

University of Nevada, Reno

**Relationships Among Peer Teaching Experiences and Self-Reported Leadership
Practices of Medical Residents**

A dissertation submitted in partial fulfillment
of the requirements for the degree of Doctor of Philosophy in Education

by

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THE GRADUATE SCHOOL

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prepared under our supervision by

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Practices of Medical Residents**

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requirements for the degree of

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ABSTRACT

Physicians are increasingly being called on to lead healthcare systems of all sizes. Healthcare organizations are looking to physicians as leaders because they are able to provide clinical insight coupled with operational acumen necessary to improve these complex systems (Angood & Birk, 2014). Despite the increasing need for physician leaders, few physicians have been formally trained to develop leadership skills (Gabel, 2012; Osborne, 2012). Some research has shown a link between leadership skill development and peer teaching experiences via incidental learning (Dandavino, Snell, and Wiseman, 2007; Ten Cate & Durning, 2007a; Micari, Gould, & Lainez, 2010; Vira, 2015). The purpose of this study was to explore the relationships among peer teaching experiences during undergraduate medical education (UGME) and self-reported leadership practices in medical residency. Data were gathered from medical residents utilizing a three-part survey instrument. This instrument was comprised of one open-ended question regarding qualities of the ideal leader of a medical team; the Leadership Practices Inventory (LPI), a leadership practices self-assessment tool; and a series of residency program, peer teaching experience, and demographics questions. The open-ended question was analyzed utilizing qualitative techniques. Quantitative data were analyzed via a series of multivariate analyses of variance (MANOVA). Overall results demonstrated significant relationships between leadership practices and overall peer teaching, tutoring, and groups based on internal medicine residency program. Qualitative findings added nuance to the quantitative findings. Results from this study may assist medical schools in developing leadership skills in medical students via incidental learning methods.

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CHAPTER I

OVERVIEW OF THE STUDY

Physician leaders. The words seem synonymous; they flow together quite naturally. In the ever-changing landscape of healthcare, physicians have always had a role in health care leadership. With large-scale changes in healthcare systems over the last decade, however, the role of the physician leader is expanding and becoming more essential in the delivery of healthcare around the country. Compared to their business-trained management counterparts, physician leaders are noted for their ability to relate clinical issues with the operations aspects of healthcare management (Angood & Birk, 2014). In addition to their clinical insight, physicians garner respect from other types of clinical providers that non-clinician leaders may not receive. This unique position affords the physician leader the opportunity to initiate innovation and serve a broad range of constituents (Angood & Birk, 2014).

As a result of their clinical training, physicians typically apply analytical or technical solutions to problem-solving (Chaudry, Jain, McKenzie, & Schwartz, 2008). Indeed, physicians are well-prepared for diagnosing disease and caring for patients, but have significantly less training in leadership (Gabel, 2012; Osborne, 2012). In leadership, an interpersonal approach to problem-solving is more often required. These skills include encouraging collaboration, inspiring culture change, and resolving conflict (Chaudry et al., 2008).

According to a white paper distributed by the National Center for Healthcare Leadership (NCHL), the healthcare industry lags behind other economic sectors in developing leadership from within systems (Garman & Lemak, 2011). The significance

of life and death decision-making, emotional stressors, and fiscal challenges associated with leadership in healthcare provide a unique set of circumstances not found in other economic sectors (Dye & Garman, 2006). Leadership is now an important focus among healthcare organizations both large and small (Garman & Lemak, 2011). The NCHL paper asserted that development of leadership capacity is based on practice, coupled with opportunities for leadership development early in one's career, rather than innate talent (Garman & Lemak, 2011).

Physician training is long and arduous. Students enter medical school after completing a bachelor's degree, and spend the next four years training to become physicians. In medical education vernacular, medical school is known as undergraduate medical education (UGME). Upon graduation from UGME, students matriculate into residency programs, known as graduate medical education (GME), where they train in a specialized field of medicine for three to seven years. After completion of medical residency, physicians are eligible to take exams to become licensed to practice medicine in their specialty field.

Leadership training is not traditionally a focus in medical schools in the U.S. (Gabel, 2012; Osborne, 2012). However, the Association of American Medical Colleges (AAMC) has incorporated two leadership competencies into its 58 General Physician Competencies (Englander, Cameron, Ballard, Dodge, Bull, & Aschenbrener, 2013). In this guide, the AAMC recommends that upon entering residency, physicians should be able to collaborate within a health care team and be able to demonstrate appropriate leadership skills to properly lead a team. With the inclusion of these two leadership competencies into the General Physician Competencies, the AAMC is calling for medical

schools to prepare graduating students for leadership roles. In so doing, the AAMC is recognizing not only that all physicians should be prepared to enter the workforce with leadership skills, but also that more physicians are taking on leadership roles than ever before (Angood & Birk, 2014).

Leadership skills are defined in many ways, but one widely-utilized leadership model defines leadership through the Five Practices of Exemplary Leadership (Kouzes & Posner, 2002a). These five practices are:

- Model the Way- leading from one's values;
- Inspire a Shared Vision- developing a shared image of what the organization aims to accomplish;
- Challenge the Process- taking action and taking risks;
- Enable Others to Act- encouraging teamwork and collaboration;
- Encourage the Heart- recognition of accomplishments.

As evidenced by the other 56 competencies in 8 domains identified by the AAMC, medical schools have an ever-increasing responsibility in medical student education, and no additional time to meet the mounting demand (Englander et al., 2013; Ozuah, 2002). Medical schools are challenged to meet all 58 competencies thoroughly. With the continuously expanding knowledge base in basic science, clinical science, technology, and changes in medical practice, it is impractical for medical schools to continuously add new material to the curriculum (Hernandez & Hall, 2016; Ozuah, 2002).

Research has demonstrated that most medical students graduate without any background in leadership (Aranda & Tilton, 2013; Gabel, 2012; Kim, 2012; Osborne,

2012), and that formal leadership curricula do not exist in today's medical schools (Chaudry et al, 2008). Medical schools must focus on preparing physicians for clinical practice. How, then, should first-year residents be expected to have demonstrated competency in leadership skills such as those defined by the AAMC: leading teams to improve health care? Could there be other avenues toward learning these sophisticated interpersonal skills than formal leadership instruction?

Incidental learning may be one solution to teaching medical students leadership skills. Incidental learning is defined as the process of additional, or supplementary, learning which takes place in the context of formal instruction in another topic area (Merriam & Bierema, 2014; Micari et al., 2010). For instance, leadership skills may be learned during formal instruction on some other topic more commonly taught in medical school. One opportunity may be teaching medical students to teach, specifically training them in teaching their peers (known as peer teaching, peer-assisted learning [PAL], or near-peer teaching). Chaudry et al. (2008) asserted that successful leaders must have teaching skills. Likewise, many peer teaching skills translate to leadership skills (Dandavino et al., 2007; Ten Cate & Durning, 2007a). These peer teaching skills include facilitating group work and interaction, decision-making, organizational skills, and the interpersonal and managerial tasks associated with serving in a teaching role (Dandavino et al., 2007; Ten Cate & Durning, 2007b). Interestingly, leadership has been identified as one of five core academic skills for a medical educator (Friedrich, 2002; Shields, 2011). Taking these pieces of evidence together, teaching and leadership are inextricably related. Teaching medical students to teach their peers is also a very important skill to prepare

them for residency, as they will serve in an essential teaching role (Post, Quattlebaum, & Benich, 2009).

Residents have significant teaching responsibilities in instructing medical students, yet only a small amount of formal training in teaching is provided to most residents (Bensinger, Meah, & Smith, 2005; Wilson, 2007). As a result, relatively few residents feel prepared for their role as clinical teacher (Brand, Ekambaram, Tucker, & Aggarwal, 2013). Recently, greater attention has been placed on the need for resident education and experience in teaching by residency programs and accrediting bodies alike (Liaison Council on Medical Education [LCME], 2014). More and more medical schools are incorporating peer-assisted learning experiences into their curricula, because all participants benefit. Peer teaching assists medical schools in reducing the teaching burden on faculty, and research has demonstrated benefits for the instructed students as well: they learn just as well from peer instructors as they do from faculty, and are more comfortable asking questions (Ten Cate & Durning, 2007b). In addition to student benefits, peer teaching simultaneously provides the senior students with teaching experiences, offering an opportunity for them to gain not only teaching skills, but also improve self-confidence, gain communication skills, and, incidentally, increase leadership skills (Hudson & Tonkin, 2008, Ten Cate & Durning, 2007b).

Participating in peer teaching activities has been linked with improved leadership skills in a number of studies, ranging across age groups and disciplines. Elementary school children participating in peer teaching demonstrated an increase in leadership skills (Zhbanova, Rule, & Stichter, 2015), and a group of teachers increased their leadership skills while engaging in peer coaching (Charteris & Smardon, 2013). Pre-med

undergraduate students developed leadership skills as a product of incidental learning through a science, technology, engineering, and mathematics (STEM) peer teaching program (Micari, et al., 2010). Among medical students, one study reported preliminary, albeit anecdotal positive results in developing leadership skills via incidental learning through a peer-led clinical skills training program (Vira, 2015). Together, these studies provide evidence of leadership development as a product of incidental learning from peer teaching experiences across a wide range of ages and disciplines. Engaging medical students in peer teaching activities during their UGME, then, could be one means by which to provide them with some leadership training prior to entering residency, and thereby meeting the AAMC's General Physician Competencies for entering residency practice.

Statement of the Problem

With large-scale changes in healthcare over the last decade, the demand for physician leaders is increasing (Angood & Birk, 2014; Zismer & Person, 2008). It is recognized in healthcare systems that leaders must understand not only the managerial and financial aspects of healthcare, but the clinical facets as well, placing physicians in a unique role to develop innovations and lead organizations (Angood & Birk, 2014). Few medical schools or residency programs, however, provide future physicians with specific training in leadership skills (Aranda & Tilton, 2013; Chaudry et al., 2008; Kim, 2012; Osborne, 2012). While accrediting bodies promote the need for leadership skills training for medical students (Englander et al., 2013), few programs have formal leadership curricula (Chaudry et al., 2008). One approach to teaching leadership skills may be through incidental learning; however, there is a gap in the current literature regarding the

utilization of an incidental learning approach to train medical students in leadership practices while they are engaged in learning another topic. Can medical students acquire leadership skills through formal training in peer teaching? Research has demonstrated leadership skill outcomes from similar peer teaching experiences for children, teachers, and undergraduate students (Charteris & Smardon, 2013; Micari et al., 2010; Zhbanova et al, 2015), and one study has positive preliminary results among medical students participating in a peer-teaching program (Vira, 2015). Incidental learning could prove to be a key means of providing medical students with leadership training, however, there is a lack of empirical studies to demonstrate this link. This gap in the literature points out the purpose of this study, which is that it is not yet known whether peer teaching in medical school has any relation to leadership practices in medical residency. In summary, the problem identified for this research is a gap in the literature describing any potential relationship between peer teaching experiences during UGME and leadership practices demonstrated during residency.

Purpose of the Study

The purpose of this study was to explore the relationships among peer teaching experiences during undergraduate medical education (UGME) and self-reported leadership practices in medical residency. The following three overarching research questions were addressed in this study:

1. For medical residents in the study group, are there significant correlations among the Leadership Practices Inventory subscale scores?
2. When groups of medical residents are established by quantity of hours of various peer teaching types (tutoring, supplemental instruction leader, small group

- facilitation, clinical skills teaching, and overall peer teaching experience), are there significant differences among the groups based on the Leadership Practices Inventory subscales?
3. When groups of medical residents are established by residency and demographic characteristics (year and type of residency program, location of medical school training, race, ethnicity, gender, and age), are there significant differences among the groups based on the Leadership Practices Inventory subscales?

Methodology

To investigate relationships among peer teaching experiences during UGME and leadership practices among medical residents, a primarily quantitative methodology was utilized, with an added qualitative component to add nuance to the study. Peer teaching experiences and self-reported leadership practices of medical residents were assessed using a three-part survey instrument. This survey consisted of one open-ended question, the Leadership Practices Inventory assessment of leadership behaviors, and several questions about peer teaching experiences, residency, and demographic characteristics. Correlation and multivariate analysis of variance (MANOVA) statistical techniques were utilized to determine relationships and to determine whether differences existed in self-reported leadership practices among groups. Participants were medical residents at one western U.S. medical school.

Theoretical Framework

The guiding theoretical framework for this research was Kouzes and Posner's (2002a) Five Practices of Exemplary Leadership. This leadership model was developed over decades using both qualitative and quantitative research studies and validated

through administration to hundreds of thousands of people who represented a broad range of demographics and occupations (Kouzes & Posner, 2002b). This framework outlines five best practices of exemplary leaders, including: Modeling the Way, Inspiring a Shared Vision, Challenging the Process, Enabling Others to Act, and Encouraging the Heart. The Leadership Practices Inventory (LPI) was developed by Kouzes and Posner to measure an individual's leadership capacity on each of these five practices subscales, and is in wide use today (Kouzes & Posner, 2002b). This tool was utilized as a major component of the research methodology for this study.

Significance of the Study

This study contributes to the literature investigating potential relationships among leadership practices and peer teaching experiences in UGME. In their meta-analysis of medical student peer teaching, Yu, Wilson, Singh, Lemanu, Hawken, & Hill (2011) pointed to several gaps in the literature, including a lack of evidence revealing long-term outcomes of peer teaching experiences on non-clinical aspects of medical school. One of these areas noted was leadership development. Results of this study may be utilized to develop and inform new medical school curricula incorporating a greater focus on peer teaching, with the added intended outcome of providing medical students with leadership training based on these experiences. This research could help medical schools around the country better prepare medical students for future leadership roles, while instructing them in teaching skills simultaneously.

Assumptions

This study includes the following assumptions:

1. All study participants responded to the survey instrument honestly and with care for each question.
2. The Leadership Practices Inventory truly measures one's level of leadership practice acuity.
3. Study data reflect the true nature of respondents' leadership practices.

Limitations

This study has the following limitations:

1. Leadership Practices Inventory scores are all based on self-report, which may be affected by personal bias.
2. There are many potential confounding variables outside of the control of the researcher which could affect research outcomes, such as any respondent experiences (teaching, leadership, or other) which may affect Leadership Practices Inventory scores.
3. This study used a convenience sample of residents at one western U.S. medical school.

Delimitations

The study is delimited to medical residents in one western U.S. medical school and to just seven medical specialties including emergency medicine, family medicine, internal medicine, obstetrics/gynecology, pediatrics, psychiatry, and surgery. Consequently, results of this study may not be generalizable to other residency programs or medical schools, or to other residency program types.

Definition of Terms

For the purpose of this study, specific terms are defined as follows:

Correlation- One type of descriptive statistics which examines the strength of association between variables (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975).

Distributed Leadership- A theoretical construct which describes a type of leadership in which leadership tasks are accomplished by the group as a whole, based on relationships built among individuals in the group (Spillane, 2016; Watson & Scribner, 2007).

Incidental Learning- The process of additional, or supplementary, learning which takes place in the context of formal instruction in another topic area (Merriam & Bierema, 2014; Micari et al., 2010).

Leadership- The act of leading a group of people or an organization.

MANOVA- Multivariate analysis of variance. A descriptive statistical test used to determine differences among groups when examining multiple independent and dependent variables.

Peer Teaching- Teaching and learning that occurs between two or more students enrolled in the same curriculum (Ten Cate & Durning, 2007b).

Quadruple Aim- A model for healthcare system improvement based on four key aims: healthier populations, better patient care, reduction in costs, and a satisfied health care workforce.

Residency- A three- to seven-year specialty training for physicians, immediately following the four years of undergraduate medical education, in which physicians hone their skills in one particular area such as family medicine, internal medicine, obstetrics and gynecology, pediatrics, or surgery.

Transformational Leadership- One leadership paradigm in which the actions of the leader are focused on changing people and situations, and is highlighted by an emotional

connection between the leader and followers in order to meet everyone's needs (Northouse, 2013). This type of leadership is emphasized in Kouzes and Posner's (2002a) *Five Practices of Exemplary Leadership*.

Undergraduate Medical Education (UGME)- Commonly known as medical school; the first four years of physician training. Typically, the first two years are classroom-based and focused on learning the basic sciences, followed by two years of hands-on clinical work. Upon graduating from UGME with a medical doctor (MD) degree, physicians begin their residency training.

Organization of the Study

This research study is organized into five chapters. Chapter I, the introduction, presents an overview of the study, the statement of the problem, the purpose of the research study, including research questions, and its significance. The chapter continues with a description of the methodology, and an overview of the theoretical framework, followed by assumptions, limitations, and delimitations of the study. Finally, this organization of the study summarizes the opening chapter.

Chapter II provides the literature review, including relevant research on physician leadership and leadership development, transformational leadership, and a description of peer teaching and incidental learning specific to the medical school setting.

Chapter III describes the specific methodology utilized in this research. This chapter includes a description of the participants, instrumentation, data collection and analysis, and a summary.

Chapter IV is the results section, in which the data are presented. This chapter consists of a description of the findings of the study, including testing and analysis of the

research questions, and an examination of the impact of residency and demographic characteristics.

Chapter V presents a summary and discussion of the research findings and potential implications of the research on future practice. The discussion chapter also presents recommendations for future study of this topic.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter presents the literature related to the relationships of peer teaching experiences during undergraduate medical education (UGME) and individuals' perceived leadership practices in medical residency. As the healthcare landscape changes, leadership skills are becoming more important as a key component of physician training. The Association of American Medical Colleges (AAMC) has called for physicians entering residency programs to be trained with leadership skills (Englander et al., 2013). However, with medical knowledge continuously expanding, medical school curricula are already at capacity. In essence, the need for leadership training for medical students is imperative, yet challenging to implement.

This study sought to investigate whether incidental learning may be a potential tool for teaching medical students leadership skills as a secondary outcome of peer teaching experiences. Peer teaching has been utilized for many years in medical schools to enhance student development across the curriculum. Well-documented positive outcomes of peer teaching experiences in medical schools include improvement in communication skills, greater interest in teaching, and enhanced skill in self-teaching (Yu et al., 2011). Recent research has also suggested that peer teaching may improve leadership development among a variety of student types (Micari et al., 2010; Ten Cate & Durning, 2007a; Vira, 2015). Thus, this study sought to examine the relationships among peer teaching experiences among undergraduate medical students and leadership skill development in preparation for medical students to advance to residency and future practice.

The following review of the literature presents the foundation for this research study. Specifically, this chapter is presented in five main sections: (a) physician leadership, (b) leadership in healthcare settings, (c) physician leadership development, (d) peer teaching, and (e) incidental learning. A chapter summary follows these sections.

Physician Leadership

For centuries, physicians have been respected for leadership in healthcare settings. In recent years, however, a great deal more emphasis has been placed on utilizing the expertise of physicians in leadership roles to lead innovations in healthcare. With changes in health care systems and the need for leaders with a range of skills and knowledge, physicians as leaders have become more central to health care systems of all sizes, ranging from major healthcare systems to smaller group and private practice organizations.

As healthcare costs continue to rise, healthcare organizations continuously evolve to meet the growing demands for services. The movement toward a model of healthcare improvement is known as the Quadruple Aim (Bodenheimer & Sinsky, 2014; Institute for Healthcare Improvement, 2015). This model aims to decrease healthcare costs, enhance population health, improve patient care, and assist healthcare workers in finding satisfaction in their work (Stoller, 2009). The initial designation of the Quadruple Aim was referred to as the Triple Aim, the three-legged stool of healthcare improvement. The satisfaction of healthcare workers was added later as the fourth leg of the stool (Bodenheimer & Sinsky, 2014; Institute for Healthcare Improvement, 2015). Under this initiative, leaders of healthcare organizations are being called upon to develop innovative means to improve healthcare delivery to achieve the lofty goals noted above. Achieving

the Quadruple Aim in the United States (U.S.) will require fundamental change at every level of the health care system. This undertaking will, in turn, necessitate the deployment of innovative, visionary leaders prepared with a deep understanding of the current system as well as the courage to lead their organization through substantial change.

Prior to the significant healthcare changes occurring in the early 2000s, complex healthcare organizations were primarily led by administrators utilizing a business leadership perspective. The Chief Medical Officer (CMO) position was typically the only leadership role held by a physician. In most organizations, the CMO position was typically filled by an admired, popular physician nearing retirement, and the role was one more of prestige than authority (Oostra, 2016). The CMO served in an advisory capacity, with little fiscal responsibility (Oostra, 2016). In contrast, the individuals who have held the title of health system administrator were academically trained in business and/or other non-clinical fields. Since the role of CMO was more symbolic than practical, many physicians and other health care providers felt a lack of clinician voice at the highest levels of hospital and health care system administration, particularly regarding issues of medical relevance. Indeed, there has been a struggle in many health care systems with implicit barriers between physicians and administrators caused by this power imbalance, which Oostra (2016) argued contributed to problems providing high-quality patient care. As changes in healthcare have developed over the last decade, the importance of an engaged, operational physician leader became more apparent, and physician leaders took on significant responsibility in changing organizational dynamics and systems.

