has been used to address topics in both academic medical centers and in examining research and specifically research integrity at AHCs, this study used the climate survey tool in this new application to the research environment at an emerging academic health center (Bland et al., 2005; Moutier et al., 2016; Sheridan et al., 2017; Wells et al., 2014). The experience of applying the climate survey worked well in that I was able to engage clinical faculty from across multiple departments so as to better understand their perspective and assess the impact on the Health System goal of increased research productivity.

Likewise, I formed this study under the overarching theme of meeting the demands for increased research, which is an important issue in the national conversation on both higher education and scientific advancement. Specifically, facilitating greater research productivity in the face of competition and limited resources has been a consistent topic in the higher education conversation for many years (RUFC, 2012; NRC, 2012; FASEB, 2018). On the national level, universities have defined their roles as lead providers of new knowledge, innovations in science, contributions to local and regional economies, and evaluations of best practices and community services. University faculty have served as integral players in addressing not only national, but also global, concerns in any number of areas such as business, economics, politics, education, and science and technology (RUFC, 2012). This has been accomplished through the academic research enterprises at the institutional level while being shaped by those national and global influences of monetary support, current priorities, and competition.

To begin to address this national issue, I felt we must look into these research production powerhouses and understand the mechanisms driving academic research forward. Within the institution a climate and culture for research has been shown to exist and its impact upon faculty can define the level of productivity (Chun, 2010; Huennke et al., 2017; Dundar & Lewis, 1998). These faculty have been shown to flourish in an institutional climate that supports their research agendas (Sheridan et al., 2017). This study was able to demonstrate the importance of resources in relation to faculty productivity. In considering that increased competition is a concern, establishing professional networks can reduce that barrier by expanding opportunities and building collaborative teams.

Through this study I began to understand more about the interactions within the research organization as was defined in the conceptual model (Figure 1.2). The individual researcher was the study participant who responded to the climate survey. Each actor was asked to perform within an environment shaped by the various inputs to the research process such as the shared system of beliefs concerning research activities, the paradigms under which processes were shaped, and the system of allocating scarce resources. How the researcher perceived each of the components of the research climate was captured through the survey instrument. Impacts upon the outputs of research productivity were evaluated through the logistic regression. What I found was that researchers are most influenced by the aspects of networking and access to resources so the culture around facilitating such opportunities and allocation those necessities directly impacts the output levels.

Limitations

While I worked to design a study with limited threats to validity, some flaws were inherent and beyond my control. The original participant list included almost 700 clinical faculty, but of those the number potentially interested in research activity and, therefore, motivated to respond, was unknown. While efforts to recruit as many participants as possible were made, the survey collection ultimately yielded 155 complete responses. This sample size may have impacted the confirmatory factor analysis results as well as the regression analysis.

Another limitation was found in the data as outliers were present. Specifically, three respondents reported having 15, 12, or 20 protocols, which skewed the data. This, in turn, presented challenges in normality. When the outliers were removed, the data still showed issues with normality and the regression results varied to the point it was determined not to be robust to violations of this assumption. Therefore an alternate analysis plan had to be created.

A bias can be created by obtaining data through one mechanism. While the survey instrument was based on a previous study found in the literature, Bland et al. (2005), the use of a survey may have impacted the results. Survey fatigue is anecdotally reported among Health System faculty. Tests for reliability showed potential needs for improvement on some subscales, but removing items would have resulted in only one item remaining thereby making the measure not applicable. The survey instrument was very long as it took an estimated ten minutes to complete. The number of questions may have been a limitation.

Implications for Practice

The findings of this study have implications for those in higher education responsible for facilitating research activities and increasing research productivity. This study examined several institutional characteristics related to research and identified two main areas significantly impacting research productivity. Those interested in research administration such as vice presidents for research, directors of research support offices, associate deans for research or departmental research leadership as well as faculty and front line research administrators will find the linkages between the research climate and research productivity of use.