Healthcare systems are large and complex; diverse groups of professionals are employed to provide medical services to communities. Physicians are seen as

professionals who possess both the clinical acumen and potential leadership capacity to make good decisions about clinical aspects of healthcare management; this is based on their unique position to understand both the care and operations aspects of healthcare (Angood & Birk, 2014). Physicians also garner respect from other clinical providers that non-clinician leaders may not receive, providing a somewhat higher level of acceptance as leaders in the clinical setting. This unique position affords the physician leader the opportunity to initiate innovation and serve a broad range of constituents (Angood & Birk, 2014).

According to the first national survey of major healthcare systems, 51% were led by physicians, and an additional 33% were jointly led by physicians and hospital administrators (Colla, Lewis, Shortell, & Fisher, 2013). Physician-led healthcare organizations have been found to be positively associated with higher quality and were more likely to gather and report both quality and financial data, as well as have more sophisticated information technology systems than organizations led by non-physicians (Colla et al., 2013; Goodall, 2011). Physicians are becoming well-integrated into the top leadership of many health care systems. Additionally, Leonard (as cited in Angood, 2015) demonstrated that five of the leading six hospitals in the U.S. in 2014-15 were physician-led. As evidenced by these statistics, physicians are taking on many new leadership challenges in the health care systems in which they work, and are contributing considerably to the success of these multi-faceted organizations.

Adapting roles in the operation of healthcare is just one component of the massive changes facing the healthcare system. Another new direction in healthcare is a move towards team-based care, which puts physicians in a distinctly new role in which care is

shared by all members of the health care team, typically with the physician at the helm. This team-based approach is a lower-cost approach to care in which patient care is managed by a team of providers, which could include physicians, nurses, medical assistants, social workers, pharmacists, behavioral health providers, and various technicians (American Hospital Association & American Medical Association, 2015; Masterson, 2014). The team-based approach can occur in both hospital and larger clinic settings. Under this model, healthcare costs are reduced in many ways, including improved efficiency and reductions in emergency department use, inpatient admissions, specialty physician visits, and hospital readmissions (Nielsen, Olayiwola, Grundy, & Grumbach, 2014). In this new paradigm of clinical care, the physician's role is significantly altered from a focus on clinical diagnoses and treatment to one of leading a team of providers to care for the whole patient in an effort to improve health outcomes (American Hospital Association & American Medical Association, 2015; Yarnall, Ostbye, Krause, Pollak, Gradison, & Michener, 2009). In summary, the physician's leadership role is changing in both directions; these providers are increasingly being called on to lead not only patient care teams, but complex healthcare systems as well.

Leadership in Healthcare Settings

The U.S. healthcare system is currently undergoing immense changes; physicians are expected to be leaders to guide both organizations and healthcare teams through these complex transitions. Due to the significant innovation, creativity, and adaptability required, transformational leadership has been highlighted as an appropriate leadership style to employ for improving the healthcare system (Zastocki, 2015). Transformational leadership is focused on changing people and situations, and is highlighted by an

emotional connection between the leader and followers to meet everyone's needs (Northouse, 2013). Leadership scholars refer to transformational leadership as the process by which leaders, in interacting with their supporters, raise the motivation and morale of everyone to a higher level (Kouzes & Posner, 2002a). Transformational leadership can be employed to change individuals, programs, and in the case of health systems, large-scale organizations, and even cultures (Northouse, 2013).

Distributed leadership is another theoretical construct related to transformational leadership. The distributed leadership theory describes leadership tasks that are performed by the group as a whole, but without the benefit of the authority that leadership roles typically bring (Watson & Scribner, 2007). Distributed leadership takes into account the social capital, or relationships built, among the individuals in the organization. The strength of these social networks can be far more powerful than the collective individual characteristics alone (Spillane, 2016). This leadership model has been most commonly applied and researched in the context of K-12 education, but its focus on group dynamics allows for application to the team-based health care model. Utilizing the distributed leadership model as a lens, it could be argued that team-based care is more effective in part due to the social capital in effect.

While physicians have been cited as the transformational change-agents necessary to lead the healthcare system to the lofty goals of the Quadruple Aim (Oostra, 2016), physician training revolves around diagnosing disease and caring for patients, rather than preparing physicians to serve in leadership roles (Gabel, 2012; Osborne, 2012). When physician leaders work to solve problems, they typically apply analytical or technical solutions, because physician training focuses on this skill set (Chaudry et al., 2008).

Indeed, healthcare leadership is unique due to the significance of life and death decision-making and emotional stressors associated with it (Dye & Garman, 2006). Changing healthcare systems via transformational leadership requires an interpersonal approach: encouraging collaboration, inspiring culture change, and resolving conflict (Chaudry et al., 2008). This is a very different skill set requiring a special kind of training for physicians.

The Handbook of Leadership astutely states that there are nearly as many definitions of leadership as there are leadership theorists (Stogdill, 1974). Medical leadership is no exception. Many different theorists have presented various paradigms, theories, and competencies to describe effective leaders in healthcare. In a study conducted in a single academic medical center, eight specific competencies of successful physician leaders were identified (Hopkins, O'Neil, & Stoller, 2015). These competencies included empathy, initiative, emotional self-awareness, deliberate communication, demonstration of respect for all, consensus building, a focus on the mission of the organization, and organizational awareness (Hopkins et al., 2015). These competencies correlate closely with those identified by Gerald Hickson, MD (Angood, 2015), which include humility, equitable and respectful treatment of all, engagement of all voices in the organization, and the ability to follow through with all decisions.

Exceptional Leadership Model

One comprehensive model of healthcare leadership has been presented by Dye and Garman (2006). This model describes 16 essential leadership competencies that are classified into four categories, or Cornerstones, specific to the high-stakes environment of healthcare. This model is known as Exceptional Leadership: 16 Critical Competencies for

Healthcare Executives (Dye & Garman, 2006). A brief description of each of the four cornerstones provides an overview of this healthcare-specific leadership model. The four cornerstones include: Well-cultivated Self-awareness, Compelling Vision, Real Way with People, and Masterful Style of Execution.

Cornerstone 1: Well-cultivated self-awareness. Competencies in this cornerstone center around emotional intelligence and understanding one's own motivations and abilities as a leader. This self-awareness includes an in-depth grasp of one's strengths and weaknesses, an ability to be open-minded and to cultivate an environment rich in feedback. This cornerstone also highlights the importance of developing an understanding of serving the organization for a higher purpose and being able to manage those objectives through leadership (Dye & Garman, 2006).

Cornerstone 2: Compelling vision. Being visionary, coupled with the ability to develop and share that vision with stakeholders, is an essential component of leadership. Through this process, exceptional leaders earn trust and loyalty throughout their organizations. Dye and Garman (2006) argued that during this time of rapid change in the healthcare industry, leaders with vision are a priceless commodity as innovations in practice become nearly-constant requirements of healthcare organizations.

Cornerstone 3: Real way with people. Every leader must have exceptional interpersonal skills. This cornerstone involves specific competencies in listening, providing effective feedback, mentoring, establishing successful teams, and motivating organizational personnel. This group of competencies highlights a very different skill set than either of the first two. Interpersonal skills require a great amount of patience and hinge on the leader's ability to develop successful relationships (Dye & Garman, 2006).

Cornerstone 4: Masterful style of execution. Finally, this last cornerstone highlights the importance of leaders being able to get things done. Developing agendas, strategizing, building consensus, making decisions, and acting on plans are all instrumental in moving organizations forward. Self-awareness, vision development, and interpersonal skills are wasted if a leader cannot implement change (Dye & Garman, 2006).

To further the discussion on leadership models, another paradigm is presented to describe leadership practices more broadly descriptive of leadership in general and across economic sectors. Themes that run through both of these models are apparent and will be noted following the next section.

The Five Practices of Exemplary Leadership

One of the most widely utilized and researched transformational leadership theories is the Five Practices of Exemplary Leadership model developed by Kouzes and Posner (2002a). Originally published in 1987, the model has become one of the most recognized leadership paradigms in the world. Jim Kouzes and Barry Posner conducted extensive leadership research and developed a model based on the five practices of exemplary leadership. These practices include: Model the Way, Inspire a Shared Vision, Challenge the Process, Enable Others to Act, and Encourage the Heart.

Model the way. The practice of modeling the way refers to understanding one's own values and beliefs, and leading from those guiding principles. This practice involves being open to discussing these values, standing up for them, and demonstrating a commitment to them through action. Serving as an institutional role model is part of this practice (Kouzes & Posner, 2002a).

Inspire a shared vision. Building from Modeling the Way, Inspire a Shared Vision incorporates the strength of the leader's belief system into developing an organizational vision. Through this practice, leaders generate excitement and engagement in constituents around a united vision. Leaders also enlist others in working toward a united goal for the future (Kouzes & Posner, 2002a).

Challenge the process. Leadership is about change; extraordinary leaders must be able to innovate and improve the organization. In order to challenge the process, leaders must be able to stand up for their beliefs and initiate change, and must be willing to take risks. Leaders must be prepared to face the possibility of failure, which is part of taking chances. Challenging the process includes accepting failures as opportunities for learning and continuous improvement (Kouzes & Posner, 2002a).

Enable others to act. Leadership cannot be performed in a vacuum; it is the process of working with other people that defines leadership. Exceptional leaders, according to Kouzes and Posner (2002a), are skilled at building effective teams and promoting teamwork and collaboration. Enabling Others to Act involves creating a culture of trust and respect among all constituents, and sharing power with whomever is best suited to perform the necessary tasks. This practice involves a high level of collaboration and an ability to recognize and utilize the strengths of everyone in the organization (Kouzes & Posner, 2002a).

Encourage the heart. The Five Practices Leadership Model depicts a very people-centered approach, and the practice of Encouraging the Heart highlights this. Engaged leaders recognize the importance of acknowledging the efforts of individuals and teams and do so on a regular basis. Understanding the significance of heartfelt

gratitude and recognition for hard work is invaluable in maintaining organizational morale and staff engagement (Kouzes & Posner, 2002a).

Similarities in Leadership Paradigms

The Exceptional Leadership Model (Dye & Garman, 2006) and the Five Practices of Exemplary Leadership Model (Kouzes & Posner, 2002a) are, at their core, quite similar. The Four Cornerstones of Exceptional Leadership relate quite easily to the Five Practices of Exemplary Leadership. Resemblances between the two are presented.

Cornerstone 1. Well-Cultivated Self-Awareness incorporates ideologically similar themes to Kouzes and Posner's Practice of Model the Way. Each of these identifies the importance of emotional intelligence, understanding one's own values and beliefs, and leading from these values. The importance of being a role model is also highlighted in both leadership models.

Cornerstone 2. Compelling Vision relates to Inspire a Shared Vision. Both consist of utilizing the beliefs and values noted above to develop organizational vision, while cultivating trust, loyalty, and institutional culture through shared responsibility for the vision and forward movement of the organization.

Cornerstone 3. Real Way with People encompasses two of the Practices of Exemplary Leadership: Enable Others to Act and Encourage the Heart. These themes point out the importance of impeccable people skills in leadership practice. The ability to lead an organization starts with the ability to lead people. Demonstrating skills such as listening, providing feedback, building teams, mentoring, sharing power, and recognizing people for their contributions are essential in successful leadership practice and are central to both models.

Cornerstone 4. Masterful Style of Execution correlates with the last of the five Leadership Practices: Challenge the Process. These two themes describe the importance of consensus building, decision-making, risk-taking, and acting on plans. With action and risk, however, comes the potential for failure, which leaders must be able to accept and learn from to continue to move their organization forward.

Physician Leadership Development

Leadership is developed through experience and specific training. Professional standards for physicians delineate an expectation for leadership skills upon entering residency. Each of these are addressed in this section.

Leadership Identity Development Model

Both the Exceptional Leadership model (Dye & Garman, 2006) and the Five Practices of Exemplary Leadership model (Kouzes & Posner, 2002a) describe the many qualities portrayed by effective leaders in many fields. What these models do not describe, however, is how leadership can be learned. Previous researchers agree that leadership can be learned (Komives, Longenecker, Owen, Mainella, & Osteen, 2006; Micari et al., 2010; Kouzes & Posner, 2002a). Komives et al. (2006) developed the Leadership Identity Development (LID) model, which describes a framework for this process. This model was developed through a process of studying college students and recent graduates (Komives et al., 2006).

The LID model describes five key components of leadership development, each representing a distinctive process that changes over time. These five components are: A broadening view of leadership; developing sense of self; group influences; developmental influences; and a changing view of the self with others. Each of these are described.

Broadening view of leadership. This component of leadership development describes the developmental process of viewing leaders and leadership. Initial stages include viewing leadership as something outside of oneself, and something other people have or do. In intermediary stages, people begin to experiment with new roles, and become more engaged with responsibility and activity. Final stages of this component of leadership development are described as being actively committed to a personal passion, gaining responsibility, and a dedication to lifelong learning. Confidence is highlighted in this final stage as well (Komives et al., 2006).

Developing sense of self. This component transitions from a simple awareness of leaders and authority figures through an active process of social skill development. Moving beyond this, the person begins to recognize some leadership potential within him or herself and explores leadership roles. From here, leaders refine their leadership style, typically from one of more control to one of more shared leadership, with a focus on passion for the cause and for serving people (Komives et al., 2006).

Group influences. This element describes the process of moving from disengagement through a series of roles that include increasingly involved interrelationships. The leader may become an active member in an organization, begin to narrow interest within that context through increasing levels of participation, and realize leadership roles. Subsequently, the leader begins to gain a better understanding of teamwork and values connectedness with the team. Ultimately, group influences culminate in a deeper understanding of organizational complexity and the willingness and interest in engaging with outside organizations (Komives et al., 2006).

Developmental influences. This component of leadership development illustrates the process of growth, primarily through role models and affirmation. This process begins in youth with affirmations from parents, coaches, teachers, and other authority figures. Developmental influences continue into young adulthood through role models, when the leader may begin to emulate these role models by taking on more responsibility with the help of mentors and peers. From this point, the individual learns to practice leadership and begin coaching others. Ultimately, the individual can recycle this process within new contexts (Komives et al., 2006).

Changing view of self and others. This last element of leadership development is described by Komives et al. (2006) as the process of moving from a dependent state into an independent/dependent state, and finally an interdependent state, in which the leader realizes the importance of working together with people (Komives et al., 2006).

Professional Standards

The need for trained physician leaders is becoming more recognized within health systems, academic health centers, and academic institutions. The Association of American Medical Colleges (AAMC) has incorporated leadership skills into its General Physician Competencies (Englander et al., 2013). The eight domains of general physician competencies outlined include:

1. Patient Care: Provide patient-centered care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health (11 competencies).

2. Knowledge for Practice: Demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences, as well as the application of this knowledge to patient care (6 competencies).
3. Practice-based Learning and Improvement: Demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and lifelong learning (10 competencies).
4. Interpersonal and Communication Skills: Demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals (7 competencies, including one specific to leadership skills).
5. Professionalism: Demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles (6 competencies).
6. Systems-based Practice: Demonstrate an awareness of and responsiveness to the larger context and system of healthcare, as well as the ability to call effectively on other resources in the system to provide optimal health care (6 competencies).
7. Interprofessional Collaboration: Demonstrate the ability to engage in an interprofessional team in a manner that optimizes safe, effective patient and population-centered care (4 competencies).
8. Personal and Professional Development: Demonstrate the qualities required to sustain lifelong personal and professional growth (8 competencies, including one specific to leadership skills).

In the AAMC's General Physician Competencies, leadership is noted under two separate domains: (a) Interpersonal and Communication Skills (ICS) and (b) Personal and Professional Development (PPD). The AAMC leadership competencies are stated as such:

- ICS-3: Work effectively with others as a member or leader of a health care team or other professional group.
- PPD-6: Provide leadership skills that enhance team functioning, the learning environment, and/or the health care delivery system.

In addition to these specific leadership competencies, many other leadership skills are identified throughout the AAMC competencies. These include effective communication, interprofessional collaboration, and building a climate of respect and trust. Through the development of these competencies, the AAMC has highlighted the importance of the physician's ability to work as a member (and leader) of healthcare teams and the capability to contribute positively to the effectiveness of these groups. The AAMC competencies describe the skills which first-year residents should possess upon entering residency programs; putting the impetus on medical schools to train their students appropriately in each competency.

According to the AAMC's General Physician Competencies, first-year residents should be prepared with leadership skills upon matriculation into their residency program. This puts an additional curricular burden on medical schools to produce graduates who possess some level of leadership capacity. Unfortunately, leadership skills are not often taught in medical schools (Aranda & Tilton, 2013; Gabel, 2012; Kim, 2012; Osborne, 2012). The curricula in medical schools typically focuses on autonomous

problem solving, which is a key clinical skill required of physicians to diagnose and treat illness (Stoller, 2009). Furthermore, physicians are not naturally team players; the medical field has traditionally rewarded individual achievements (Souba, 2004). Promotion to leadership roles has often relied on a physician's clinical and academic performance rather than demonstration of leadership skills (Lobas, 2006). This type of promotion may not result in advancement of the most effective leaders. Excellence in intellectual pursuits and clinical abilities requires a great deal of dedication and time, which may actually hinder the development of leadership skills (Lobas, 2006). Clinical skills, however, are an essential component of leadership in garnering the respect of peer physicians (Angood & Birk, 2014). Ultimately, a balance of strong clinical skills paired with an aptitude for leadership is now what is needed in the physician role.

The Leadership Practices Inventory (LPI) is a tool to assess self-reported leadership skills (Kouzes & Posner, 2013). In a study examining LPI scores among experienced physician leaders, Kusy, Essex, and Marr (1995) found that physician leaders scored higher in all subscales of the LPI than did the general population (based on the LPI normative database). Older physician leaders demonstrated increased practice of Modeling the Way, and those who were in clinical practice for a longer period of time prior to taking on leadership roles exhibited greater use of both Modeling the Way and Inspiring a Shared Vision. Leadership Practices Inventory data for medical residents and early career physicians were not available, but this research demonstrated that a great deal of clinical experience enhances leadership skills, particularly those pertaining to Modeling the Way and Inspire a Shared Vision.

Of note, leadership skills are often taught to practicing physicians. Trainings have been conducted that demonstrate positive leadership skill development among physicians (Straus, Soobiah, & Levinson, 2013). The Harvard Macy Institute, a medical educator training program, identifies leadership as one of the five main themes in their program (Friedrich, 2002; Shields, 2011). The other four components include teaching and learning, assessment, curriculum development, and information technology (Friedrich, 2002; Shields, 2011). Participation in various continuing education training programs have been found to improve physicians' academic rank and hospital leadership positions (Straus et al., 2013).

The responsibility is now on UGME institutions to prepare medical graduates with leadership skills as early as entering residency programs, however, UGME curricula are already at capacity. How can medical schools be expected to increase the number of student learning outcomes without adding more educational content and curricular time? Would it be possible to utilize existing training models to incorporate leadership skills training? Peer teaching may provide the benefits of incidental learning to help teaching institutions respond to this need.

Peer Teaching

Peer teaching is broadly defined as teaching and learning that occurs between two or more students enrolled in the same curriculum (Ten Cate & Durning, 2007b). The utilization of peer instructors to promote learning can take many different forms, based on desired outcomes and available resources (Ten Cate & Durning, 2007b). A sizeable body of literature exists concerning peer teaching, which describes peer-led instruction by a variety of names, including peer-assisted learning (PAL), peer teaching, peer learning,

near-peer teaching (NPT), and peer tutoring. While some minor differences exist in definitions from various researchers, these are all similar terms to describe the occurrence of two or more students working together to promote learning. Peer-assisted learning is used to broadly describe teaching and learning situations in which students help each other to learn, and in which the students are learning about teaching in the process (Ross & Cameron, 2007; Topping, 2005). In general, when researchers utilize the term peer teaching, they are focusing on the peer teachers in the peer-led instruction session; likewise, when discussing peer learning, researchers are directing their attention to the student-learners engaged in the session. Near-peer teaching is more specifically defined as a teaching situation in which the teaching and learning students are enrolled in the same curriculum, and the distance between peer teacher and peer learner is at least one year, with the more senior students taking on the role of peer teacher, and the more junior students assuming the role of peer student (Ten Cate & Durning, 2007b). Peer tutoring is defined as students working one-on-one, with one student having more knowledge or experience than the other (Damon & Phelps, 1989). Many varieties of each of these modalities exist, and have been used at all levels of education and in a range of subject areas (Topping, 2005).