For research administration leadership, this study provides clues as to which facets of the research enterprise are more likely to impact the volume of research activity. This study also reveals those features that may not provide as much return for the effort and resources invested. Specifically, the presence of an internal and external network and availability of resources were identified as significant predictors of research productivity.

Network. To increase networking opportunities I recommend several actions that can be taken by research leadership. First, an increased number of networking opportunities should be hosted throughout the academic year to bring together researchers at the institutional, department, disease-specific, or other levels as appropriate for the research community. Networking can occur in a formal or informal manner. Leadership can increase the frequency, quality, and caliber of outside researchers presenting at events within the Health System. Or, leadership can look to the partner institutions to bring in outside collaborators to increase the network of the clinical

faculty. Speed dating events for researchers are one mechanism by which faculty can get connected. Another tool could be an online database that is searchable by key terms so researchers can learn what each other's research areas of interest are.

A second tool that practitioners should consider is facilitating a culture of networking by instilling the time and ability to conduct research in the clinical faculty. Perhaps researchers find it difficult to speak about their interests to other or ask for help. Support staff may need to work with faculty so they are skilled as telling their research story. Likewise, faculty can develop their research elevator pitch so in just a few minutes they can effectively share their research interests and agendas. Along with this, researchers should be encouraged to share their successes and challenges faced.

Informal networks form within departments and faculty who feel excluded from such networks may be less productive. A third recommendation for practice is that departments create designated times for informal networking to occur such as brown bag lunches or coffee breaks at which research activities would be discussed. Another consideration the channels by which networking can occur and so leadership can share news, opportunities, and by which researchers can be engaged with one another. Social media can be a useful tool by which this can be accomplished.

A fourth area of application for practitioners could be a network analysis to identify who people talk to about research, who gives advice on research practices, who gets recruited for supporting projects, and who is a trusted leader in the research field within the institution. Trust is a key component of building a network. The Health System research division leadership may consider advising departmental leadership to be mindful

of inclusiveness when facilitating within department professional networks (Sheridan et al., 2017). Being fair and equitable in recognizing research accomplishments is also important to not alienate others.

Resources. This study will also be useful to those working in the area of resource allocation within academic health centers, specifically. Research divisions are asked to accomplish much under financial constraints and often must justify the needs. This study provides empirical evidence of the importance of research-related resources such as well-equipped space, support staff, travel funds to be productive. Those responsible for research administration finances have support from this study for the application of internal funding to the research enterprise. I recommend the following actions be addressed to best support researchers so they can be productive.

First, general research support resources must be made available to the faculty. Research librarians are needed for access to academic journals, support in performing literature searchers, advising on content and structure, and many other services. A data support core with experience statisticians and data report writers is needed so faculty prepare strong methods plans and conduct quality analyses with complete data sets. In the academic health center setting, access to a qualified, trained staff of research coordinators, data managers, and regulatory coordinators is needed so that the research project activities can be completed within the federal, sponsor and institutional policies in a timely manner. While it is often preferred for each department to maintain their own staff, if issues with the cost of supporting these individual units arise, leadership should consider the development of a central research unit that serves across departmental lines.

Likewise, administrative staff informed on current best practices and policies must be available to guide researchers through the many, often complex, rules and requirements pertaining to research.

Next, I recommend that institutions make available travel budgets so faculty can attend conferences and other trainings. This is important not only for disseminating research, but also in learning the current work done in the various research fields, gaining insight on research methods, learning about potential funding mechanisms such as grant opportunities, and building networks, which ties back to our previous recommendations. Travel support is also important for the research administration and research support staff so they connect with their respective professional development groups during which they refresh skills and identify ways to address institutional barriers to research activity.