Peer teaching is a complex process involving many different variables. Topping (1996, 2005) outlined thirteen dimensions that help define the range of interactions that can be categorized as peer teaching. Topping's typology includes:

1. Curriculum content- Subject matter can be nearly anything, and can include a focus on knowledge or skills (or both).

2. Contact constellation- This category describes the size of the group, including the number of both peer teachers and peer learners. A wide range exists in contact constellation formations. Groups can be as small as a pair (dyad), with students teaching each other or a more traditional tutor-student scenario, or as large as two peer teachers addressing a group of thirty or more peer students. The range of constellations is limitless.
3. Within or between institutions- Students are typically enrolled in the same school or institution, but this can vary, for instance when high school students tutor middle or elementary school students.
4. Year of study- Peer teachers and students can come from the same or different year of study.
5. Ability- Learners and teachers can be of varying ability levels. Most common would be the peer teacher having a greater ability in the subject matter than the students. However, this is not always the case. Peer learning can occur among students of the same ability mastering small portions of the content and subsequently teaching each other for a deeper understanding of the material for both the peer teacher and peer learner.
6. Role continuity- This particularly applies to learning in same-ability situations, in which the roles of peer teacher and peer learner are not permanent. Planned role changes can positively affect both learning and self-esteem for all involved students.
7. Place- Location of planned peer teaching activities can be widely varied and could include classrooms, small group workrooms, libraries, or any other location where

- learning would be best-suited, including hospital wards, clinics, or other worksite training locations.
8. Time- The planned time for peer teaching to take place can vary widely. Peer teaching can be a part of regularly scheduled classroom sessions or outside of class hours, depending on whether the content is part of the course or ancillary to the course.
 9. Tutee/helped/student learner characteristics- This category describes the peer learners. The learning sessions may be inclusive of all students in a particular course, or may be targeted at specific students such as gifted, underachievers, or a specific minority group represented in the class.
 10. Tutor/helper/student teacher characteristics- One might assume that tutors (peer teachers) would be selected based on high achievement; the *best students* in the class would be the best teachers. In some cases, this is true, but in some instances peer teachers can be average or underperforming students, put in the role of peer teacher for their own benefit.
 11. Objectives- Peer teaching projects may be developed with various aims, including improvements in knowledge or skills, or affective or social developments, or combinations of the above. Objectives of peer teaching endeavors can include secondary outcomes (incidental learning) such as increases in self-esteem or leadership skills.
 12. Voluntary or compulsory- Whether the events are required or not can have major implications on the quality of instruction.

13. Reinforcement- Much debate revolves around the issue of extrinsic and intrinsic reinforcement for both student teachers and student learners. The use of a range of rewards for participation either as a student teacher or student learner can seriously affect the learning outcomes of the program.

As Topping (1996, 2005) described, peer teaching situations can vary widely in structure, content, and role, and can target a range of objectives and student outcomes. Peer teaching can be utilized in creative ways to serve as either the focus of a curriculum or as a tool to support a curriculum and promote student learning. As demonstrated in Topping's (1996, 2005) typology, a great deal of variation can occur in defining and utilizing peer teaching events in a range of settings, from elementary school through post-graduate education.

Peer Teaching in Medical Education

Medical education consists of a unique set of hierarchical terms and processes to describe both student progression and faculty supervisors. The initial four years of medical school are known broadly as undergraduate medical education (UGME); while students are enrolled in these four years, they are referred to as first-year (MSI), second-year (MSII), third-year (MSIII), or fourth-year (MSIV) medical students. The first two years of medical school are typically didactic, while the third and fourth years are spent in clinical settings. During the latter two years, students rotate through clerkships, or clinical rotations. Physicians who oversee the education of students on clinical rotations are known as attending physicians.

Upon graduation, students (now physicians) match into residency programs, which are clinical sites where they are known as interns for their first year and residents

or resident physicians for the duration of their education (an additional 2-5 years, typically). The residency program years are known as Graduate Medical Education (GME), which are specialized training programs in which residents focus their learning and practice in a specialty area, such as family medicine, internal medicine, pediatrics, surgery, or emergency medicine. During these intensive training years, resident physicians often have medical student teaching assignments in addition to their clinical responsibilities. Upon completion of residency, the next step in medical education is to take exams to become board certified in the particular specialty area in which they trained during their residency years. Passing these exams to become board certified in their specialty area permits the new physician to apply to their state to become licensed to practice medicine. Residents may choose to enroll in a specialty training program known as a fellowship, upon completion of residency. At this point, residents are known as fellows. Fellowships are typically one year, but could be longer depending on the specialty.

Peer Teaching in Medical Residency

Teaching is a skill that medical residents and physicians are typically expected to possess, but is not generally taught in medical school. Attending physicians have many demands on their time, and have little time to spend with undergraduate medical students (Ten Cate & Durning, 2007a; Wilson, 2007), which increases the demands of teaching on residents' time. Indeed, the bulk of the responsibility for the training of medical students in the clinical setting falls on residents (Wilson, 2007), and a significant portion of residents' clinical time is spent with medical students (Ostapchuk, Patel, Hughes-Miller, Ziegler, Greenberg, & Haynes, 2010).

The importance of high-quality clinical and didactic training at this level is essential for many reasons. Medical students who felt they have had high-quality teaching in a third-year clerkship rate higher satisfaction in their overall clinical rotations (Huynh, Savitski, Kirven, Godwin, & Gil, 2011). In addition, medical students have reported that the quality of resident teaching had an effect on their medical specialty career choice (Musunuru, Lewis, Ridders, & Chen, 2007). Given that residents and medical students are members of one continuous curriculum, however varied, they are often described as peers, according to Ten Cate and Durning (2007b). By this definition, the resident-medical student teaching relationship can be defined as one of near-peer teaching. In a study to determine qualities medical students valued in their resident teachers, three attributes were clearly identified. These teaching skills included: the use of pertinent clinical examples, reiteration of central concepts, and presenting information at the level of the learner (Melvin, Kassam, Burke, Wasi, & Neary, 2014). Teaching physicians and residents should have an understanding of these basic teaching concepts in order to serve as effective instructors for medical students.

Many attending physicians have little formal background in teaching, and therefore, Wilson (2007) argued, have insufficient ability to instruct residents in how to do so. Residents serve a unique role and are a critical link in the education of future physicians (Post et al., 2009), and are viewed by their attending physicians as key teachers for their medical students (Busari, Scherpbier, van der Vleuten, & Essed, 2000). Unfortunately, Brand et al. (2013) reported that many residents did not feel prepared for their role as teachers. With a lack of prior training, coupled with the inability of their

attending physicians to train them in the art of teaching, many residents struggle in a teaching role.

Residency programs and the Liaison Council on Medical Education (LCME), the accrediting body for medical schools in the U.S., recognize the need and challenge in providing appropriate training to incoming residents in preparing them for their vital role as teachers (LCME, 2014). Most residents receive little to no formal instruction in effective clinical teaching techniques (Bensinger et al., 2005). While no standard practice exists in educating residents about teaching, residency programs across the country have developed a range of workshops designed to instruct residents on clinical teaching practices (Ostapchuk et al., 2010; Post et al., 2009). A number of clinical teaching training programs have demonstrated efficacy in improving residents' self-assessed teaching skills, understanding of teaching principles, and enthusiasm for serving as a peer teacher (Grady-Weliky, Chaudron, & DiGiovanni, 2010; Morrison, Rucker, Boker, Gabbert, Hubbell, Hitchcock, & Prislin, 2004). Teaching residents how to serve as peer teachers for medical students has also been shown to increase their motivation to do so (Grady-Weliky et al., 2010), and in one case, the success of the Residents As Teachers program actually improved the culture of the entire institution (Ostapchuk et al., 2010). Despite these successful programs and demonstrated positive outcomes, many residency programs are challenged to find the time and resources to dedicate to peer teacher training.

Benefits of Peer Teaching for Medical Students

Teaching residents to be teachers is beneficial to the medical students who are learning from them as well as to the residents themselves. First, evidence demonstrates

that residents are as effective at teaching undergraduate medical students as attending physicians are (Cooper, Wilson, Huffman, & Humbert, 2012), and may even be better in some ways. One of the benefits of medical students learning from residents rather than attending physicians is a near-peer phenomenon: students may feel more at ease with instructors who are closer to them in education level, less intimidated than with attending physicians, and more willing to ask questions (Ten Cate & Durning, 2007b; Wilson, 2007). In addition, the residents' more recent experiences in undergraduate medical education provide them with a better understanding of the students' level of knowledge and can, therefore, better relate to their educational needs (Ten Cate & Durning, 2007b). This curricular proximity is one of the foundations of peer teaching, often identified as cognitive and social congruence (Gottlieb, Epstein, & Richards, 2016; Lockspeiser, O'Sullivan, Teherani, & Muller, 2008). Cognitive congruence is described as the teacher having the ability to teach students at exactly the right level, in this case stemming from his or her own recent experiences at that same level of understanding. Social congruence works in tandem with cognitive congruence, as the teacher having a recent personal understanding of the specific experiences and challenges of being in the student role (Lockspeiser et al., 2008). All of these factors serve as indicators for the provision of peer-assisted learning. While residents and medical students typically are not viewed as peers, residents' experiences are much more closely linked to those of medical students purely as a factor of time than attending physicians are, thus providing residents with an important, and unique, perspective on the educational needs of medical students.

Benefits of Peer Teaching for Resident Teachers

Teaching residents to teach also benefits the residents themselves in many ways, not only through increasing their motivation to teach, as noted above, but also increasing knowledge and skills associated with medical education, improving self-teaching, strengthening self-esteem, and the development of leadership skills. Of these, the most obvious is the gain in knowledge and skills associated with medical education (Morrison et al., 2004), which is an expected outcome of providing education on any topic. Improving self-teaching naturally follows from learning to teach, and this ability is of particular importance in a field where constant learning is required. Physicians are constantly engaging with the literature and must be adept at self-teaching, and learning to teach others provides a foundation for learning to teach ourselves (Ten Cate & Durning, 2007b). Additionally, teaching frequently improves the self-esteem of the teacher. As described in Role Theory, when someone is put in a position of authority, such as that of a teacher, self-esteem and self-efficacy can be significantly improved. Individuals meet the expectations of the new role and realize greater value in themselves (Ten Cate & Durning, 2007b). Last, and most pertinent to this study: engaging in peer teaching can help peer teachers to develop leadership skills (Micari et al., 2010; Ten Cate & Durning, 2007a; Vira, 2015).

As demonstrated, great value can be obtained for both the resident and the student if the resident is both prepared for the teaching role and embraces it. How can this occur, then, when residency programs are unable to prepare the resident for this vital role? One potential solution is to prepare students for their role as resident teachers prior to residency, during their undergraduate medical education years.

Peer Teaching in Undergraduate Medical Education

Medical students are good candidates for learning teaching skills (Blatt & Greenberg, 2007), and medical education offers a prime environment for this development through peer teaching (often referred to as peer-assisted learning, or PAL). Peer teaching during medical school is a more traditional view of PAL than in residency, as medical students are more closely *peers* than a resident-medical student relationship. Many different forms of peer teaching exist within medical school curricula, including peer tutoring, supplemental instruction (in which students organize and teach additional modules or seminars on various topics to more junior students), small group facilitation (e.g. for case discussion), hands-on clinical skills teaching, team-based learning, and formal course instruction (Yu et al., 2011). Peer assisted learning has been shown to be an effective means of teaching undergraduate medical students in a number of capacities, and has been shown to be consistently as effective as faculty instruction (Hudson & Tonkin, 2008; Robinson, Hazelgrove-Planel, Edwards, & Siassakos, 2010; Silbert & Lake, 2012; Yu et al., 2011). While the junior students' learning experiences have been shown to be as great through PAL as through traditional faculty teaching, these students realize additional benefits through PAL. This teaching methodology offers students the advantage of social and cognitive congruence, providing an opportunity for them to be more comfortable asking questions and engaging with a teacher who has a better understanding of their educational level, experiences, and needs (Lockspeiser et al., 2008; Yu et al., 2011).

In addition to benefitting the junior students, the teaching students involved with PAL achieve numerous benefits as well, similar to those outlined for resident teachers above. Peer-assisted learning has been shown to improve student-teacher learning skills,

develop their ability to better communicate with patients and other providers, and provide feedback to students (Blatt & Greenberg, 2007; Dandavino et al., 2007; Robinson et al., 2010; Silbert & Lake, 2012; Yu et al, 2011). Additionally, the development of leadership skills among the senior students has been identified as one important justification to incorporate peer teaching into medical school (Ten Cate & Durning, 2007a).

Incidental Learning

Informal learning is defined as the learning that takes place in our everyday lives; the unstructured, unorganized learning that occurs during the routine undertakings of our interactions with the world (Merriam & Bierema, 2014). One specific variety of informal learning is known as incidental learning, which is a type of informal learning that occurs outside of the learner's awareness. Incidental learning is described as a secondary outcome of learning one topic, while in the process of actively learning something else (Merriam & Bierema, 2014). This type of learning has been shown to be an effective means by which to learn a range of topics, including leadership skills. One study demonstrated the success of utilizing an incidental learning model as a means of educating pre-med students about leadership skills through a required science, technology, engineering, and mathematics (STEM) peer teaching workshop (Micari et al., 2010). Additionally, preliminary results in another study, conducted by Vira (2015), suggested that leadership skills may be acquired as an incidental learning outcome via medical students' involvement in a Multidisciplinary Ultrasound Leadership Training Initiative (MULTI). This program was designed primarily for advanced medical students to develop ultrasound training sessions to further the ultrasound knowledge base of first- and second-year medical students. In each of these examples, the students were engaged

in peer teaching activities, and via incidental learning, strengthened their leadership practices in addition to augmenting their knowledge and skills about the subject matter at hand.

Summary

As the healthcare environment faces dramatic changes, physicians are increasingly being called on to lead. In this era of dramatic changes in healthcare, when health systems are working toward the Quadruple Aim of healthier populations, better patient care, reduction in costs, and a satisfied health care workforce, physicians stand out as leaders because their level of clinical expertise puts them in a position to both innovate and garner the respect of other clinical providers (Angood & Birk, 2014). The Exceptional Leadership and the Five Practices of Exemplary Leadership models both address the transformational leadership required of physicians in this shifting health care world. As organizations increasingly realize the value of physicians trained as leaders, in addition to extensive clinical training, more burden is placed on UGME institutions to incorporate leadership training into their curricula. With already burgeoning curricular loads, however, these schools could benefit from the utilization of incidental learning devices to instruct students on a range of topics such as leadership skill development.

Peer teaching is a broad classification of teaching and learning methodologies characterized by the use of peers in the roles of both teacher and student. Many varieties of peer teaching exist, based on differences outlined in Topping's typology (1996, 2005). There are many proven benefits of peer teaching, for both the learner and the teacher. For the learning peer, social and cognitive congruence are the key factors which support the use of this modality to enhance learning (Lockspeiser et al., 2008; Yu et al., 2011).

For the teaching peer, many benefits also exist, including an improvement in self-teaching skills, communication skills, providing student feedback, and incidentally, an improvement in leadership skills (Blatt & Greenberg, 2007; Dandavino et al., 2007; Micari et al., 2010; Robinson et al., 2010; Silbert & Lake, 2012; Vira, 2015; Yu et al, 2011).

Peer teaching can be extremely beneficial in the medical education setting, for peer teachers as well as peer students. This study investigated the relationships among participation in UGME peer teaching experiences and self-reported leadership practices during medical residency.

CHAPTER III

METHODOLOGY

This chapter provides a description of the methodology utilized for this study. Sections in this chapter include a restatement of the purpose, research design, instrumentation, participants, data collection, data analysis, and a chapter summary. This research investigated the potential of peer teaching experiences to serve as incidental learning devices for leadership skill development.

Restatement of the Purpose

The purpose of this study was to explore the relationships among peer teaching experiences during undergraduate medical education (UGME) and self-reported leadership practices in medical residency. The following research questions were addressed:

1. For medical residents in the study group, are there significant correlations among the Leadership Practices Inventory subscale scores?
2. When groups of medical residents are established by quantity of hours of various peer teaching types (tutoring, supplemental instruction leader, small group facilitation, clinical skills teaching, and overall peer teaching experiences), are there significant differences among the groups based on the Leadership Practices Inventory subscales?
3. When groups of medical residents are established by residency and demographic characteristics (year and type of residency program, location of medical school training, gender, race, ethnicity, and age), are there significant differences among the groups based on the Leadership Practices Inventory subscales?

This chapter is divided into six sections and provides details regarding the methodology employed in this study. These sections include a description of the study design, a description of the three-part survey instrument, an account of study participants, data collection, data analysis, and a concluding methods summary.

Research Design

This study utilized descriptive correlational procedures to study relationships, and multivariate analysis of variance (MANOVA) techniques to examine differences among groups in the study population. In quantitative research, statistics are used to analyze numerical data to address research questions (Lunenburg & Irby, 2008). A descriptive study illustrates a phenomenon without imposing changes on an environment or situation, and does not investigate cause and effect relationships. Descriptive statistics are a variety of indicators used to illustrate or describe characteristics of the population being studied.

There are four common types of descriptive statistics utilized in educational research (Lunenburg & Irby, 2008). First, measures of central tendency include mean, median, and mode, which describe the middle or average scores or traits of a population or sample. Second, measures of variability highlight the breadth of scores and how far scores fall from the mean. These include standard deviation and range. Next, measures of relative position describe how one data point or individual score relates to all other data points in the population or sample. Typical measures of relative position include percentile ranks and standardized scores, such as z scores, which describe a data point in terms of distance from the mean of the group. Last are measures of relationship, or correlation, which are used to examine the strength of association between two variables (Nie et al., 1975).

Measures of central tendency and measures of relationship were utilized to illustrate characteristics of the study participants. Measures of central tendency were computed utilizing mean scores; measures of relationship were calculated utilizing Pearson's correlation. Descriptive statistics are valuable for illustrating features of the group being studied.

Inferential statistics are used to compare groups. There are many types of inferential statistics; each provides a statistical test of significance (Lunenburg & Irby, 2008). One common type of inferential statistics involves comparing two groups based on their means. The most basic method of comparing means is the t-test, which compares two groups based on one variable (Green & Salkind, 2005).

For more complex research involving multiple variables, multivariate analysis of variance (MANOVA) is an efficient method of analysis to determine differences among all groups, rather than conducting multiple individual t-tests (Lunenburg & Irby, 2008). The MANOVA was utilized in this study to investigate possible differences among groups. The variables considered in this study included residency and demographic characteristics, peer teaching experiences, and scores on the Leadership Practices Inventory (Kouzes & Posner, 2013). The MANOVA is the appropriate statistical analysis when examining relationships between two or more dependent variables (Lunenburg & Irby, 2008; Mertler & Vannatta, 2013). If a significance was found in a main effect from the MANOVA test, then appropriate analysis of variances (ANOVAs) were utilized to identify specific differences. The ANOVA can be employed when comparing three or more group means with one dependent variable (Mertler & Vannatta, 2013). In cases when significant ANOVAs were found, then appropriate post hoc

analyses were computed to determine where specific differences existed. In the case of two groups, inspection of the data determined significance. If there were three or more groups, Tukey post-hoc tests were computed.

To summarize, this study examined descriptive statistics, including correlation, to illustrate characteristics of the study participants. MANOVA tests were used to determine differences among groups, with post hoc ANOVAs used to determine specifically where significant differences existed among groups. Groups were established using select independent variables.

Instrumentation

The survey instrument utilized in this study was comprised of three parts. These were: an open-ended question about leadership, a widely-used leadership skills assessment tool known as the Leadership Practices Inventory (LPI), and questions related to residency and demographic characteristics and peer teaching. The complete study instrument can be found in Appendix A.

Open-ended Question

The first component of the survey instrument that participants encountered was one open-ended question. The open-ended question was posed prior to the LPI on the survey instrument, and read: *“Please briefly describe the ideal leader of a medical team.”* The open-ended question was posed on a separate page prior to the LPI in an attempt to gain responses uninfluenced by the other questions and content in the LPI. This question was designed to enhance the study with a qualitative component.

Leadership Practices Inventory

The Leadership Practices Inventory (LPI) was the main component of the survey instrument utilized in this study. This widely-disseminated tool was developed by James Kouzes and Barry Posner (2002b), authors of the *Leadership Challenge*, to inform people about their own leadership styles and abilities. To date, more than three million people have utilized this instrument to gain clarity into their own leadership style, and the instrument continues to be utilized worldwide and among people from all disciplines (Kouzes & Posner, 2002b). This tool can be employed online via the Leadership Practices website, but for the purposes of this research, it was distributed to medical residents via paper copy. The LPI instrument utilized for this research study was the original, the LPI-Self, in which individuals self-reflect on their leadership practices. This version will be referred to throughout this document as simply the LPI.

The subscales of the LPI are the Five Practices of Exemplary Leadership: Model the Way, Inspire a Shared Vision, Challenge the Process, Enable Others to Act, and Encourage the Heart (Kouzes & Posner, 2002a). Each of these subscales are represented in the LPI through six items, delineated in Table 1.

Table 1. *Item Numbers Associated with Each LPI Subscale*

| LPI Subscale | Item Numbers |
|-------------------------|-----------------------|
| Model the Way | 1, 6, 11, 16, 21, 26 |
| Inspire a Shared Vision | 2, 7, 12, 17, 22, 27 |
| Challenge the Process | 3, 8, 13, 18, 23, 28 |
| Enable Others to Act | 4, 9, 14, 19, 24, 29 |
| Encourage the Heart | 5, 10, 15, 20, 25, 30 |

Participants were asked to score themselves one through ten on each of the above items in the LPI. After totaling these items for the subscale scores, each subscale has a possible range of six through sixty, providing interval data for analysis.

Scoring of the LPI. The LPI contains 30 items, each is associated with one of the five leadership practices. Each item requires respondents to rate how frequently they engage in the particular behavior on a ten-point Likert scale of one, indicating a response of *almost never*, to a score of ten, indicating *almost always*. As noted above, each of the five subscales is represented by six questions, each rated on a ten-point scale. Therefore, each subscale has a potential total scoring range of 6-60.

To provide a more representative report of the individual's characteristic leadership practices, the instructions provided with the LPI encourage users to be honest and realistic when scoring themselves. This includes responding to each item in consideration of their typical behavior rather than focusing on specific situations or occasions.

Model the way. This subscale describes the respondent's tendency to lead from personal values and beliefs, and to act as a role model consistent with these values and beliefs (Kouzes & Posner, 2002a). The LPI evaluates a person's strengths in this area with six items. These questions ask respondents to assess how commonly they exhibit the following behaviors: setting a personal example of expectations; ensuring others are adhering to agreed-upon standards; following through on commitments; requesting feedback on how personal actions affect those around them; building consensus around common values; and expressing clarity around personal philosophy of leadership (Kouzes & Posner, 2013).

Inspire a shared vision. Inspiring a Shared Vision attempts to describe the respondent's perception of their ability to gain support of others in working toward common goals (Kouzes & Posner, 2002a). In this area, respondents are asked to report

how commonly they exhibit the following behaviors: discussing future trends affecting activities and describing an exciting future; appealing to others to work toward common goals for the future; continually illustrating positive images of those goals; and speaking about the higher meaning and value of the organization's effort (Kouzes & Posner, 2013).

Challenge the process. This subscale describes the respondent's tendency for risk-taking, developing innovative practices, and initiating change (Kouzes & Posner, 2002a). In order to assess their ability to Challenge the Process, respondents are asked to rate how regularly they demonstrate the following behaviors: seeking out challenging opportunities; challenging people to try new things; pursuing innovative ways to improve; taking risks; seeking learning opportunities in response to failures; and consistently establishing realistic goals and quantifiable milestones for their work (Kouzes & Posner, 2013).

Enable others to act. The Enable Others to Act subscale assesses the respondent's perception of their ability to build successful teams and promote collaboration among team members. This involves relinquishing power to appropriate team members and developing a culture of respect within the group (Kouzes & Posner, 2002a). The LPI measures ability in this area by asking respondents to evaluate how frequently they display the following behaviors: developing collaborative partnerships; actively listening to different viewpoints; treating others with respect and support their ability to make decisions; providing people and collaborative partners with autonomy in decision-making; and consistently encouraging team members' professional growth (Kouzes and Posner, 2013).

Encourage the heart. This last subscale considers the respondent's inclination to acknowledge the efforts of people and teams, and to provide heart-felt recognition and gratitude whenever possible (Kouzes & Posner, 2002a). Assessment of Encourage the Heart is based on questions regarding the frequency of the following behaviors: commending people for good work; ensuring people are publicly rewarded and in creative ways; going out of their way to ensure accomplishments are celebrated; and consistently being a source of praise and appreciation to all team members for their efforts in working toward shared goals (Kouzes and Posner, 2013).

Reliability of the LPI. The LPI was developed over many years through a triangulation process utilizing both qualitative and quantitative methodologies. Kouzes and Posner's research began in the early 1980's with case studies and extensive interviews examining people's greatest leadership moments and achievements (Posner, 2015). Based on this qualitative research, a lengthy survey, known as the Personal-Best Leadership Experience questionnaire, was designed. The five leadership practices were drawn from the results of this long survey. The items in the LPI were developed based on behaviors descriptive of each of the leadership practices: Model the Way, Inspire a Shared Vision, Challenge the Process, Enable Others to Act, and Encourage the Heart. From the earliest model of the LPI instrument, the five leadership practices have remained consistent (Kouzes & Posner, 2000).

The internal reliability of an instrument is defined as its ability to provide consistent results (Lunenburg & Irby, 2008), and is measured by Cronbach's alpha reliability coefficient (Aiken, 1997). An instrument with a Cronbach's alpha score over .60 is considered consistent and reliable, and higher scores indicate increasing reliability

(Aiken, 1997). The LPI survey instrument has demonstrated strong reliability through many studies over time. For each of the subscales, the published LPI reliability coefficients range from .75 to .93, indicating very strong instrument reliability (Kouzes & Posner, 2000). These coefficients are based on studies from a broad range of professions, including management, engineering, telecommunications, education, and healthcare (Kouzes & Posner, 2000). Numerous researchers have demonstrated reliability of the LPI as well. Strack (2001) reported LPI reliability coefficients ranging from .73 to .90 in a study of healthcare managers, and Clavelle, Drenkard, Tullai-McGuinness, and Fitzpatrick (2012) found internal reliability coefficients of .66 to .87 for chief nursing officers. Posner (2015) summarized the results of more than 50 studies and reported internal reliability coefficients ranging from .61 to .97.

Validity of the LPI. Face validity reflects the extent to which an instrument appears to measure what it claims to measure (Lunenburg & Irby, 2008). Face validity assesses whether the questions on the subscales appear to assess the corresponding leadership practices. Kouzes and Posner (2000) and other researchers have investigated the face validity of the LPI thoroughly, through both qualitative and quantitative means. Participants at LPI workshops consistently associate their personal-best leadership experiences with the five practices, indicating face validity of the instrument (Kouzes & Posner, 2000).

Construct validity is an indication of the degree to which an instrument actually measures what it claims to measure. Researchers have employed factor analysis and multiple regression in numerous studies which unfailingly support the construct validity of the instrument (Adcock-Shantz, 2011; Kouzes & Posner, 2000). That is, the factor

analysis of the data from the LPI consistently produces five factors which mathematically support the subscale structure of the instrument. Additionally, studies have demonstrated alignment of results from the LPI with other measures of leadership, which support the validity of the LPI. In these studies, the LPI has consistently provided indicators of face validity and construct validity (Kouzes & Posner, 2000; Posner, 2015).

Residency and Demographic Characteristics, and Peer Teaching Component

The final component of the survey instrument was a series of questions to address pertinent residency and demographic characteristics, as well as peer teaching experience information. Residency and demographic questions included current year of residency, location of UGME (inside or outside U.S.), residency specialty type (emergency medicine, family medicine, internal medicine, obstetrics/gynecology, pediatrics, psychiatry, and surgery), age, gender (female, male, other), race (American Indian/Alaska Native, Asian, Black/African American, Caucasian, Native Hawaiian/Pacific Islander, and Two or more races), and ethnicity (Hispanic/Latino or not Hispanic/Latino). In addition to the residency and demographic characteristics, four questions were posed to determine the types and amount of peer teaching experiences residents participated in during medical school. These included tutoring, supplemental instruction (SI), small group facilitation, and clinical skills teaching. Each of these peer teaching questions was posed as a five-point Likert scale with the following categories: None, 1-10 hours, 11-25 hours, 26-50 hours, and 50+ hours. One last question pertained to resident's overall peer teaching experience during medical school, and provided only two possible responses: None/little or a great deal. For this study, residency and demographic characteristics and

peer teaching types were used as the independent variables to determine groups for data analysis.

Participants

At the time of the study, there were 395 residents enrolled in the university graduate medical education (GME) program under study. These medical residents were enrolled in one of seven medical specialties. While convenience sampling (i.e. all of the participants are medical residents at one institution) was applied, two conditions existed that helped to ensure diversity within the study group. First, the nature of seven residency specialties (emergency medicine, family medicine, internal medicine, obstetrics/gynecology, pediatrics, psychiatry, and surgery) provided a diversity of types of medical practices.

The second condition to ensure diversity of the sample was that prior to graduation from their undergraduate medical education (UGME) institution, all medical students apply for residency programs all over the country. Typically, only a handful of students remain at their UGME institution, or medical school, for residency; therefore, the vast majority of study participants were residents who received their medical education at different universities. In addition, medical residents were accepted from medical schools outside the United States (U.S.). Thus, the participants of this study were from medical schools around the U.S. and other countries, which provided a rich and diverse sample from various UGME programs as well as residency specialty experiences.

Paper copies of the survey instrument were delivered to a designated staff member of each residency program in the medical school. Due to an agreement with the Wiley Company, owner of the Leadership Practices Inventory, this study could only be

conducted on paper copies. These individuals were asked to distribute and collect the surveys during a weekly didactic session. Residency programs have one weekly meeting when most residents come together to learn about a specific topic. These weekly meetings are required of all program residents who are on-site and available that particular day.

Data Collection

The LPI is a proprietary tool of the Wiley Company, which allows investigators to utilize the instrument for research purposes after being granted permission. Application was made, and approval received from the Wiley Company to utilize the LPI in this research study. See Appendix B for the permission letter from the Wiley Company.

In addition to obtaining permission to utilize the LPI in this research study, approval for this research was also requested from the University School of Medicine Office of Graduate Medical Education (GME), which oversees medical resident training. This research study was presented to the Associate Dean of GME, who was in support of the project being conducted and invited the researcher to present the research opportunity to the residency program directors. During two GME staff meetings, program directors offered undisputed support for the research study to take place. The Office of GME also provided contact information for the residency program directors and their coordinators, as well as current numbers of residents in each specialty area.

Finally, approval was obtained from the University of Nevada, Reno (UNR) Institutional Review Board (IRB) through the Research Integrity Office (RIO). The request was made to conduct this study as *Exempt* research. This research met the definition of Exempt research as it was survey-based research that did not record any

identifying information about participants. This research placed exceptionally low risk on participants' well-being in any sense, and offered far more benefit, particularly if participants chose to request their leadership practices scores. Appendix C contains the IRB approval letter.

To collect data, the investigator or a residency program designee presented the survey to residents in each of the residency programs during a weekly scheduled meeting. The Wiley Company required paper method of survey administration as part of the research agreement in place. A script was read which included the purpose of the study, a description of the instrument, notification of the voluntary nature of the study, and the potential risks and benefits of the study (see Appendix D). Participants were given an Information Sheet which provided additional information about the research (see Appendix E). In this document, participants were notified that consent was presumed based on completion of the survey instrument. While the script was being read, paper copies of the survey were distributed to all residents. The survey took approximately 15 minutes to complete. Program staff were instructed to either mail the surveys back in the self-addressed, stamped mailing envelope that was enclosed with the surveys, or the surveys were picked up in person. Upon receipt of all responses, data were manually entered into an Excel spreadsheet, and subsequently examined and reviewed for accuracy and to account for missing values.

The intent of this study was to collect data anonymously. No personal identifiers were collected as part of the survey. There was one exception to collecting the data anonymously, however. If a resident opted to receive notification of his or her leadership practices scores, he or she had the option to provide an email address at the end of the

survey. If participants requested their scores by providing an email address, the investigator informed participants of their scores via email. The participants' email addresses were not transferred to the Excel spreadsheet with the rest of the data. Email addresses were only kept on the hard copy of the completed survey, which was removed and shredded after accuracy of the data transfer to the Excel spreadsheet was confirmed, and after each resident requesting his or her scores was contacted with the results. Program directors were notified that they had the option to request aggregate scores specific to their residency program. Individual LPI scores were not released to the Office of GME or to program directors; likewise, demographic data and results from the open-ended qualitative response question were not shared.

Data Analysis

Upon completion of data collection from all residency programs, all data except email addresses, if provided, were manually entered into an Excel spreadsheet. Quantitative data were recorded on one spreadsheet and qualitative data were transcribed to another Excel spreadsheet. Survey responses from the open-ended question were first grouped based on the LPI subscales. A second analysis was conducted by grouping common words, ideas, or themes. For each of these analyses, common themes or topics were reported by strength based on the number of times each was mentioned. Qualitative analysis occurred prior to quantitative data analysis to reduce investigator bias in assigning theme areas.

Independent variables included all residency and demographic characteristics and peer teaching experiences. Residency and demographic characteristic variables included current year of residency, location of medical school (inside or outside U.S.), residency

specialty type (emergency medicine, family medicine, internal medicine, obstetrics/gynecology, pediatrics, psychiatry, and surgery), age, race, ethnicity, and gender. Peer teaching experiences included tutoring, supplemental instruction (SI), small group facilitation, clinical skills teaching, and overall peer teaching experience.

Dependent variables were the summed individual scores for the five subscales of the Leadership Practices Inventory: Model the Way, Inspire a Shared Vision, Challenge the Process, Enable Others to Act, and Encourage the Heart.

Quantitative survey data were analyzed using IBM Statistical Package for Social Sciences (SPSS) software version 24. In addition to the residency and demographic characteristics and peer teaching variables, total subscale scores were created by summing participant's responses for the items related to each of the LPI subscales. Data were screened for accuracy of data entry, missing data, and outliers. For accuracy, a visual inspection of the data was conducted and corrections were made accordingly. One data point was found to have been incorrectly entered, so it was adjusted to the correct value.

Missing values were adjusted in two ways. For nominal data (age, gender, race, medical school, residency year and program, and the teaching variables of tutoring, supplemental instruction, small group facilitation, and clinical skills teaching), the most common or mean response was calculated and used to replace the missing value. Two exceptions to this were the overall peer teaching experience variable and the ethnicity variable. Because these two variables had a great deal of missing values (18 and 15, respectively), the data were analyzed without replacing missing values. The other

nominal variables had between zero and five missing values, which were replaced as noted.

For the items on the Leadership Practices Inventory, the rounded mean score was calculated and inserted to replace missing values. This method was suggested by Mertler and Vannatta (2013) as somewhat conservative, yet an effective means by which to estimate missing values while maintaining sample size.

To determine outliers, box plots were initially analyzed for each MANOVA analysis. When outliers were identified, data were examined to determine whether the outlier was due to an error in data entry. If so, the data were corrected and data analysis proceeded. If the data appeared to have been entered correctly and the case represented an individual score that was radically different from the other cases, the decision was made to include all outliers in the analysis. Because the Leadership Practices Inventory was constructed with a ten-point Likert scale, scores between 6-60 for each LPI subscale are potential and reasonable. Therefore, all values within this range were left in the data set and subsequent data analysis.

Basic descriptive statistics were calculated for each of the variables. These variables included age, race, ethnicity, gender, current year of residency, location of medical school (inside or outside U.S.), and residency specialty type. The residency specialty variable considered seven residency specialties: emergency medicine, family medicine, internal medicine, obstetrics/gynecology, pediatrics, psychiatry, and surgery. The amount of peer teaching experience included measures related to tutoring, supplemental instruction (SI), small group facilitation, clinical skills teaching, and an

overall peer teaching experience variable. Because these variables are nominal, the primary descriptive statistic was frequencies.

A Cronbach's Alpha reliability coefficient was computed for each of the subscales to establish the reliability of the LPI for the study group. Cronbach's Alpha was computed for each subscale and for the total instrument. These obtained values were compared to the reliability values published by the developers.

Research Question 1

This research question states: *For medical residents in the study group, are there significant correlations among the Leadership Practices Inventory subscale scores?* Subsequent to the initial descriptive statistical analysis, Pearson's r correlations were conducted to determine and describe relationships among the study variables.

Research Questions 2 and 3

Following data screening and correlation testing, a series of multivariate analysis of variance (MANOVA) tests were conducted to identify possible differences among groups to address questions 2 and 3. This statistical operation allows comparison of mean differences among groups on a combination of dependent variables (Mertler & Vannatta, 2013). For these calculations, normality was assumed, as MANOVA is robust to violations of the assumptions of normality.

Figure 1 provides a description of the analysis for Question 2: *When groups of medical residents are established by quantity of hours of various peer teaching types (tutoring, supplemental instruction leader, small group facilitation, clinical skills teaching, and overall peer teaching experience), are there significant differences among the groups based on the Leadership Practices Inventory subscales?*

Figure 1. Sub-questions, Levels, and Labels for Teaching Experience Variables

| Question 2 Sub-questions | Levels | Labels |
|---|---------------|---|
| Question 2a. Are there significant differences among groups of medical residents established by <i>Tutoring Experience</i> based on the five subscales of the LPI? | 5 Levels | None 1-10 hours 11-25 hours 26-50 hours 50+ hours |
| Question 2b. Are there significant differences among groups of medical residents established by <i>Supplemental Instruction Experience</i> based on the five subscales of the LPI? | 5 Levels | None 1-10 hours 11-25 hours 26-50 hours 50+ hours |
| Question 2c. Are there significant differences among groups of medical residents established by <i>Small Group Facilitation Experience</i> based on the five subscales of the LPI? | 5 Levels | None 1-10 hours 11-25 hours 26-50 hours 50+ hours |
| Question 2d. Are there significant differences among groups of medical residents established by <i>Clinical Skills Teaching Experience</i> based on the five subscales of the LPI? | 5 Levels | None 1-10 hours 11-25 hours 26-50 hours 50+ hours |
| Question 2e. Are there significant differences among groups of medical residents based on an overall peer teaching experience variable? | 2 Levels | None/little A great deal |

Figure 2 provides a description of the analysis for Question 3: *When groups of medical residents are established by residency and demographic characteristics (year and type of residency program, location of medical school training, gender, race/ethnicity, and age), are there significant differences among the groups based on the Leadership Practices Inventory subscales?*

Figure 2. Sub-questions, Groups, and Labels for Demographics and Residency

Program Variables

| Question 3 Sub-questions | Groups | Labels |
|--|---------------|--|
| Question 3a. Are there significant differences between groups of medical residents established by <i>Location of Medical School</i> based on the five subscales of the LPI? | 2 Groups | U.S. Outside U.S. |
| Question 3b. Are there significant differences among groups of medical residents established by <i>Age</i> based on the five subscales of the LPI? | 3 Groups | 28 or younger 29-33 34 or older |
| Question 3c. Are there significant differences among groups of medical residents established by <i>Gender</i> based on the five subscales of the LPI? | 3 Groups | Female Male Other |
| Question 3d. Are there significant differences among groups of medical residents established by <i>Race</i> based on the five subscales of the LPI? | 6 Groups | AI/AN Asian B/AA Caucasian H/PI Two or more races |
| Question 3e. Are there significant differences among groups of medical residents established by <i>Ethnicity</i> based on the five subscales of the LPI? | 2 Groups | Hispanic/Latino Not Hispanic/Latino |
| Question 3f. Are there significant differences among groups of medical residents established by <i>Year of Residency</i> based on the five subscales of the LPI? | 5 Groups | 1 2 3 4 5+ |
| Question 3g. Are there significant differences among groups of medical residents established by <i>Residency Specialty</i> based on the five subscales of the LPI? | 7 Groups | Emergency Medicine Family Medicine Internal Medicine Obstetrics/Gynecology Pediatrics Psychiatry Surgery |

If any group size was disproportionately small, groups were combined. If significance for a main effect was obtained from an overall MANOVA test, then appropriate follow-up post hoc analyses were conducted. For post hoc tests comparing just two groups, t-tests were utilized to identify differences. Inspection of the means were utilized to determine the direction of any significance. If more than two groups were to be

compared in a post hoc test, one-way ANOVA tests were conducted. If significant ANOVAs were found, then Tukey HSD was utilized. For this study, significance level was set at $\alpha \leq .05$ ($p \leq .05$).

Summary

In summary, this study examined differences in the Leadership Practices Inventory subscales (Kouzes & Posner, 2013) among groups of medical residents based on specific residency and demographic characteristics and various types of peer teaching experience. Descriptive statistics and correlations were computed via SPSS statistical software. Subsequent MANOVAs were conducted to determine whether differences existed among groups. If significance was determined for a main effect in the MANOVA, follow-up ANOVA were utilized to identify specific differences. As appropriate, additional post hoc analysis was conducted. Responses from the single open-ended question were analyzed for themes in two distinct ways; these data add nuance to the quantitative correlation and MANOVA results.

CHAPTER IV

RESULTS AND FINDINGS

The purpose of this study was to examine relationships among peer teaching experiences during undergraduate medical education (UGME) and self-reported leadership practices for selected students in medical residency. The study utilized a survey administered to medical residents at one western United States (U.S.) medical school. The survey included: one open-ended question, the Leadership Practices Inventory (a leadership skills self-assessment instrument), several questions about residency program and personal demographics, and UGME peer teaching experiences. This chapter provides a summary of the findings and is divided into four sections. The first section describes the process of data collection and cleaning, outlining how missing data were handled, and a summary of descriptive data. The second section provides a summary of the statistical analysis results for each question, and the third section provides a summary of the qualitative analysis of the open-ended question.

Study Data

A total of 144 surveys were completed. Of these 144 completed surveys, one case was discarded due to incomplete responses; the respondent completed only the demographics questions, and none of the Leadership Practices Inventory questions. As a result, data from 143 surveys were analyzed.

Data were examined for accuracy and reviewed for missing data. During this initial review, one of the LPI question values was noted to be outside the bounds of the 1-10 scale. The paper copy was referenced, and the questionable value was noted to be a data entry error. This value was corrected. All other data were noted to be accurate.