Skill building is a third area in which I recommend institutional leadership commit resources if they want to see their research portfolios grow. Many researchers have the benefit of being trained in their academic preparation or by working under a mentor experienced in research. Many others, especially clinical faculty, have a keen interest, but have not been exposed to formal research activity. I recommend facilitating education events on specific topics such as crafting your research agenda, learning to formulate research questions and hypotheses, designing a research study, identifying a study population, developing your biographical sketch, building a research project budget, conducting your analyses, scientific writing for successful publication, and others.

A more formal approach that can be recommended is that of a certification designed for the specific types of researchers from which you want to see increased research productivity. For example, the Health System formed a free clinical research certificate program with its lead academic partner for research. This program addresses all of these areas specific to translational research as is done in this clinical environment. Another way to address this area is to train specific subgroups, such as residents, in research and increase research activity through their projects.

Finally, it is imperative that institutions address needs for space in which research is conducted an adequately outfit that space to meet researchers needs. A more formal needs assessment can be conducted to understand the requirements of the current faculty and account for any anticipated growth. I recommend creating a process for requesting and allocating space so that new faculty, or faculty with increasing interest in conducting research, understand how to go about attaining support for the tangible research support elements. I recognize that funding to accomplish these tasks can often be limited, but identifying the sources and creating an investment in the research environment is essential.

What brought me to research this topic was that I am a research administrator working to create programs, systems, and processes to facilitate research in the academic health center setting. I have learned through this study the Health System needs to continue efforts concerning networking and resources, but the survey needs to be repeated to understand how opinions shift as the Health System continues to grow. New faculty are consistently being hired and they bring with them fresh perspectives, different

levels of research experience, and recommendations for ways to improve the research enterprise.

Implications for Research

This study examined the perceptions of clinical faculty on the research climate and its impact on their research productivity. Through this project, I expanded the research Bland et al. (2005) contributed by applying their survey to a new setting and institution type. Therefore, a study previously not replicated now has been. I recommend the following future research studies to expand on these findings, address other applications of this survey, and work to improve this survey for future use.

Expansion of current data analysis. I can expand on the analysis of the current dataset. While not defined as research questions under this dissertation, the data exist and can be examined to address other areas. A research question could be defined as examining the perceptions of clinical faculty by department, researcher type, length of time employed at the health system, or length of time spent on research each week.

Exploring the significant predictors. As the model I identified points to multiple factors under the subscales network and resources as being significantly relation to research productivity, additional research is needed to explore the relationship more in depth. I recommend future research be conducted such as a qualitative study designed to gather insight in these areas and identify what specific the needs are. This research could examine the barriers to research as perceived by the faculty. Focus groups or interviews of a variety of researchers, including clinical faculty, may provide valuable information

on the barriers faced concerning participating in networking opportunities or accessing research-related resources.

I recommend research be conducted on the building of networks in the research enterprise. Research such as a formal network analysis examining the connection points within the research community of one institution can provide valuable details on the information flow and who is seen as a valued colleague. A second recommended research topic in this area is to identify the limitations to researchers creating networks. Understanding the ways in which researchers create networks may prove useful to practitioners in building support structures.

I recommend research be conducted to examine the effects of an intervention such as creating structured skill-building opportunities and evaluating the perception of this factor before and after. This was reported as a significant attribute of the resources subscale and shifting towards a climate where faculty feel prepared to lead research efforts is important. This could also lead into a future study examining the role of self-efficacy in faculty productivity.

Extension to other populations. Several other aspects of this study were unexplored and could be examined through future research. I recommend the same survey be repeated and extended out to other members of the research community. Post-doctoral scholars, Ph. D. researchers, and staff members conducting research can all provide valuable insight into the research climate. It would be interesting to see how results might shift when this new population is considered.

Likewise, I recommend investigating the perspectives of the research administrator community on the research climate as another future research topic. Future research could also work to understand how research administrators view their role in building the research climate. Finally, I recommend a future study use the climate survey to examine the connections between perceptions of leadership and the impact on productivity. As leadership teams govern much of how the research culture is shaped, understanding this viewpoint and comparisons with the faculty, staff, and support services community is valuable.

Replication at other academic institutions. I recommend this study be replicated at other emerging academic institutions. The institutions could be an academic medical college or health center or a non-medical academic institution in the more traditional sense. As this was the first time this study was replicated, there is value in continuing to apply it in new settings.

Modification of the survey. I recommend future researchers consider evaluating ways to improve this current climate survey. Factor analysis may prove useful in aligning some of the questions in a more appropriate fashion. It could be modified to address potential limitations caused by the length. As the research environment is ever changing, there could be new aspects to examine such as access to, training on, and use of technology related to research activities.

Conclusion

In this chapter, I provided a summary of the study and its findings. I also connected those findings to the theoretical framework that underpinned this research

study. Moreover, I provided insights into practical applications for this work and recommendations for future research. Through this study I applied the climate survey as a tool by which the connection between the research enterprise and faculty productivity can be examined and specifically which factors can be address to impact the odds of increasing research activity.

As higher education leaders, it is important to not assume the processes and supports put in place meet the need of those we serve, but rather a better practice is to assume a position of curiosity and scholarship by which feedback obtained and interpreted. This affords the opportunity to challenge those assumptions and shift towards a better alignment. As work is done to meet the demands for cutting edge research in the academic health setting, adopting this organizational learning perspective may lead to increased scholarly products that can forever change the lives of the populations and communities served by these institutions.

APPENDICES

Appendix A

Survey Questions

Examining the Research Climate and Its Impact on Productivity

The purpose of this study is to examine the relationship between faculty perceptions of several institutional characteristics related to the research climate and faculty research productivity as indicated by number of approved protocols. Your part in the study will be to this survey containing questions pertaining to the climate for research productivity, which will take you less than 10 minutes to complete.

Please answer the following questions with the research and scholarship activities of the health system in mind.

Are you employed at Prisma Health–Upstate?

- Yes (1)
- No (2)

Skip To: End of Survey If Are you employed at Prisma Health–Upstate? = No

In which Prisma Health–Upstate department is your primary appointment?

- Anesthesiology (1)
- Emergency Medicine (2)
- Family Medicine (3)
- Internal Medicine (4)
- Obstetrics and Gynecology (5)
- Pathology (6)
- Pediatrics (7)
- Psychiatry/Behavioral Medicine (8)
- Radiology (9)
- Surgery - General (10)
- Surgery - Orthopaedics (11)
- Other (12) _____

Do you have an appointment as clinical faculty at the University of South Carolina School of Medicine Greenville?

- Yes (1)
- No (2)

Skip To: End of Survey If Do you have an appointment as clinical faculty at the University of South Carolina School of Medi... = No

How long have you been with Prisma Health–Upstate?

- Less than 1 year (1)
- One to less than 3 years (2)
- Three to less than 5 years (3)
- Five to less than 10 years (4)
- Ten years or more (5)

Are you currently involved in research (principal investigator, co-investigator, etc.) or do you have an interest in pursuing research activities?

- Yes (1)
- No (2)

Skip To: End of Survey If Are you currently involved in research (principal investigator, co-investigator, etc.) or do you... = No

Which researcher career stage best describes you?

- New/Early Career Stage (A new investigator who has completed his or her terminal degree/medical residency within the past 10 years and/or has not yet competed successfully for a substantial, competing research grant or has only limited, in process protocol activity.) (1)
- Mid-Career Stage (A researcher at the Associate Professor level or functioning at that rank in an academic setting or equivalent non-academic setting with an established record of some independent, peer-reviewed research including grant funding, established active trials, and/or publications.) (2)
- Advanced Stage (An investigator who has a substantial track record of external funding, successful research protocols, and peer-reviewed publications.) (3)

Please share about your research productivity…

Have you been included on a protocol approved by an Institutional Review Board (IRB)?

- Yes (1)
- No (2)

On how many approved IRB protocols are you currently an investigator or have you been an investigator in the past year?