A total of 65 missing values were found in the 143 cases. Of these, 36 missing values were among the peer teaching experience variables (18 of these were in the overall peer teaching variable alone), and 21 were among the demographics category (15 of these were in the ethnicity variable alone). The remaining eight missing values were from the LPI questions. Missing values were adjusted in two ways. For nominal data (age, gender, race, ethnicity, medical school, residency year and program, and the teaching variables of tutoring, supplemental instruction, small group facilitation, and clinical skills teaching), the most common response was calculated and used to replace the missing value. For ratio scale data (Leadership Practices Inventory [LPI] scores), the rounded mean score was used to replace missing values. With these methods, all 65 missing values were replaced. With all values in place, new variables were created to represent each of the five subscales of the LPI. Each subscale (Model the Way, Inspire a Shared Vision, Challenge the Process, Enable Others to Act, and Encourage the Heart) is comprised of the total scores from six questions. Each subscale has a possible range of 6 to 60. The subscale scores were computed in Excel by summing appropriate items for each. Demographic, residency program, and peer teaching experience variables were summed and are described here.

Age

For the age variable, a frequency distribution was computed. Of the total 143 respondents, 50% were ages 29-33 (n=71), 34% were 28 or younger (n=49), and 16% were 34 years or older (n=23). The frequencies are summarized in Table 2.

Table 2. *Distribution of Results for Age Variable*

| Variable | Group | N | % |
|-----------------|---------------|----------|----------|
| Age | 28 or younger | 49 | 34 |
| | 29-33 | 71 | 50 |
| | 34 or older | 23 | 16 |
| | Total | 143 | |

Gender

For the gender variable, a frequency distribution was computed. Of the total 143 respondents, 55% of residents were male (n=79), and 45% were female (n=64). A third option on the survey, other, received no responses so was not included in the analysis.

The frequencies are summarized in Table 3.

Table 3. *Distribution of Results for Gender Variable*

| Variable | Group | N | % |
|-----------------|--------------|----------|----------|
| Gender | Female | 64 | 45 |
| | Male | 79 | 55 |
| | Other | 0 | |
| | Total | 143 | |

Race

For the race variable, a frequency distribution was computed. Of the six race categories, 46% of residents reported Caucasian (n=66), 43% reported Asian (n=62), and there was little representation from other groups. Just 6% (n=9) of residents indicated two or more races, 3% (n=4) indicated Black/African American (B/AA), 1% (n=2) indicated American Indian/Alaska Native (AI/AN), and no respondents (n=0) indicated Native Hawaiian/Pacific Islander (HPI). The frequencies are summarized in Table 4.

Table 4. *Distribution of Results for Race Variable*

| Variable | Group | N | % |
|-----------------|----------------------------------|----------|----------|
| Race | American Indian/Alaska Native | 2 | 1 |
| | Asian | 62 | 43 |
| | Black/African American | 4 | 3 |
| | Caucasian | 66 | 46 |
| | Native Hawaiian/Pacific Islander | 0 | 0 |
| | Two or more races | 9 | 6 |
| | Total | 143 | |

Ethnicity

For the ethnicity variable, a frequency distribution was computed. Of the total 143 respondents, 82% noted Non-Hispanic/Latino (n=117), while just 8% indicated Hispanic/Latino ethnicity (n=12). This question was the second most commonly skipped question, with 10% missing values (n=15). The frequencies are summarized in Table 5.

Table 5. *Distribution of Results for Ethnicity Variable*

| Variable | Group | N | % |
|-----------------|---------------------|----------|----------|
| Ethnicity | Hispanic/Latino | 12 | 8 |
| | Non-Hispanic/Latino | 117 | 82 |
| | Missing Values | 15 | 10 |
| | Total | 143 | |

Medical School Location

For the medical school location variable, a frequency distribution was computed. Medical school location was more evenly distributed than some other variables. Of the 143 respondents, 59% reported having been to a U.S.-based medical school (n=85), while 41% reported their medical school training was abroad, commonly referred to as international medical graduates, or IMG (n=58). The frequencies are summarized in Table 6.

Table 6. *Distribution of Results for Medical School Location Variable*

| Variable | Group | N | % |
|-----------------|------------------|----------|----------|
| Medical School | U.S.-based | 85 | 59 |
| | Outside the U.S. | 58 | 41 |
| | Total | 143 | |

Residency Program Year

For the residency program year variable, a frequency distribution was computed. Residency year was evenly distributed for the first three years. Thirty-four percent reported being in the first year (n=49), 30% in the second year (n=43), and 26% in the third year (n=37). Just 5% of residents reported being in the fourth or fifth year (n=7 respondents each). The frequencies are summarized in Table 7.

Table 7. *Distribution of Results for Residency Program Year Variable*

| Variable | Group | N | % |
|-----------------|--------------|----------|----------|
| Residency Year | 1 | 49 | 34 |
| | 2 | 43 | 30 |
| | 3 | 37 | 26 |
| | 4 | 7 | 5 |
| | 5 or more | 7 | 5 |
| | Total | 143 | |

Residency Program Type

For the residency program variable, a frequency distribution was computed. A range of residency programs was represented. Thirty-eight percent of respondents were from Internal Medicine programs (n=54), 20% were Surgery (n=29), 12% were Family Medicine (n=17), 10% were Psychiatry (n=15), 8% were Emergency Medicine (n=12), 8% were Pediatrics (n=12), and just 3% were Obstetrics/Gynecology (n=4). The frequencies are summarized in Table 8.

Table 8. *Distribution of Results for Residency Program Variable*

| Variable | Group | N | % |
|-------------------|-----------------------|----------|----------|
| Residency Program | Emergency Medicine | 12 | 8 |
| | Family Medicine | 17 | 12 |
| | Internal Medicine | 54 | 38 |
| | Obstetrics/Gynecology | 4 | 3 |
| | Pediatrics | 12 | 8 |
| | Psychiatry | 15 | 10 |
| | Surgery | 29 | 20 |
| | Total | 143 | |

Tutoring

Four of the teaching experience questions were based on the same Likert scale of No Experience, 1-10 hours, 11-25 hours, 26-50 hours, and 51 or more hours. For the tutoring variable, a frequency distribution was computed. For the tutoring variable, 37% of respondents indicated 1-10 hours (n=53), 23% indicated no experience (n=33), 22% noted 11-25 hours (n=32), 9% indicated 26-50 hours (n=13), and 8% responded 51 or more hours (n=12). The frequencies are summarized in Table 9.

Table 9. *Distribution of Results for Tutoring Variable*

| Variable | Levels | N | % |
|-----------------|------------------|----------|----------|
| Tutoring | None | 33 | 23 |
| | 1-10 hours | 53 | 37 |
| | 11-25 hours | 32 | 22 |
| | 26-50 hours | 13 | 9 |
| | 51 or more hours | 12 | 8 |
| | Total | 143 | |

Supplemental Instruction

For the supplemental instruction variable, a frequency distribution was computed. The supplemental instruction variable had a similar number of responses as tutoring. Of the 143 respondents, 43% indicated 1-10 hours (n=62), 26% indicated no experience

(n=37), 18% noted 11-25 hours (n=25), 8% indicated 26-50 hours (n=11), and 6% noted 51 or more hours (n=8). The frequencies are summarized in Table 10.

Table 10. *Distribution of Results for Supplemental Instruction Variable*

| Variable | Levels | N | % |
|--------------------------|------------------|----------|----------|
| Supplemental Instruction | None | 37 | 26 |
| | 1-10 hours | 62 | 43 |
| | 11-25 hours | 25 | 18 |
| | 26-50 hours | 11 | 8 |
| | 51 or more hours | 8 | 6 |
| | Total | 143 | |

Small Group Facilitation

For the small group facilitation variable, a frequency distribution was computed. Small Group Facilitation also demonstrated a similar response pattern. Of the 143 respondents, 41% indicated 1-10 hours (n=58), 23% indicated 11-25 hours (n=33), 20% reported no experience (n=28), 11% indicated 26-50 hours (n=15), and 6% reported 51 or more hours (n=9). The frequencies are summarized in Table 11.

Table 11. *Distribution of Results for Small Group Facilitation Variable*

| Variable | Levels | N | % |
|--------------------------|------------------|----------|----------|
| Small Group Facilitation | None | 28 | 20 |
| | 1-10 hours | 58 | 41 |
| | 11-25 hours | 33 | 23 |
| | 26-50 hours | 15 | 11 |
| | 51 or more hours | 9 | 6 |
| | Total | 143 | |

Clinical Skills Teaching

For the clinical skills teaching variable, a frequency distribution was computed. The clinical skills teaching variable demonstrated a similar pattern as the other peer teaching experience variables, with 40% reporting 1-10 hours (n=57), 28% indicating 11-25 hours (n=40), 12% reporting 51 or more hours (n=17), 11% indicating no experience

(n=16), and just 9% of respondents reporting 26-50 hours (n=13). The frequencies are summarized in Table 12.

Table 12. *Distribution of Results for Clinical Skills Teaching Variable*

| Variable | Levels | N | % |
|--------------------------|------------------|----------|----------|
| Clinical Skills Teaching | None | 16 | 11 |
| | 1-10 hours | 57 | 40 |
| | 11-25 hours | 40 | 28 |
| | 26-50 hours | 13 | 9 |
| | 51 or more hours | 17 | 12 |
| | Total | 143 | |

Overall Peer Teaching Experience

For the overall peer teaching experience variable, a frequency distribution was computed. This last variable represented respondents' overall peer teaching experience during medical school. Only two choices were available for this survey question: none/little or a great deal. Of 126 responses, 54%, indicated none/little (n=68), while 46% indicated a great deal (n=58). It is important to note that this question was the most commonly skipped question on the survey, with 18 missing values. Missing values were not replaced for this variable because it only has two levels. The frequencies are summarized in Table 13.

Table 13. *Distribution of Results for Overall Peer Teaching Experience Variable*

| Variable | Levels | N | % |
|-----------------------|---------------|----------|----------|
| Overall Peer Teaching | None/Little | 68 | 54 |
| | A great deal | 58 | 46 |
| | Total | 126 | |

Reliability Coefficients

Cronbach's Alpha reliability coefficients have been published for each subscale of the LPI, indicating the level of internal reliability. Kouzes and Posner (2000) reported consistently high internal reliability, based on Cronbach's Alpha, for each of the five

subscales of the LPI. Kouzes and Posner (2000) noted consistent reliability coefficients of .75 or greater for each of the five subscales. This study also utilized Cronbach's Alpha to examine internal reliability of the LPI, specific to this study population. All but two of the subscales achieved an internal reliability score of greater than .75. Inspire a Shared Vision was .83, Challenge the Process was .80, and Encourage the Heart was .84. The internal reliability score for Model the Way was .67 and .71 for Enable Others to Act. All of these values are considered consistent and reliable (Aiken, 1997). A comparison of these results to Kouzes and Posner's reported LPI reliability scores is displayed in Table 14.

Table 14. *Comparison of Internal Reliability Coefficients (Cronbach's α) for Each of the Five LPI Subscales*

| LPI Subscale | National Population ^a | Study Sample |
|-------------------------------|----------------------------------|--------------|
| Model the Way (MTW) | .77 | .67 |
| Inspire a Shared Vision (ISV) | .87 | .83 |
| Challenge the Process (CTP) | .80 | .80 |
| Enable Others to Act (EOA) | .75 | .71 |
| Encourage the Heart (ETH) | .87 | .84 |

^aFrom: Kouzes, J.M., & Posner, B.Z. (2000). The leadership practices inventory: Theory and evidence behind the five practices of exemplary leaders. *Leadership Challenge.com*.

Data Analysis by Question

Each research question will be examined and described in detail. Statistical methods will be described for each question.

Question 1

For medical residents in the study group, are there significant correlations among the Leadership Practices Inventory subscale scores?

Measures of central tendency and measures of relationship between the subscale scores were utilized to illustrate characteristics of the study participants. Measures of

central tendency were computed utilizing mean scores and standard deviations. Measures of relationship were calculated utilizing Pearson product-moment correlation.

Descriptive statistics, including mean scores, ranges, and standard deviations, illustrate nuances of the subscale data. Each subscale had a possible range of 6-60. For Model the Way (MTW), the range was 25-58, with a mean score of 42.5 and a standard deviation of 7.1. For Inspire a Shared Vision (ISV), the range was 12-58, with a mean score of 35.5 and a standard deviation of 9.7. Challenge the Process (CTP) also had a range of 12-58, with a mean score of 37.8 and a standard deviation of 8.6. Enable Others to Act (EOA) had a range of 27-60, with a mean score of 46.9 and a standard deviation of 6.2. Last, Encourage the Heart (ETH) had a range of 19-60 with a mean score of 42.3 and a standard deviation of 9.3. These statistics are summarized in Table 15.

Table 15. *LPI Subscale Descriptive Statistics. N=143.*

| | Minimum | Maximum | Mean | Std. Deviation |
|-----|---------|---------|------|----------------|
| MTW | 25 | 58 | 42.5 | 7.1 |
| ISV | 12 | 58 | 35.5 | 9.7 |
| CTP | 12 | 58 | 37.8 | 8.6 |
| EOA | 27 | 60 | 46.9 | 6.2 |
| ETH | 19 | 60 | 42.3 | 9.3 |

In comparison, Kouzes and Posner (2002b) report mean scores for the LPI subscales computed in a database of more than 100,000 respondent scores. Mean scores for this norm group are consistently higher than the sample mean scores noted above. For Model the Way, the norm group mean and standard deviation were 47.00 and 6.00, for Inspire a Shared Vision, the norm group mean and standard deviation were 40.60 and 8.80. The norm group mean and standard deviation for Challenge the Process were 43.9 and 6.8, for Enable Others to Act they were 48.7 and 5.4, and for Encourage the Heart

they were 43.8 and 8.0. Table 16 highlights the mean and standard deviations for the sample population and the norm group.

Table 16. Means and Standard Deviations for LPI Subscales by Study Sample and Norm Group

| | Study Sample | | Norm Group ^a | |
|-----|--------------|----------------|-------------------------|----------------|
| | Mean | Std. Deviation | Mean | Std. Deviation |
| MTW | 42.5 | 7.1 | 47.0 | 6.0 |
| ISV | 35.5 | 9.7 | 40.6 | 8.8 |
| CTP | 37.8 | 8.6 | 43.9 | 6.8 |
| EOA | 46.9 | 6.2 | 48.7 | 5.4 |
| ETH | 42.3 | 9.3 | 43.8 | 8.0 |

^aFrom: Kouzes, J.M., & Posner, B.Z. (2002b). The leadership practices inventory: Theory and evidence behind the five practices of exemplary leaders. *Leadership Challenge.com*.

A series of Pearson product-moment correlations were calculated to determine the relationships between pairs of the LPI subscales. Each correlation was significant at the .001 level. The values ranged between .548 and .760, indicating strong positive correlations between each of these pairs.

A Pearson product moment correlation was conducted between Model the Way and Inspire a Shared Vision. This correlation was strong and positive. This correlation between Model the Way and Inspire a Shared Vision was statistically significant ($r=.716$, $n=143$, $p \leq .001$).

A Pearson product moment correlation was conducted between Model the Way and Challenge the Process. This correlation was strong and positive. This correlation between Model the Way and Challenge the Process was statistically significant ($r=.689$, $n=143$, $p \leq .001$).

A Pearson product moment correlation was conducted between Model the Way and Enable Others to Act. This correlation was strong and positive. This correlation

between Model the Way and Enable Others to Act was statistically significant ($r = .642, n = 143, p \leq .001$).

A Pearson product moment correlation was conducted between Model the Way and Encourage the Heart. This correlation was strong and positive. This correlation between Model the Way and Encourage the Heart was statistically significant ($r = .700, n = 143, p \leq .001$).

A Pearson product moment correlation was conducted between Inspire a Shared Vision and Challenge the Process. This correlation was strong and positive. This correlation between Model the Way and Encourage the Heart was statistically significant ($r = .760, n = 143, p \leq .001$).

A Pearson product moment correlation was conducted between Inspire a Shared Vision and Enable Others to Act. This correlation was strong and positive. This correlation between Model the Way and Enable Others to Act was statistically significant ($r = .548, n = 143, p \leq .001$).

A Pearson product moment correlation was conducted between Inspire a Shared Vision and Encourage the Heart. This correlation was strong and positive. This correlation between Inspire a Shared Vision and Encourage the Heart was statistically significant ($r = .706, n = 143, p \leq .001$).

A Pearson product moment correlation was conducted between Challenge the Process and Enable Others to Act. This correlation was strong and positive. This correlation between Challenge the Process and Enable Others to Act was statistically significant ($r = .559, n = 143, p \leq .001$).

A Pearson product moment correlation was conducted between Challenge the Process and Encourage the Heart. This correlation was strong and positive. This correlation between Challenge the Process and Encourage the Heart was statistically significant ($r = .650, n = 143, p \leq .001$).

A Pearson product moment correlation was conducted between Enable Others to Act and Encourage the Heart. This correlation was strong and positive. This correlation between Enable Others to Act and Encourage the Heart was statistically significant ($r = .711, n = 143, p \leq .001$). These Pearson product-moment correlations are summarized in Table 17.

Table 17. *Pearson Product-Moment Correlations for Each Pair of LPI Subscales.*
 $p \leq .001$

| | MTW | ISV | CTP | EOA | ETH |
|-----|------|------|------|------|-----|
| MTW | -- | | | | |
| ISV | .716 | -- | | | |
| CTP | .689 | .760 | -- | | |
| EOA | .642 | .548 | .559 | -- | |
| ETH | .700 | .706 | .650 | .711 | -- |

These results are consistent with the results of Kouzes and Posner (2002b) and demonstrate that all of the pairs of subscales were highly correlated. Two of the correlations, ISV-EOA and CTP-EOA, were not as strong as other correlations among this study population.

Question 2

When groups of medical residents are established by quantity of hours of various peer teaching types (tutoring, supplemental instruction leader, small group facilitation, clinical skills teaching, and overall peer teaching experience), are there significant differences among the groups based on the Leadership Practices Inventory subscales?

A series of one-way MANOVAs was conducted to investigate differences in LPI scores and peer teaching experiences during medical school: tutoring, supplemental instruction, small group facilitation, and clinical skills teaching. These variables each had five levels indicating the number of hours that the respondent participated in that activity during medical school. The levels were: 0 hours, 1-10 hours, 11-25 hours, 26-50 hours, and 51 or more hours. An additional variable was the overall peer teaching variable, which consisted of just two levels: none/little and a great deal. The LPI has five subscales, which were the dependent variables for this study: Model the Way (MTW), Inspire a Shared Vision (ISV), Challenge the Process (CTP), Enable Others to Act (EOA), and Encourage the Heart (ETH).

Tutoring. Initial data screening utilizing box plots revealed 18 total outliers for this set of dependent variables. Because the LPI is a self-assessment tool with possible scores ranging from 6-60 for each subscale, these outliers were viewed as reasonable scores well within the bounds of the LPI instrument and were therefore included in each data analysis. No outlier scores were discarded for the analysis.

The first one-way MANOVA conducted utilized the tutoring variable as the independent variable, and all five LPI subscales as the dependent variables. A descriptive analysis was conducted initially, which revealed unacceptable differences in group sizes for the purpose of MANOVA. Therefore, a regrouping among levels was performed prior to data analysis. Initially, the five levels had 33, 53, 32, 13, and 12 responses. After regrouping to three levels, the groups had 33, 53, and 57 responses. Table 18 demonstrates this regrouping.

Table 18. *Tutoring Variable Regrouping. N=143.*

| Initial Level | <i>N</i> | Regrouping Level | <i>N</i> |
|----------------------|----------|-------------------------|----------|
| 0 Hours | 33 | 0 Hours | 33 |
| 1-10 Hours | 53 | 1-10 Hours | 53 |
| 11-25 Hours | 32 | 11 or More Hours | 57 |
| 26-50 Hours | 13 | -- | -- |
| 51 or More Hours | 12 | -- | -- |

With the regrouping, the results of this MANOVA indicated that there was a significant main effect for tutoring based on the dependent variables of the LPI subscales (Wilks' $\lambda = .859$, $F(10, 272) = 2.16$, $p = .02$, $\eta_p = .07$).

To identify differences among the groups, ANOVA post hoc analyses were conducted for each dependent variable. The ANOVAs revealed that the responses across the tutoring groups were statistically significantly different for four of the five subscales: Model the Way ($F(2,280)=6.02$; $p=.003$; $\eta_p=.08$); Inspire a Shared Vision ($F(2, 419)=4.68$; $p=.011$; $\eta_p=.06$); Challenge the Process ($F(2,435)=6.36$; $p=.002$; $\eta_p=.08$); and Encourage the Heart ($F(2,257)=3.05$; $p=.05$; $\eta_p=.04$). Enable Others to Act was not found to be significant ($F(2,87)=2.33$; $p=.10$; $\eta_p=.03$).

Thus, additional post hoc analyses were required. To identify specific differences across the groups, Tukey's HSD post-hoc tests were conducted for each of the significant ANOVAs, which provided a pairwise comparison of the group means for the subscale. These results revealed a significant difference in Model the Way between 0 hours of tutoring and 11 or more hours of tutoring ($M=5.17$, $p=.002$). This result indicated that the responses of the 11 or more hours of tutoring group had a mean score on Model the Way 5.17 points greater than the 0 hours of tutoring group. The respective means were 44.32 and 39.15. The difference between 0 hours of tutoring and 1-10 hours was nearly significant ($p=.054$). The respective means were 39.15 and 42.68. No significant

difference was found, however, between 1-10 hours and 11 or more hours ($M=1.64$, $p=.421$). The respective means were 42.68 and 44.32.

Post hoc analysis of the responses related to the Inspire a Shared Vision variable revealed a similar finding. Parallel to the above analysis, a significant difference between 0 hours and 1-10 hours ($M=5.15$, $p=.041$) and between 0 hours and 11 or more hours ($M=6.13$, $p=.01$) indicated that the responses of the 1-10 hours of tutoring group had a mean score on Inspire a Shared Vision that was 5.15 points higher than the 0 hours of tutoring group. The respective means were 36.30 and 31.15. Likewise, the 11 or more hours of tutoring group had a mean score on Inspire a Shared Vision that was 6.13 points higher than the 0 hours of tutoring group. The respective means were 37.28 and 31.15. No difference was found between 1-10 hours and 11 or more hours of tutoring groups, however ($M=.98$, $p=.42$).

Post hoc analysis of the responses related to the Challenge the Process variable revealed another very similar finding. A significant difference between 0 hours and 1-10 hours ($M=5.01$, $p=.019$) and between 0 hours and 11 or more hours ($M=6.33$, $p=.002$) indicated that the responses of the 1-10 hours of tutoring group had a mean score on Challenge the Process that was 5.01 points higher than the 0 hours of tutoring group. The respective means were 38.43 and 33.42. The responses of the 11 or more hours of tutoring group had a mean score on Challenge the Process that was 6.33 points higher than the 0 hours of tutoring group. The respective means were 39.75 and 33.42. No significant difference was found between tutoring levels of 1-10 hours and 11 or more hours ($M=1.32$, $p=.681$).

Post hoc analysis for Encourage the Heart demonstrated just one significant difference, between the 0 hours of tutoring group and the 11 or more hours of tutoring group ($M=4.89, p=.042$). The responses of the 11 or more hours of tutoring group had a mean score on Encourage the Heart that was 4.89 points higher than the 0 hours of tutoring group. The respective means were 43.89 and 39.00. No difference was found between 0 hours and 1-10 hours ($M=0.04, p=1.10$), or between 1-10 hours and 11 or more hours ($M=2.24, p=.137$). Table 19 summarizes the significant pairwise results for the tutoring variable.

Table 19. *Tutoring Variable Significant Pairwise Results. N=143.*

| Subscale | Pairwise Levels | Mean Difference (<i>M</i>) | Significance (<i>p</i>) |
|----------|---------------------|---------------------------------|---------------------------|
| MTW | 0 hours- 11+ hours | 5.16 | .002 |
| ISV | 0 hours- 1-10 hours | 5.15 | .041 |
| ISV | 0 hours- 11+ hours | 6.13 | .010 |
| CTP | 0 hours- 1-10 hours | 5.01 | .019 |
| CTP | 0 hours- 11+ hours | 6.33 | .002 |
| ETH | 0 hours- 11+ hours | 4.89 | .042 |

Supplemental instruction (SI). The second MANOVA conducted utilized the supplemental instruction variable as the independent variable and all five LPI subscales as the dependent variables. As with the tutoring variable, while outliers were found, all were included in the analysis due to the scores being reasonable and acceptable scores on the LPI. Similar to the tutoring MANOVA analysis, the SI levels were regrouped for analysis, based on an uneven distribution of responses. The initial five levels had 37, 62, 25, 11, and 8 responses. After regrouping, the three levels had 37, 62, and 44 responses. Table 20 summarizes the regrouping of levels for the SI variable.

Table 20. *Supplemental Instruction Variable Regrouping. N=143.*

| Initial Level | <i>N</i> | Regrouping Level | <i>N</i> |
|----------------------|----------|-------------------------|----------|
| 0 Hours | 37 | 0 Hours | 37 |
| 1-10 Hours | 62 | 1-10 Hours | 62 |
| 11-25 Hours | 25 | 11 or More Hours | 44 |
| 26-50 Hours | 11 | -- | -- |
| 51 or More Hours | 8 | -- | -- |

Subsequent to the new grouping, the MANOVA was conducted. The results of this MANOVA suggested there was no significant main effect for supplemental instruction based on the dependent variable of the LPI subscales (Wilks' $\lambda = .895$, $F(10, 272) = 1.55$, $p = .122$, $\eta_p = .054$). Because the main effect was not significant, no further investigation was conducted for the SI variable.

Small group facilitation. The third MANOVA analysis utilized the small group facilitation variable as the independent variable, and the five LPI subscales as the dependent variables. Just as with the previous examples of tutoring and supplemental instruction MANOVAs, outliers were noted but not excluded. Also, levels of the small group facilitation variable were once again regrouped due to small group sizes and to maintain consistency with other variables. The initial five levels of the small group facilitation variable had 28, 58, 33, 15, and 9 responses. These were regrouped into three levels with 28, 58, and 57. It is noted here that the first group containing 28 responses remained somewhat smaller than the other groups, but this remained the most logical grouping method. Table 21 summarizes the regrouping of levels for the small group facilitation variable.

Table 21. *Small Group Facilitation Variable Regrouping. N=143.*

| Initial Level | <i>N</i> | Regrouping Level | <i>N</i> |
|----------------------|----------|-------------------------|----------|
| 0 Hours | 28 | 0 Hours | 28 |
| 1-10 Hours | 58 | 1-10 Hours | 58 |
| 11-25 Hours | 33 | 11 or More Hours | 57 |
| 26-50 Hours | 15 | -- | -- |
| 51 or More Hours | 9 | -- | -- |

After this regrouping, the MANOVA was conducted. No main effect was found for small group facilitation based on the dependent variable of the LPI subscales (Wilks' $\lambda = .917$, $F(10, 272) = 1.20$, $p = .289$, $\eta_p = .042$). Because no significant main effect was found in this analysis, no further analysis was conducted for the small group facilitation variable.

Clinical skills teaching. The fourth MANOVA conducted utilized the clinical skills teaching variable as the independent variable, and the five LPI subscales as the dependent variables. As noted above for each of the other MANOVA tests, outliers were found for this variable as well, and were not discarded from the data set, as all scores were deemed reasonable and pertinent to this study. Also similar for the clinical skills teaching variable, the five levels were unevenly distributed, so a regrouping took place in line with the other variables. The initial levels had 16, 57, 40, 13, and 17 responses, and the subsequent groups (in keeping with the other variables) had 16, 57, and 70 responses. The initial MANOVA was conducted with these groups, with an understanding that the first group of 16 is not an acceptable size. Because of this limitation, a further grouping and subsequent analysis were conducted. This second regrouping combined the groups to provide just two groups for analysis, with 73 and 70 responses, respectively. Table 22 summarizes the two regroupings of the clinical skills teaching variable levels.

Table 22. *Clinical Skills Teaching Variable Regrouping. N=143.*

| Initial Grouping Level | N | First Regrouping Level | N | Second Regrouping Level | N |
|-------------------------------|----------|-------------------------------|----------|--------------------------------|----------|
| 0 Hours | 16 | 0 Hours | 16 | 0-10 Hours | 73 |
| 1-10 Hours | 57 | 1-10 Hours | 57 | 11 or More Hours | 70 |
| 11-25 Hours | 40 | 11 or More Hours | 70 | -- | -- |
| 26-50 Hours | 13 | -- | -- | -- | -- |
| 51 or More Hours | 17 | -- | -- | -- | -- |

The initial MANOVA conducted with three groups found no significant main effect (Wilks' $\lambda = .882$, $F(10, 272) = 1.76$, $p = .068$, $\eta_p = .061$). No further examination of these data were conducted, however, a subsequent MANOVA was conducted with just two groups as noted above. Once again, no significant main effect was found, therefore, no additional analyses were conducted (Wilks' $\lambda = .960$, $F(5, 137) = 1.14$, $p = .342$, $\eta_p = .040$). No relationship was found between clinical skills teaching experiences and the five subscales of the LPI.

Overall peer teaching experience. The last teaching variable investigated represented a comprehensive assessment of all peer teaching experiences during medical school. This variable had only two levels: None/little (68 responses) and a great deal (58 responses). Interestingly, this question was the most frequently skipped question, with 18 missing values, representing 13% of responses. A MANOVA was conducted utilizing the overall peer teaching experience variable as the independent variable ($n=126$), and the five subscales of the LPI as the dependent variables. The results from this MANOVA indicated a significant main effect (Wilks' $\lambda = .889$, $F(5, 120) = 3.00$, $p = .014$, $\eta_p = .111$). These data demonstrate that there was a significant relationship between medical residents' overall peer teaching experience during medical school and the five subscales of the LPI.

To determine differences between the two groups, ANOVA post hoc analyses were conducted for each dependent variable. The ANOVAs revealed that the responses across overall peer teaching groups were statistically significantly different for three of the five subscales. These differences were: Model the Way ($F(1, 363)=7.97; p=.006; \eta_p=.06$); Inspire a Shared Vision ($F(1, 726)=8.10; p=.055; \eta_p=.06$); and Challenge the Process ($F(1, 610)=9.07; p=.003; \eta_p=.07$). No significant differences were found in Enable Others to Act ($F(1, 89)=2.45; p=.12; \eta_p=.02$) and Encourage the Heart ($F(1, 100)=1.11; p=.29; \eta_p=.01$). Estimated marginal means indicated that responses of the great deal of overall peer teaching experience during medical school had a mean score on Model the Way of 3.41 points greater than the none/little group. The respective means were 44.05 and 40.65. For Inspire a Shared Vision, estimated marginal means indicated that responses of the great deal of overall peer teaching experience had a mean score 4.82 points higher than the none/little group. The respective means were 37.26 and 32.44. For Challenge the Process, estimated marginal means indicated that responses of the great deal of overall peer teaching experience had a mean score 4.42 points higher than the none/little group. The respective means were 39.83 and 35.41.

Summary of significant results for question 2. Results from the MANOVAs pertaining to various types of teaching experiences and the five subscales of the LPI revealed that only tutoring experience demonstrated a significant difference among any of the LPI subscales. Tutoring experience showed a difference within each of the subscales except for Enable Others to Act. These subscales included: Model the Way, Inspire a Shared Vision, Challenge the Process, and Encourage the Heart. This result provided a general sense that some experience with tutoring was significantly related to

an increase in four of the subscale scores. In addition to tutoring experience, overall peer teaching experience also demonstrated a significant difference among three of the five subscales, including Model the Way, Inspire a Shared Vision, and Challenge the Process. Enable Others to Act and Encourage the Heart were not found to be significant in this analysis.

Question 3

When groups of medical residents are established by residency and demographic characteristics (year and type of residency program, location of medical school training, race, ethnicity, gender, and age), are there significant differences among the groups based on the Leadership Practices Inventory subscales?

A series of MANOVA analyses were conducted to determine differences among groups of medical residents' scores on the five subscales of the LPI, based on residency and demographic characteristics. These characteristics included age, gender, race, ethnicity, year and type of residency program, and location of medical school training. Each of these variables is described along with the report of the pertinent MANOVA analysis.

Age. A MANOVA was conducted utilizing the age variable as the independent variable and the five LPI subscales as the dependent variables. The age variable had three levels: 28 or younger (n=49), 29-33 (n=71), and 34 or older (n=23). The MANOVA was conducted with all three levels. The three-group MANOVA results demonstrated no significant main effects on LPI subscale scores (Wilks' $\lambda = .877$, $F(10, 272) = 1.84$, $p = .054$, $\eta_p = .063$). Because significance was close, and the 34 or older group was small, the age variable was then regrouped into just two groups. The new grouping was: 28 or

younger (n=49) and 29 and older (n=94). Table 23 summarizes the age variable regrouping.

Table 23. *Age Variable Regrouping. N=143.*

| Initial Level | N | % | Regrouping Level | N | % |
|----------------------|----------|----------|-------------------------|----------|----------|
| 28 or younger | 49 | 34 | 28 or younger | 49 | 34 |
| 29-33 | 71 | 50 | 29 or older | 94 | 66 |
| 34 or older | 23 | 16 | -- | -- | |
| Total | 143 | | | 143 | |

An additional MANOVA was conducted with the two groups of age as the independent variable and the five subscales of the LPI as the dependent variables. Box's Test was significant (.044), indicating the use of Pillai's Trace in lieu of Wilks' λ to determine significance. (Pillai's Trace = .066, $F(5, 137) = 1.92, p = .095, \eta_p = .066$). Once again, age was not associated with a significant difference in LPI subscale scores among this sample.

Gender. A MANOVA was conducted utilizing the gender variable as the independent variable and the five LPI subscales as the dependent variables. The gender variable was initially designed with three levels: Female, male, and other. No respondents selected other, therefore this level was dropped from the analysis, leaving just female (n=64) and male (n=79). A significant main effect was found for gender (Wilks' $\lambda = .897, F(5, 137) = 3.14, p = .010, \eta_p = .103$), indicating holistic differences when considering gender variations.

Follow-up univariate analysis (ANOVA) were conducted. No individual variable could be identified as significant. For Model the Way, results were not significant ($F(1,141)=3.42, p=.067, \eta_p =.024$). Inspire a Shared Vision results were not significant ($F(1,141)=.003, p=.956, \eta_p =.000$). Challenge the Process results were not shown to be

significant ($F(1,141)=.865, p=.354, \eta_p =.006$), Enable Others to Act was not significant ($F(1,141)=1.85, p=.176, \eta_p =.013$), and Encourage the Heart was also not significant ($F(1,141)=1.85, p=.176, \eta_p =.013$). No further investigation was conducted. Thus, the results from MANOVA indicated a holistic difference, but ANOVA indicated no significant difference.

Race. A MANOVA was conducted utilizing race as the independent variable and the five subscales of the LPI as the dependent variables. Initial descriptive statistics revealed inequity among the six groups in the race variable, ranging from 0-66 respondents per group. The Hawaiian/Pacific Islander (H/PI) group had no respondents, the American Indian/Alaska Native (AI/AN) group had two respondents, Black/African American (B/AA) had four respondents, two or more races (2+) had 9, Asian had 62 and Caucasian had 66. Therefore, for the purpose of data analysis, the race variable was regrouped into three levels, retaining the highest frequency groups of Asian and Caucasian. With the Others group still well below the other two ($n=15$), the groups were once again regrouped into just two groups (Caucasian and All Others). Table 24 summarizes the race regroupings.

Table 24. *Race Variable Regrouping. $N=143$.*

| Initial Grouping | <i>N</i> | % | First Regrouping | <i>N</i> | % | Second Regrouping | <i>N</i> | % |
|-------------------------|-----------------|----------|-------------------------|-----------------|----------|--------------------------|-----------------|----------|
| AI/AN | 2 | 1 | Asian | 62 | 43 | Caucasian | 66 | 46 |
| Asian | 62 | 43 | Caucasian | 66 | 46 | All Others | 77 | 54 |
| B/AA | 4 | 3 | Others | 15 | 11 | -- | -- | -- |
| Caucasian | 66 | 46 | -- | -- | -- | -- | -- | -- |
| H/PI | 0 | 0 | -- | -- | -- | -- | -- | -- |
| 2+ | 9 | 6 | -- | -- | -- | -- | -- | -- |
| Total | 143 | | | 143 | | | 143 | |

Both data sets were analyzed using MANOVAs. The first MANOVA utilized the first regrouping of race groups as the independent variable and the five LPI subscales as the dependent variables. No significant main effect was found (Wilks' $\lambda = .919$, $F(10, 272) = 1.18$, $p = .304$, $\eta_p = .042$). No subsequent tests were conducted.

The second MANOVA utilized the second regrouping of the race variable as the independent variable. Still, no significant main effect was found (Wilks' $\lambda = .943$, $F(5, 137) = 1.67$, $p = .146$, $\eta_p = .057$). No further investigation was conducted for the race variable as no significant differences were found.

Ethnicity. A MANOVA was conducted utilizing ethnicity as the independent variable and the five subscales of the LPI as the dependent variables. The ethnicity variable had a large number of missing values ($n=15$). As indicated with the race variable, the groups of ethnicity were not evenly distributed, with Non-Hispanic/Latino representing 117 (91%) respondents and Hispanic/Latino representing just 12 (9%) respondents. These groups are very uneven and not appropriate for MANOVA, however, with just two groups, regrouping was not an option. Even with inappropriate group sizes, a MANOVA was conducted to identify whether differences were apparent. No significant main effect was found (Wilks' $\lambda = .995$, $F(5, 137) = .149$, $p = .980$, $\eta_p = .005$). No significant differences were found for the LPI subscales based on groups by ethnicity, though groups represented a very uneven distribution.

Medical school location. A MANOVA was conducted utilizing location of medical school training as the independent variable and the five subscales of the LPI as the dependent variables. This variable indicates where residents completed their medical school training, either inside the U.S. or outside the U.S. (known as an international

medical graduate, or IMG). Here, the two groups were more equally distributed, with 85 (59%) residents from medical schools inside the U.S. and 58 (41%) from medical schools outside the U.S. A MANOVA was conducted to determine differences among the LPI subscales between these two groups. No significant difference was found (Wilks' $\lambda = .947$, $F(5, 137) = 1.53$, $p = .183$, $\eta_p = .053$). No significant differences were found on the LPI subscales based on groups by location of medical school training.

Residency year. A MANOVA was conducted utilizing residency year as the independent variable and the five subscales of the LPI as the dependent variables. This variable represents the residents' current year in the residency program, with five groups ranging from first year to five or more years. Initial descriptive statistics revealed inequity among the groups. Two of the groups, four years and five or more years, were unequally represented in the sample. Of the total respondents, 49 were in their first year, 43 were in their second year, 37 were in third year, and 7 residents reported being in the fourth and fifth year. The variable was regrouped to three levels to account for these small groups. Table 25 summarizes the variable regrouping.

Table 25. *Residency Year Variable Regrouping. N=143.*

| Initial Group | N | % | Regrouping | N | % |
|----------------------|----------|----------|--------------------|----------|----------|
| First year | 49 | 34 | First year | 49 | 34 |
| Second year | 43 | 30 | Second year | 43 | 30 |
| Third year | 37 | 26 | Third or more year | 51 | 36 |
| Fourth year | 7 | 5 | -- | -- | -- |
| Fifth or more year | 7 | 5 | -- | -- | -- |
| Total | 143 | | | 143 | |

A MANOVA was conducted utilizing the regrouped variable for residency year, and no significant main effect was found (Wilks' $\lambda = .899$, $F(10, 272) = .148$, $p = .145$, η_p

= .052). Therefore, no significant differences were found on the LPI subscales based on groups by residency year.

Residency program type. A MANOVA was conducted utilizing residency program as the independent variable and the five subscales of the LPI as the dependent variables. Once again, an uneven distribution was found among groups in the residency program variable. Groups ranged from 4 to 54. Obstetrics/ gynecology (OBG) had 4 respondents, pediatrics (Peds) and emergency medicine (EM) each had 12 respondents, psychiatry (Psy) had 15, family medicine (FM) had 17, surgery (SURG) had 29, and internal medicine (IM) had 54. A regrouping was conducted prior to data analysis to ensure more equal groups to run the MANOVA. This regrouping was conducted with consideration for group sizes and similarities between specialty areas of medicine. For this regrouping, internal medicine was a stand-alone group simply because of the number of responses for this group. Emergency medicine, family medicine, and pediatrics were grouped due to similarities in practice, as these specialties are more generalists than the other medical specialties. Obstetrics/gynecology, psychiatry, and surgery were grouped primarily as an ‘other’ category. Table 26 summarizes the residency program variable regrouping.

Table 26. *Residency Program Variable Regrouping. N=143*

| Initial Group | N | % | Regrouping | N | % |
|----------------------|------------|----------|-------------------|------------|----------|
| EM | 12 | 8 | EM, FM, Peds | 41 | 29 |
| FM | 17 | 12 | IM | 54 | 38 |
| IM | 54 | 38 | OBG, Psy, Surg | 48 | 33 |
| OBG | 4 | 3 | -- | -- | -- |
| Peds | 12 | 8 | -- | -- | -- |
| Psy | 15 | 11 | -- | -- | -- |
| Surg | 29 | 20 | -- | -- | -- |
| Total | 143 | | | 143 | |

A MANOVA was conducted to determine differences among groups of residents on the subscales of the LPI based on residency program. A significant main effect was found (Wilks' $\lambda = .856$, $F(10, 272) = 2.20$, $p = .018$, $\eta_p = .075$). This result demonstrates a significant difference among the LPI subscales based on type of residency program.