Enter number between 0 and 500_____

On average, in 2018, how many hours each week were you involved in research activities?

- Less than 2 (1)
- Two to less than 4 hours (2)
- Four to less than 6 hours (3)
- Six to less than 8 (4)
- Eight to less than 10 (5)
- More than 10 hours (6)

Please share the degree to which you agree with the following statements concerning various institutional characteristics related to research activities.

Effective recruitment strategies are in place for attracting the best talent in priority areas in my department.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

My department has a commonly held vision for what we want to look like in the next five years concerning research activity.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

It is clear to me how my work and goals are or can be related to the departmental vision for research.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)

- Disagree (6)
- Strongly disagree (7)

I have confidence in the current direction in which my department is heading.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

The following statements pertain to departmental emphasis on research activity:

- There is a high expectation in my department for faculty to be productive in research.
- There is a high expectation in my department to conduct research that is externally funded.
- The reward system in the department matches the departmental goals for research.

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)
There is high expectation in my department for faculty to be productive in research. (1)	O	O	O	O	O	O	O
There is a high expectation in my department to conduct	O	O	O	O	O	O	O

research that is externally funded. (2)							
The reward system in the department matches the departmental goals for research. (3)	O	O	O	O	O	O	O
The priorities in the department (e.g., money allocation, new hires) match the stated goals for research. (4)	O	O	O	O	O	O	O

I have excellent opportunities here to pursue my interests in research.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

A large portion of my department's faculty can be considered to be productive in research (e.g., produce peer-reviewed articles and/or develop innovations that can be patented or copyrighted).

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)

- Disagree (6)
- Strongly disagree (7)

A large portion of my department's faculty are successful at pursuing externally funded grants.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

The number of faculty in my department is large enough to accomplish our goals in research.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

If I were to select a faculty career again, I would choose to be in my current department.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

I have been formally assigned a mentor within my department.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

I have, or had previously, an informal mentor either in this department or in other departments/organizations who provides me with guidance in research.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

I get constructive feedback, guidance, and/or suggestions from my department colleagues that help me perform my best.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

For the promotion in the appointment I hold, I fully understand the expectations related to:

- Patient care.
- Teaching.
- Research.

I have a clear picture of where I want to be in my academic career in five to seven years.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)

- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

I have a well-defined plan for achieving my academic career goals.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

I have a well-developed network of colleagues with whom I discuss research projects:

- Within my academic department.
- Outside my department/within university.
- Outside the university.

At least weekly, I have substantive conversations with important colleagues about research:

- In my department.
- In my school.
- In my university.
- In my discipline.

The following statements pertain to research-related resources.

- I have access to adequate resources to conduct my research projects. These may include things like research assistants, computers, library materials, data analyses, nursing/clerical staff support, etc.
- My academic department provides me with, or I have from external or other sources, adequate support to travel to research-based conferences.
- I have adequate space to conduct my research.
- I have space that is well equipped for me to conduct my research.
- The skills, expertise, and experience of faculty in my department are appropriate to accomplish our research goals.
- I feel appreciated and valued by my departmental colleagues for my work in research.

I have adequate time to conduct research projects.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

I have a personal system that allows me to protect periods of uninterrupted time to address research activities.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

I have a high degree of input into how I wish to spend my time within each of my faculty roles.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

My department has a communications system that allows me to be adequately informed in a timely fashion about major issues, important events, and upcoming concerns related to research and scholarly activities.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)

- Strongly disagree (7)

My department has systematic and fair mechanisms for non-monetarily recognizing and celebrating achievements in research.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

When money is available, my department has systematic and fair mechanisms for monetarily recognizing and rewarding achievements in research.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

As compared to others in a similar position, my compensation (i.e., salary and fringe benefits) is fair for the work I do.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

My department leadership (e.g., division chief, academic vice chair, chair) actively nominates the following individuals for awards, honors, and growth opportunities such as leadership roles or new positions:

- New faculty members
- Midcareer faculty members
- Senior faculty members
- Women faculty members

The vision of the department is kept visible by my department's senior faculty.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

My department's leadership makes clear the expected ethical standards in research.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

Appendix B

Information about Being in a Research Study

Clemson University

Examining the relationship between research climate and faculty productivity at an emerging academic health center in the Southeastern U.S.

Description of the Study and Your Part in It
Dr. Robin Phelps-Ward and Hagan Walker are inviting you to take part in a research study. Dr. Robin Phelps-Ward is an Assistant Professor at Clemson University. Hagan Walker is a doctoral candidate at Clemson University, running this study with the help of Dr. Robin Phelps-Ward. The purpose of this study is to examine the relationship between faculty perceptions of several institutional characteristics related to the research climate and faculty research productivity as indicated by number of approved protocols.

Your part in the study will be to complete an online survey containing questions pertaining to the climate for research productivity, which were developed based upon a review of the current literature. Data will be collected through a survey with a variety of question styles. These include: multiple choice, a Likert scale of strongly agree to strongly disagree, and open comment response section. The research team will remove all identifying information to protect the confidentiality of study participations. It will take you less 20 minutes to complete the survey.

Risks and Discomforts
We do not know of any risks or discomforts to you in this research study.

Possible Benefits
We do not know of any way you would benefit directly from taking part in this study. However, this research may help us to understand how the organizational climate can affect research productivity.

Protection of Privacy and Confidentiality
We will do everything we can to protect your privacy and confidentiality. We will not tell anybody outside of the research team that you were in this study or what information we collected about you in particular. The results of this study may be published in scientific journals, professional publications, or educational presentations; however, no individual participant will be identified.

Choosing to Be in the Study
You may choose not to take part and you may choose to stop taking part at any time. You will not be punished in any way if you decide not to be in the study or to stop taking part in the study.

Contact Information
If you have any questions or concerns about your rights in this research study, please contact the Clemson University Office of Research Compliance (ORC) at 864-656-0636 or irb@clemson.edu. If you are outside of the Upstate South Carolina area, please use the ORC's toll-free number, 866-297-3071. The Clemson IRB will not be able to answer some study-specific questions. However, you may contact the Clemson IRB if the research staff cannot be reached or if you wish to speak with someone other than the research staff.

If you have any study related questions or if any problems arise, please contact Hagan Walker at Clemson University at haganw@clemson.edu or 864-455-1120.

Consent
By participating in the study, you indicate that you have read the information written above, are at least 18 years of age, been allowed to ask any questions, and are voluntarily choosing to take part in this research. You do not give up any legal rights by taking part in this research study.

A copy of this form will be given to you.

Appendix C

Recruitment Email

Dr. Desmond Kelly, Chief Medical Research Officer, and Dr. Windsor Sherrill, Chief Science Officer, on behalf of the Prisma Health Division of Research and Scholarship, ask you to take a few minutes to complete this valuable survey.

Dr. Robin Phelps-Ward and Hagan Walker are inviting you to take part in a research study. Dr. Robin Phelps-Ward is an Assistant Professor at Clemson University. Hagan Walker is a doctoral candidate at Clemson University, running this study with the help of Dr. Robin Phelps-Ward.

The purpose of this study is to examine the relationship between faculty perceptions of several institutional characteristics related to the research climate and faculty research productivity as indicated by number of approved protocols.

Your part in the study will be to complete an online survey containing questions pertaining to the climate for research productivity, which were developed based upon a review of the current literature. Data will be collected through a survey with a variety of question styles. These include: multiple choice, a Likert scale of strongly agree to strongly disagree, and open comment response section. The research team will only report data in the aggregate so responses will be completely anonymous. It will take you less 10 minutes to complete the survey.

If you have any study related questions or if any problems arise, please contact Hagan Walker at Clemson University at haganw@clemson.edu or 864-455-1120.

Thank you for your time and participation in this research study.

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