To identify differences among the groups, ANOVA post hoc analyses were conducted for each dependent variable. The follow-up ANOVA analyses indicated that the responses across the residency groups were statistically significantly different for three of the five LPI subscales: Model the Way ($F(2,140)=6.192$, $p=.003$, $\eta_p =.081$), Inspire a Shared Vision ($F(2,140)=4.54$, $p=.012$, $\eta_p =.061$), and Encourage the Heart ($F(2,140)=4.917$, $p=.009$, $\eta_p =.066$). The other two subscales did not reveal significant differences: Challenge the Process ($F(2,140)=2.18$, $p=.117$, $\eta_p =.030$) and Enable Others to Act ($F(2,140)=2.967$, $p=.055$, $\eta_p =.041$).

Thus, additional post hoc analyses were required. Tukey HSD post hoc tests were conducted for each of the significant ANOVAs, which provided a pairwise comparison of the group means for the subscale. These results revealed significant differences only between the EM/FM/Peds group and the IM group in Model the Way ($M= -4.96$, $p=.002$), Inspire a Shared Vision, ($M= -5.90$, $p=.009$), and Encourage the Heart ($M= -5.52$, $p=.011$). These results indicated that the IM group had a mean score on Model the Way 4.96 points higher compared to the EM/FM/Peds group, with the respective means 44.59 and 39.63. The IM group also had a mean score of 5.91 points higher than the EM/FM/Peds group on Inspire a Shared Vision, with the respective means 37.93 and 32.02. Last, the IM group had a mean score of 5.52 points higher than the EM/FM/Peds group on Encourage the Heart, with the respective means 45.30 and 39.78. No other

significant differences were found. Table 27 summarizes the significant pairwise results for residency program.

Table 27. *Residency Program Variable Significant Pairwise Results. N=143.*

| Subscale | Pairwise Levels | Mean Difference (M) | Significance (p) |
|-----------------|------------------------|--------------------------------|-------------------------|
| MTW | EM/FM/Peds- IM | -4.96 | .002 |
| ISV | EM/FM/Peds- IM | -5.90 | .009 |
| ETH | EM/FM/Peds- IM | -5.52 | .011 |

These results indicated that Emergency Medicine, Family Medicine, and Pediatrics residents as a group scored a mean of almost five points lower than Internal Medicine residents in Model the Way; nearly six points lower on Inspire a Shared Vision, and about 5.5 points lower on the Encourage the Heart subscale. No significant differences were found between Internal Medicine and the Other group consisting of Surgery, Obstetrics and Gynecology, and Psychiatry, or between the Emergency Medicine, Family Medicine, and Pediatrics group and the Other group consisting of Surgery, Obstetrics and Gynecology, and Psychiatry.

Summary of significant results for question 3. Of the MANOVA conducted utilizing groups based on personal and residency program demographics, two revealed significant differences among groups. These significant results pertained to gender and residency program type. First, examining groups based on gender produced a significant main effect, however, further testing demonstrated no specific significant effects.

Second, a MANOVA utilizing grouped residency program as the independent variable yielded significant results. Post hoc analysis determined that specific differences were found between the Emergency Medicine, Family Medicine, and Pediatrics group and the Internal Medicine group for three of the LPI subscales: Model the Way, Inspire a

Shared Vision, and Encourage the Heart. For each of these subscales, the Internal Medicine group scored a mean of between five and six points higher than the Emergency Medicine, Family Medicine, and Pediatrics group.

Results from the Open-Ended Question

The survey included one open-ended question which stated: *“Please briefly describe the ideal leader of a medical team.”* There were 139 responses to this question. A qualitative analysis was conducted of the responses, in two phases. The first analysis involved categorizing responses into the five practices of exemplary leadership (the five subscales of the LPI) as themes: Model the Way (MTW), Inspire a Shared Vision (ISV), Challenge the Process (CTP), Enable Others to Act (EOA), and Encourage the Heart (ETH). The second phase of qualitative analysis was an examination of responses without consideration of the five subscales of the LPI. This analysis included categorizing responses into four overarching themes and subthemes found in the responses. Each of these analyses is described.

Qualitative analysis utilizing the five practices of exemplary leadership as themes. The first qualitative analysis was conducted utilizing the Five Practices of the Exemplary Leadership: Model the Way (MTW), Inspire a Shared Vision (ISV), Challenge the Process (CTP), Enable Others to Act (EOA), and Encourage the Heart (ETH). Responses were categorized to one of the Five Practices. An important note here is that many of the responses were personality traits that did not necessarily apply to the Five Practices, which are behavioral characteristics. For example, one complete response to the open-ended question read, “I think an ideal leader of a team is one who is confident, compassionate, listens to concerns of interns/students, and tries to understand

where they are coming from and teach/guide. The best and most efficient way to run a team.” For this analysis, this statement was broken down into its key components: confident, compassionate, listens to concerns, tries to understand where they are coming from, teach/guide, best/most efficient way to run a team. Several of these statements fit into the Five Practices: compassionate (ETH), listens to concerns (ISV), teach/guide (EOA), and managing a team (ISV). The other statement, confident, did not fit within the Five Practices themes, as it is more of a personality characteristic, so it was not included in this analysis. A discussion about each of the Five Practices is presented. Table 28 presents the number of respondents indicating at least one response for the Five Practices of Exemplary Leadership.

Table 28. *Number of Respondents Per Practice. N=139.*

| Practice | N | %of Respondents |
|-------------------------|----------|------------------------|
| Model the Way | 84 | 60% |
| Inspire a Shared Vision | 72 | 52% |
| Challenge the Process | 27 | 19% |
| Enable Others to Act | 71 | 51% |
| Encourage the Heart | 23 | 17% |

Model the way. The first practice is the first of the Five Practices of Exemplary Leadership, and was also the most common response category in the open-ended question. There were 84 statements or words that applied to the Model the Way category. This equates to approximately 60% of respondents noting some aspect of Model the Way in their responses. Kouzes and Posner (2002a) described Model the Way as understanding one’s own values and beliefs, leading from these, and standing up for them. Modeling the way involves being open to discussing one’s values and demonstrating a commitment to them through action and serving as an institutional role model (Kouzes & Posner, 2002a).

For the qualitative analysis, responses applied to Model the Way included: Leading by example, clearly defining goals, living from one's ideals, determination, passion for work, taking responsibility, and guiding the team. Also included was the large number of responses pertaining to clinical expertise. These responses included: knowledgeable, good caregiver, practices evidence-based medicine, quality patient care, and effective patient management. These attributes were applied to Model the Way because these skills are the foundation of the practice of medicine and highlight that the respondents viewed these skills as important facets of their ideal leader.

Inspire a shared vision. This next practice had a large collection of responses as well, with 72 (52%) of respondents highlighting some aspect of Inspire a Shared Vision in their response. Kouzes and Posner (2002a) described Inspire a Shared Vision as developing a shared organizational vision among the team. By doing so, leaders generate excitement, and engage people around the united vision. Through this work, leaders enlist more people to join in the cause.

For this analysis, responses applied to the Inspire a Shared Vision theme included: Good communication, including being open to input and ideas, bringing people together, managing a team, being charismatic, listening, and being helpful. Also included in this theme were characteristics such as motivating, inspiring, and encouraging the team, being respectful of others and being non-judgmental.

Challenge the process. This practice was one of the two with the least number of respondents (n=27), representing just 19%. Kouzes and Posner (2002a) defined Challenge the Process as the practice of addressing and implementing change. This process is about innovation and organizational improvement. To do this, leaders must be

able to stand up for their beliefs, initiate change, and perhaps most importantly, be willing to take risks. One important component of risk taking is a willingness to face the possibility of failure, and to view failure as a process for learning and improvement (Kouzes & Posner, 2002a).

Responses coded to this category included: Accepting challenges, allowing team members to make mistakes and learn from them, not being afraid to take risks, demanding improvement, providing constructive and timely feedback, promoting questions, and being open to suggestions.

Enable others to act. This practice had a larger number of responses (51%, n=71) than Challenge the Process. Kouzes and Posner (2002a) described Enable Others to Act as the process of building effective teams, promoting collaboration and teamwork. This theme involves developing trust and respect within the team, sharing power, delegation, and utilizing the strengths of everyone in the organization.

One very common theme noted here was teaching. A range of descriptions applied to teaching: Actively teaches, helps others to enable them to help themselves, cares and invests time in teaching, and pushes others to grow. Other themes noted for Enable Others to Act included motivates the group to improve, shared decision-making, fair, brings out the best in each team member, and expects high achievement of team members.

Encourage the heart. This last practice was also the least commonly cited (17%, n=23). Kouzes and Posner (2002a) defined Encourage the Heart as being one of the most people-centered practices of the Five Practices of Exemplary Leadership. This practice

focuses on regular recognition of efforts and successes of individuals and the team, and building an environment of positive morale and engagement.

For this analysis, two key words were prominent: compassion and empathy. These words suggest that respondents felt that a leader should embrace the feeling side of leadership. Other words and phrases categorized in this practice included: appreciative of thoughts and ideas of team members, cares about team members and patients, makes experience enjoyable, provides recognition, celebrates accomplishment, is encouraging, supportive, enthusiastic, and kind.

Based on this analysis, Model the Way, Inspire a Shared Vision, and Enable Others to Act were more commonly cited as ideal leadership skills by medical residents than Challenge the Process and Encourage the Heart.

Qualitative analysis with general themes. For this analysis, key words were identified in the responses and categorized into themes without consideration for the Five Practices of Exemplary Leadership. Most respondents offered multiple words and phrases within their response to this question. Ten initial concepts were eventually recategorized into four overarching themes to describe the responses: Team management; teaching and communication; personality characteristics; and patient care expertise. Of 139 respondents, team management had the most responses (n=114), followed by teaching and communication (n=105), personality characteristics (n=98), and patient care expertise (n=73). It is important to note that most of the 139 respondents provided multiple words and phrases in their responses; therefore, the total number of responses was 390. Table 29 presents the number of respondents per theme. Each of these themes will be described in detail below.

Table 29. *Number of Respondents Per General Theme for Second Qualitative Analysis*

| Theme | N | %of Respondents |
|-----------------------------|----------|------------------------|
| Team management | 114 | 82% |
| Teaching and communication | 105 | 76% |
| Personality characteristics | 98 | 71% |
| Patient care expertise | 73 | 53% |

Team management was the most common theme, with a large majority of respondents noting some aspect of team management as part of the ideal leader of a medical team. Common words and phrases for this theme included: Leads by example, delegates, makes quick decisions, involves all team members, shares decision power, and organized. Several respondents also noted what an ideal leader would not do. Five responses specifically stated that the ideal leader would not micromanage their team, and other respondents noted that the leader should: be part of a team, not an exception to it; be open to opinions not dismissive; command without being bossy; oversee not manage the team; and not employ retaliatory actions or develop hierarchy.

This theme suggests that the ideal leader is someone who knows the strengths and weaknesses of each person on the team and works to highlight the strengths and improve on their weaknesses. This leader develops clear goals and works alongside the team members in achieving them. The ideal leader is trusting of other team members and values input.

Teaching and communication was the next most common theme. This highlighted the importance of teaching, good communication, and the provision of feedback as part of the leadership role for these respondents. Responses included a need for an ideal leader to be an effective and willing teacher, foster the growth of team members, accommodate different learning styles, encourage self-improvement, and

promote questions. Respondents also expected a good communicator and listener who is approachable and open to input and critique. This communicator provides clear and concise instruction and is easy to talk to. These residents also expected their ideal leader to be able to provide effective, timely, and constructive feedback. A few of the respondents also noted that their ideal leader should also ask for, and be receptive to, feedback on their own behavior as well. One specific, negatively-phrased response stated that this leader should convey knowledge without being patronizing.

Personality characteristics of the ideal leader is a more broad theme, encompassing a variety of terms. One characteristic in this category, cited by fifteen respondents, was confidence. Similar terms included strong, charismatic, firm, and having integrity. Respondents also indicated a leader is ethical, someone who lives by their own ideals, is honest, fair, professional, hard-working, and respectful. Calm was a trait frequently highlighted, along with similar traits of patience and being forgiving. Respondents also desired a positive influence from this leader, citing traits such as being friendly, supportive, compassionate, helpful, and encouraging. Negatively phrased responses for this theme included non-judgmental, not mean, not harsh, not confrontational, not condescending or arrogant, doesn't embarrass, and helps rather than blames.

The last theme identified was patient care expertise. Thirty-three respondents indicated a need for an ideal leader to be knowledgeable, with others suggesting terms such as critical thinking skills, analytical, skillful, intelligent, experienced, and wise. A knowledge of evidence-based medicine, clinically-skilled, and competent were also noted. Regarding the care of patients, respondents suggested responsible for patient care

at all times, patient advocacy, patient communication, and caring for their patients as important facets of being a medical leader. The only negatively framed response for the patient care expertise theme was not endangering patients.

Summary

Results from the quantitative analyses demonstrated several significant outcomes. First, all pairs of the LPI subscales were significantly correlated, as would be expected based on the history and wide use of the instrument. Second, overall peer teaching experience was found to have a significant difference between groups. The difference was revealed to be in Model the Way, Inspire a Shared Vision, and Challenge the Process.

The tutoring variable was the only specific teaching variable that revealed a significant difference among groups, and this difference was seen in four of the five LPI subscales: Model the Way, Inspire a Shared Vision, Challenge the Process, and Encourage the Heart. There were no significant differences found for Enable Others to Act.

Gender was found to have a main effect on the LPI as a whole, but post hoc analyses provided no further information about what this difference might be. When utilizing residency program as the grouping variable, significant differences were found. Internal Medicine was shown to have higher scores on three of the four LPI subscales than the Emergency Medicine/Family Medicine/Pediatrics group. These subscales were Model the Way, Inspire a Shared Vision, and Encourage the Heart. Also regarding demographics, it was noteworthy that there was no significant difference among U.S.-based and international medical graduates.

The qualitative component of this study was conducted in two phases. The first qualitative analysis applied the responses to the Five Practices of Exemplary Leadership (the five subscales of the LPI) as the themes. More responses were cited for Model the Way, Inspire a Shared Vision, and Enable Others to Act than for Challenge the Process or Encourage the Heart. Responses for Model the Way included living based on one's ideals, setting clear goals for the team, guiding the team, and demonstrating knowledge and expertise for the practice of medicine.

Responses for Inspire a Shared Vision included being a good communicator, bringing a team together, motivating, inspiring, and being helpful. Being a charismatic leader was also applied to this theme.

Enable Others to Act was the third of the more commonly cited themes. Responses here included teaching, providing opportunities for team members to grow and learn, delegating, sharing decision-making, and bringing out the best in each team member.

Responses around Challenge the Process were cited less frequently. These responses included accepting challenges, offering constructive feedback, not afraid to take risks, and promotes asking of questions.

Similarly, Encourage the Heart was less frequently cited. These responses included: cares about team members and patients, compassionate, provides recognition and praise, and is supportive.

The second qualitative analysis grouped responses into four broad themes that became clear through the data itself. These themes included team management, teaching and communication, personality characteristics, and patient care expertise. Team

management included such qualities as: leads by example, organized, delegates tasks, shares decision-making power, sets clear goals, and is team-focused. The teaching and communication theme included listening, teaching, good communicator, approachable, and provides constructive feedback. The personality traits theme was more diverse, including such terms as: confident, compassionate, motivating, encouraging, respectful, honest, assertive, collegial, and hard working. The final theme identified in this analysis was patient care expertise. In these responses, residents made it clear that the ideal leader would be knowledgeable, medically competent, provide quality patient care, and serve as a patient and team advocate. This leader is analytical, skillful, experienced, wise, and practices evidence-based medicine. These results as a whole present an overall description of the ideal leader from residents' perspective. The implications of these results will be presented in Chapter 5.

CHAPTER V

KEY FINDINGS, DISCUSSION, AND CONCLUSIONS

Physicians are increasingly being called on to fill leadership roles in a range of healthcare settings (Angood & Birk, 2004). One potential barrier is that physicians in general receive little training in leadership, so may not be prepared for these roles (Chaudry et al., 2008; Gabel, 2012; Osborne, 2012). Many medical students, however, take part in peer teaching experiences during medical school, which may help to prepare them for leadership roles via incidental learning (Dandavino et al., 2007; Ten Cate & Durning, 2007a; Micari et al., 2010; Vira, 2015). The purpose of this study was to investigate potential relationships among peer teaching experiences during undergraduate medical education (UGME) and self-reported leadership practices in medical residency.

The study was conducted via a paper survey distributed to medical residents in each of seven medical specialties. The instrument contained three sections, beginning with an open-ended question asking respondents to: *Please briefly describe the ideal leader of a medical team.* The second section contained the Leadership Practices Inventory, which is a widely-used leadership practices self-assessment tool (Kouzes & Posner, 2002a). The third section contained twelve questions pertaining to teaching experiences during medical school, residency program qualities, and personal demographics. The open-ended question was qualitatively analyzed for themes, and the quantitative data were analyzed using correlations and MANOVA tests.

This chapter contains a discussion of the findings, implications for practice, recommendations for further research, and a final conclusion. The purpose of this section is to consider the study results in relation to the existing literature on the topic of peer

teaching and leadership, and to present suggestions for further research to explore the subject matter in more detail.

Discussion of the Findings

There were two primary findings of this study that will be presented in this section. The first was the lack of congruence among the indicators of teaching as a component of leadership. The second was the role of medical specialty area in leadership practices.

Lack of Congruence Among Teaching Indicators on Leadership Practices

The concept of teaching as a component of leadership was revealed in four areas of the data. The first significant finding from this study was related to overall peer teaching experience. A significant difference was found among LPI subscale scores when groups were established using the overall peer teaching experience variable. The group established as reporting a great deal of peer teaching experience during medical school was higher on three of the LPI subscales in relation to the group established as reporting none/little experience. The three subscales were Model the Way, Inspire a Shared Vision, and Challenge the Process. In this analysis, no significant differences were found in the Enable Others to Act and Encourage the Heart subscales related to overall peer teaching experience.

Beyond reporting overall teaching experience during medical school, residents who engaged in some level of tutoring (1-10 hours or 11 or more hours, compared to zero hours), reported higher scores on all but one of the leadership practices subscales. The one scale that did not reveal a significant difference was Enable Others to Act. There were slight differences in the effect, but the key finding in this area was a significant

difference in each of these subscales when comparing some tutoring experience to no tutoring experience.

A third interesting result related to teaching as a component of leadership couples the first two quantitative findings with the respondents' overall mean subscale scores. Enable Others to Act (EOA) was the only LPI subscale that did not demonstrate a significant relationship with peer teaching in any capacity; however, of the five LPI subscales, EOA was the highest mean subscale score in this study. An interesting contrast appears to have been at play with these findings. Residents overall scored highest in EOA, but no relationship was found between EOA and peer teaching.

Residents also noted the importance of EOA qualities in a leader on the qualitative portion of the survey. Regarding the question of the ideal leader of a medical team, statements were made such as: divides tasks among the team, delegates, teaches, and allows team members to function at their level of expertise. Based on the mean EOA subscale score, respondents reported already practicing many skills identified in the EOA subscale.

On the surface, Enabling Others to Act could be construed as the primary purpose of teaching. Deeper examination of the individual questions associated with the EOA subscale reveal that only one relates to teaching. Five of the six statements associated with the EOA subscale questions pertain to developing cooperative relationships, actively listening to diverse points of view, treating people with dignity and respect, supporting individual decisions, and giving people autonomy in their work. Only one statement on the EOA subscale is focused on increasing the knowledge and skills of team members.

This teaching quality was one facet of leadership that was consistent with the qualitative data.

In the open-ended question asking residents to identify important leadership qualities, teaching was reported 28 times, or by 20% of respondents. These comments were evenly split between a view of the leader-as-teacher as an expert who simply imparts knowledge to the residents, and a view of the leader-as-teacher as someone who fosters the growth of team members, accommodates different learning styles, and recognizes strengths of all team members. This balance suggests that respondents equally valued knowledge and expertise, consistent with an expert approach to teaching, and developing the capacity of individuals and team, consistent with a more cooperative approach to teaching and learning.

These results align with the previously stated need for physician leaders. Leadership in medicine is a complex task, as the nature of medicine is life and death. Healthcare systems require leaders to not only be expert clinicians with extensive knowledge, but also people who can build and support collaboration and teamwork (Chaudry et al., 2008; Dye & Garman, 2006).

The Leadership Identity Development (LID) model (Komives et al., 2006) may provide a framework for interpreting these findings. This model supports the idea that leadership skills are not innate; they can be learned. The LID outlines five critical elements in the process of leadership development, including: A broadening view of leadership, developing sense of self, group influences, developmental influences, and a changing view of the self with others.

Conceivably, teaching experiences, and specifically tutoring experiences, prepare the peer tutor with additional confidence, or identification with the role of leader, which pertains to the broadening view of leadership component of the LID model. These experiences may also enhance social skills, which relate to the developing sense of self component. Tutoring may be a first step for some medical students to engage in organizational leadership, which, according to the group influences component of the LID model, is the first step in engaging in a series of increasingly involved roles within an organization. The group influences component describes taking on a variety of roles as gaining a better understanding of teamwork. The developmental influences component describes the process of receiving affirmations and following role models, another potential influence on the peer tutor or teacher. Finally, in the changing view of self and others component of leadership development, leaders learn to become less dependent, more independent, and finally, interdependent. This process is recognized in peer tutoring, as peer tutors and teachers must be able to work independently as well as interdependently, to serve as an effective teacher.

The qualitative analysis contributed to this finding. In the general qualitative analysis, when analyzing for themes, one overarching theme that was identified was teaching and communication. This finding suggests that teaching is part of the skill set of an ideal medical leader, according to respondents. Of the four peer teaching types investigated in this study, tutoring has potentially the most similarity to the one-on-one teaching that is experienced between residents and their preceptors. Skills used in this type of teaching include improving communication and social skills (Arco-Tirado, Fernandez-Martin, & Fernandez-Balboa, 2011).

Examining the difference between the overall peer teaching variable results and the tutoring-specific results, it is interesting to note that overall peer teaching was significantly related to each of the LPI subscales except Enable Others to Act and Encourage the Heart. Tutoring was significant with all except Enable Others to Act. From this, it may be deduced the importance of a range of peer teaching experiences during medical school, to introduce students to each of the Five Practices of Exemplary Leadership.

Overall, these results demonstrate a relationship between peer teaching, particularly tutoring, and leadership skills. This relationship is consistent with previous research linking the two, in a range of settings. These include elementary school children, teachers, and pre-med undergraduate students (Charteris & Smardon, 2013; Micari et al., 2010; Zhbanova et al., 2015).

Medical Specialty Area

Groups established by the residency program variable also demonstrated significant differences among the LPI subscales. The single statistically significant finding in this analysis was that the internal medicine group demonstrated higher scores on three of the LPI subscales than the combined emergency medicine/ family medicine/ pediatrics group. These three subscales were Model the Way, Inspire a Shared Vision, and Encourage the Heart. Interestingly, once again, Enable Others to Act was not significant. The other non-significant subscale was Challenge the Process.

Many of the leadership qualities noted in the qualitative responses were personality characteristics, rather than behavioral characteristics that serve as the basis of the Leadership Practices Inventory. The fact that some personality characteristics were

noted indicates that some residents felt that personality characteristics are important defining points for their ideal leader. Some researchers have also noted differences in personality types among different physician specialties. In particular, Maron, Fein, Maron, Hillel, El Baghdadi, and Rodenhauser (2007) found that internal medicine physicians were more likely to be agreeable than were other physician types. The researchers defined agreeableness as “a measure of interpersonal tendencies, assessing how an individual values different aspects of a relationship” (Maron et al., 2007, p. 23). They used the following terms to describe agreeableness: trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness. Perhaps medical students with these qualities are drawn to internal medicine, making them more likely to rate themselves higher on Model the Way, Inspire a Shared Vision, and Encourage the Heart. An alternate argument is that somehow the practices represented in these subscales of the LPI are cultivated or taught more in internal medicine than in other medical specialties. Internal medicine focuses on general adult care. Indeed, the internal medicine practice, which often works in diversely interprofessional settings such as hospitals or long-term care centers (American College of Physicians, 2017), may provide more opportunities for collaboration and teamwork than other medical specialties, particularly those providers working primarily independently in outpatient settings.

Interestingly, results from analysis of the qualitative responses among internal medicine residents demonstrated a robust group of responses for Model the Way, Inspire a Shared Vision, and Enable Others to Act. Encourage the Heart and Challenge the Process had lower ratings. This pattern, however, was consistent with most other

residency programs in the qualitative analysis, therefore they cannot be singled out for residents in internal medicine.

Implications for Practice

While medical schools do not typically have a structured curriculum in leadership (Gabel, 2012; Osborne, 2012), the results of this study suggest that peer teaching experiences, via incidental learning, may be one avenue to convey some leadership skills to aspiring physicians, while not adding instructional time to medical school curriculum. These experiences, however, do not seem to impart skills pertaining to Enable Others to Act, such as building committed teams and actively involving others. Carefully crafted curricula involving a range of peer teaching experiences, particularly peer tutoring experiences, may contribute to achievement of the leadership competencies outlined by the AAMC in their 58 General Physician Competencies that are expected of medical school graduates (Englander et al., 2013).

Because groups established based on the two significant teaching variables, overall peer teaching experience and tutoring, demonstrated differences among the LPI subscales, it is important that medical schools offer a range of peer teaching experiences to medical students, in an effort to prepare them with the full range of skills associated with leadership according to Kouzes and Posner's (2002a) Five Practices of Exemplary Leadership.

Related to the differences in LPI scores among residency specialty areas, it is important to ensure that all medical students are provided the opportunity to acquire these leadership skills, with the expectation that students will take these skills with them into residency. Further, because the nature of peer teaching means working together with

other students, this result may indicate the importance of ensuring students have experiences working with many different students, to have a range of experiences working with unique personalities and various skill sets.

Recommendations for Further Research

Several recommendations for further research can be made based on this study, primarily pertaining to differences in peer teaching types related to leadership skill acquisition.

1. Conduct a study to further examine the differences between peer teaching types on leadership skill development, including investigating more about which aspects of overall peer teaching, and particularly tutoring, affect leadership skills.
2. Investigate possible differences between overall teaching and tutoring on the subscales of Enable Others to Act and Encourage the Heart.
3. Research the specific skills learned in overall peer teaching experience that may influence Model the Way, Inspire a Shared Vision, and Challenge the Process, but do not impact Enable Others to Act or Encourage the Heart.
4. Explore reasons why Enable Others to Act has no relationship with peer teaching experience.
5. Conduct a study to expand the research on differences in leadership skill development between medical residency specialty areas.
6. Given no differences among U.S.-based and international medical graduates, future research would be valuable to understand what learning experiences students encounter in other countries that result in similar leadership scoring

as residents from U.S.-based medical schools. Further, investigate whether peer teaching experiences are part of the curriculum in international medical programs.

7. Further investigate gender differences among medical residents in leadership practices. Since gender differences in this study were inconclusive based on a significant MANOVA but no significant post hoc tests, additional research in this area may be insightful.

Conclusion

This study sought to investigate differences among peer teaching experiences during undergraduate medical education (UGME) and self-reported leadership practices during medical residency. Physicians are increasingly being recruited, and expected, to take on leadership roles in all areas and types of health care organizations due to their ability to understand both the clinical and administrative aspects of healthcare management (Angood & Birk, 2014). The Association of American Medical Colleges also now expects medical students to matriculate to residency programs with leadership competencies already learned (Englander et al., 2013). But medical school curriculum typically has little or no time for instruction outside of the essential basic and clinical sciences; content areas which themselves are expanding in breadth every day. The range of instructional tools utilized by medical schools often includes peer teaching and learning, in which students teach and learn from each other. The heart of this research was to investigate whether leadership skills can be learned via involvement in peer teaching experiences.

This study was conducted utilizing a three-part survey completed by medical residents. This survey included an open-ended question regarding respondents' perception of the ideal leader; the Leadership Practices Inventory, a commonly used leadership skill self-assessment tool, and twelve peer teaching, residency, and personal demographic questions.

Results of this study align with previous research, demonstrating that peer teaching can be associated with an increase in leadership scores. This study revealed that among medical residents, overall peer teaching and tutoring specifically were associated with an increase in most, but not all, of the leadership domains identified by Kouzes and Posner (2002a). Among the Five Practices of Exemplary Leadership, Model the Way, Inspire a Shared Vision, Challenge the Process, and Encourage the Heart all had some significant findings associated with peer teaching. The last of the Five Practices of Exemplary Leadership, Enable Others to Act, was not significantly related to any peer teaching experiences.

Type of residency program also was found to be significant. This study discovered that internal medicine residents in general scored higher than a group of combined emergency medicine, family medicine, and pediatric residents on three of the five leadership domains.

Further research is necessary to continue to investigate detailed aspects of the relationship between peer teaching and leadership skill development, specifically in the medical student and resident populations.

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APPENDIX A

Complete Survey Instrument (1 of 4 pages)

Dear Resident,

Thank you for participating in this study. Completing this packet signifies your willingness to participate.

1. Please briefly describe the ideal leader of a medical team.

Then, move on to the next page.

APPENDIX A (cont.)

Complete Survey Instrument (2 of 4 pages)



BY JAMES M. KOUZES & BARRY Z. POSNER

INSTRUCTIONS

you will find thirty statements describing various leadership behaviors. Please read each statement carefully, and using the rating scale below, ask yourself:

“How frequently do I engage in the behavior described?”

- Be realistic about the extent to which you actually engage in the behavior.
- Be as honest and accurate as you can be.
- DO NOT answer in terms of how you would like to behave or in terms of how you think you should behave.
- DO answer in terms of how you typically behave on most days, on most projects, and with most people.
- Be thoughtful about your responses. For example, giving yourself 10s on all items is most likely not an accurate description of your behavior. Similarly, giving yourself all 1s or all 5s is most likely not an accurate description either. Most people will do some things more or less often than they do other things.
- If you feel that a statement does not apply to you, it's probably because you don't frequently engage in the behavior. In that case, assign a rating of 3 or lower.

For each statement, decide on a response and then record the corresponding number in the box to the right of the statement. After you have responded to all thirty statements, go back through the LPI one more time to make sure you have responded to each statement. *Every* statement *must* have a rating.

The Rating Scale runs from 1 to 10. Choose the number that best applies to each statement.

| RATING SCALE | 1-Almost Never | 3-Seldom | 5-Occasionally | 7-Fairly Often | 9-Very Frequently |
|--------------|----------------|-------------------|----------------|----------------|-------------------|
| | 2-Rarely | 4-Once in a While | 6-Sometimes | 8-Usually | 10-Almost Always |

Thank you.

APPENDIX A (cont.)

Complete Survey Instrument (3 of 4 pages)

To what extent do you engage in the following behaviors? Choose the response number that best applies to each statement and record it in the box to the right of that statement.

| | |
|--|----------------------|
| 1. I set a personal example of what I expect of others. | <input type="text"/> |
| 2. I talk about future trends that will influence how our work gets done. | <input type="text"/> |
| 3. I seek out challenging opportunities that test my own skills and abilities. | <input type="text"/> |
| 4. I develop cooperative relationships among the people I work with. | <input type="text"/> |
| 5. I praise people for a job well done. | <input type="text"/> |
| 6. I spend time and energy making certain that the people I work with adhere to the principles and standards we have agreed on. | <input type="text"/> |
| 7. I describe a compelling image of what our future could be like. | <input type="text"/> |
| 8. I challenge people to try out new and innovative ways to do their work. | <input type="text"/> |
| 9. I actively listen to diverse points of view. | <input type="text"/> |
| 10. I make it a point to let people know about my confidence in their abilities. | <input type="text"/> |
| 11. I follow through on the promises and commitments that I make. | <input type="text"/> |
| 12. I appeal to others to share an exciting dream of the future. | <input type="text"/> |
| 13. I search outside the formal boundaries of my organization for innovative ways to improve what we do. | <input type="text"/> |
| 14. I treat others with dignity and respect. | <input type="text"/> |
| 15. I make sure that people are creatively rewarded for their contributions to the success of our projects. | <input type="text"/> |
| 16. I ask for feedback on how my actions affect other people's performance. | <input type="text"/> |
| 17. I show others how their long-term interests can be realized by enlisting in a common vision. | <input type="text"/> |
| 18. I ask "What can we learn?" when things don't go as expected. | <input type="text"/> |
| 19. I support the decisions that people make on their own. | <input type="text"/> |
| 20. I publicly recognize people who exemplify commitment to shared values. | <input type="text"/> |
| 21. I build consensus around a common set of values for running our organization. | <input type="text"/> |
| 22. I paint the "big picture" of what we aspire to accomplish. | <input type="text"/> |
| 23. I make certain that we set achievable goals, make concrete plans, and establish measurable milestones for the projects and programs that we work on. | <input type="text"/> |
| 24. I give people a great deal of freedom and choice in deciding how to do their work. | <input type="text"/> |
| 25. I find ways to celebrate accomplishments. | <input type="text"/> |
| 26. I am clear about my philosophy of leadership. | <input type="text"/> |
| 27. I speak with genuine conviction about the higher meaning and purpose of our work. | <input type="text"/> |
| 28. I experiment and take risks, even when there is a chance of failure. | <input type="text"/> |
| 29. I ensure that people grow in their jobs by learning new skills and developing themselves. | <input type="text"/> |
| 30. I give the members of the team lots of appreciation and support for their contributions. | <input type="text"/> |

APPENDIX A (cont.)

Complete Survey Instrument (4 of 4 pages)

Peer teaching activities involve medical students teaching other medical students, such as tutoring, supplemental instruction, small-group facilitation, and clinical skills training. Please indicate the total number of hours you served in a teaching role during medical school for each activity below by marking the appropriate space next to each peer teaching type:

| | | | | | |
|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1. Tutoring | None | 1-10 hours | 11-25 hours | 26-50 hours | 50+ hours |
| | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. Supplemental Instruction (SI) | None | 1-10 hours | 11-25 hours | 26-50 hours | 50+ hours |
| | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. Small Group Facilitation | None | 1-10 hours | 11-25 hours | 26-50 hours | 50+ hours |
| | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 4. Clinical Skills Teaching | None | 1-10 hours | 11-25 hours | 26-50 hours | 50+ hours |
| | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

5. Thinking back to your role in teaching during medical school, to what degree would you say you participated:

| | |
|-----------------------|-----------------------|
| None/little | A great deal |
| <input type="radio"/> | <input type="radio"/> |

- | | |
|---|--|
| <p>6. What is your age?</p> <p><input type="radio"/> 28 or younger</p> <p><input type="radio"/> 29-33</p> <p><input type="radio"/> 34+</p> <p>7. What is your gender?</p> <p><input type="radio"/> Female</p> <p><input type="radio"/> Male</p> <p><input type="radio"/> Other</p> <p>8. What is your race?</p> <p><input type="radio"/> American Indian/Alaska Native</p> <p><input type="radio"/> Asian</p> <p><input type="radio"/> Black/African American</p> <p><input type="radio"/> Caucasian</p> <p><input type="radio"/> Native Hawaiian/Pacific Islander</p> <p><input type="radio"/> Two or more races</p> <p>9. What is your ethnicity?</p> <p><input type="radio"/> Hispanic/Latino</p> <p><input type="radio"/> Not Hispanic/Latino</p> | <p>10. Where did you complete your medical school training?</p> <p><input type="radio"/> US</p> <p><input type="radio"/> Outside the US (International Medical Graduate)</p> <p>11. What is your current year of residency?</p> <p><input type="radio"/> 1</p> <p><input type="radio"/> 2</p> <p><input type="radio"/> 3</p> <p><input type="radio"/> 4</p> <p><input type="radio"/> 5+</p> <p>12. In which UNR Med residency program are you enrolled?</p> <p><input type="radio"/> Emergency Medicine</p> <p><input type="radio"/> Family Medicine</p> <p><input type="radio"/> Internal Medicine</p> <p><input type="radio"/> Ob/Gyn</p> <p><input type="radio"/> Pediatrics</p> <p><input type="radio"/> Psychiatry</p> <p><input type="radio"/> Surgery</p> |
|---|--|

Thank you very much!

Many people find their own results informative. If you would like a copy of your LPI scores, please provide your email address here: _____

Your email address will not be used in this research.

APPENDIX B

LPI Permission Letter

WILEY

November 5, 2015

Jennifer Bennett
411 W. Second Street
Reno, Nevada 89503

Dear Ms. Bennett:

Thank you for your request to use the LPI®: Leadership Practices Inventory® in your dissertation. This letter grants you permission to use either the print or electronic LPI [Self/Observer/Self and Observer] instrument[s] in your research. You may *reproduce* the instrument in printed form at no charge beyond the discounted one-time cost of purchasing a single copy; however, you may not distribute any photocopies except for specific research purposes. If you prefer to use the electronic distribution of the LPI you will need to separately contact Eli Becker (ebecker@wiley.com) directly for further details regarding product access and payment. Please be sure to review the product information resources before reaching out with pricing questions.

Permission to use either the written or electronic versions is contingent upon the following:

- (1) The LPI may be used only for research purposes and may not be sold or used in conjunction with any compensated activities;
- (2) Copyright in the LPI, and all derivative works based on the LPI, is retained by James M. Kouzes and Barry Z. Posner. The following copyright statement must be included on all reproduced copies of the instrument(s): "Copyright © 2013 James M. Kouzes and Barry Z. Posner. Published by John Wiley & Sons, Inc. All rights reserved. Used with permission";
- (3) One (1) **electronic** copy of your dissertation and one (1) copy of all papers, reports, articles, and the like which make use of the LPI data must be sent **promptly** to my attention at the address below; and,
- (4) We have the right to include the results of your research in publication, promotion, distribution and sale of the LPI and all related products.

Permission is limited to the rights granted in this letter and does not include the right to grant others permission to reproduce the instrument(s) except for versions made by nonprofit organizations for visually or physically handicapped persons. No additions or changes may be made without our prior written consent. You understand that your use of the LPI shall in no way place the LPI in the public domain or in any way compromise our copyright in the LPI. This license is nontransferable. We reserve the right to revoke this permission at any time, effective upon written notice to you, in the event we conclude, in our reasonable judgment, that your use of the LPI is compromising our proprietary rights in the LPI.

Best wishes for every success with your research project.

Cordially,



Ellen Peterson
Permissions Editor
Epeterson4@gmail.com

APPENDIX C

Letter of IRB Approval from University of Nevada, Reno (1 of 2 pages)



University of Nevada, Reno

Research Integrity Office
 218 Ross Hall / 331,
 Reno, Nevada 89557
 775.327.2368 / 775.327.2369 fax
www.unr.edu/research-integrity

DATE: October 7, 2016
 TO: Janet Usinger, Ph.D.
 FROM: University of Nevada, Reno Institutional Review Board (IRB)

PROJECT TITLE: [968887-1] The Relationships Among Peer-Teaching Experiences and Leadership Practices of Medical Residents
 REFERENCE #: Social Behavioral
 SUBMISSION TYPE: New Project
 ACTION: DETERMINATION OF EXEMPT STATUS
 DECISION DATE: October 7, 2016
 REVIEW CATEGORY: Exemption Category #2

--

The Research Integrity Office, or the IRB reviewed this project and has determined it is EXEMPT FROM IRB REVIEW according to federal regulations. Please note, the federal government has identified certain categories of research involving human subjects that qualify for exemption from federal regulations.

Only the Research Integrity Office and the IRB have been given authority by the University to make a determination that a study is exempt from federal regulations. The above-referenced protocol was reviewed and the research deemed eligible to proceed in accordance with the requirements of the Code of Federal Regulations on the Protection of Human Subjects (45 CFR 46.101 paragraph [b]).

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Reviewed Documents

- Advertisement - Recruitment Script - Coordinator (UPDATED: 10/5/2016)
- Advertisement - Recruitment Script - CO-I (UPDATED: 10/5/2016)
- Application Form - Exempt 2 Tests Surveys Interviews Observation 061316 (1).docx (UPDATED: 10/5/2016)
- Consent Form - Information Sheet (UPDATED: 10/5/2016)
- Letter - Site Approval (UPDATED: 10/5/2016)
- Questionnaire/Survey - Survey (UPDATED: 10/5/2016)
- University of Nevada, Reno - Part I, Cover Sheet - University of Nevada, Reno - Part I, Cover Sheet (UPDATED: 10/3/2016)

If you have any questions, please contact Nancy Moody at 775.327.2367 or at nmoody@unr.edu.

NOTE for VA Researchers: You are not approved to begin this research until you receive an approval letter from the VASNHCS Associate Chief of Staff for Research stating that your research has been approved by the Research and Development Committee.

Sincerely,

APPENDIX C (cont.)

Letter of IRB Approval from University of Nevada, Reno (2 of 2 pages)



Richard Bjur, PhD
Co-Chair, UNR IRB
University of Nevada Reno



Janet Usinger, PhD
Co-Chair, UNR IRB
University of Nevada Reno

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Nevada, Reno IRB's record.

APPENDIX D

Research Script (for Co-Investigator)

Hello, my name is Jennifer Bennett, a PhD student in Educational Leadership. For my dissertation, I am conducting a research study about leadership practices among medical residents in relation to peer teaching experiences during medical school.

I have a brief survey that will take about 15 minutes of your time to complete. For this survey, you will be asked to provide a brief response to one open-ended question about leadership, complete the widely-used Leadership Practices Inventory, and respond to a few peer-teaching, residency, and demographic characteristic questions. Your participation is entirely voluntary. I will only use aggregated data in my research study report. Some of you may wish to see your own scores on the Leadership Practices Inventory. If so, you may add your email address at the end of the survey and your results will be sent to you. Email addresses will not be stored with the data, nor will they be used in data analysis. Individual residency program aggregate data will be made available to program directors, but no individual data will be released. I'm also giving you an information sheet, which provides more detail about the study.

Are you ready to begin?

[After survey completion.] Thank you for your participation in this research study. If you have any questions, you may reach me by email at jbennett@med.unr.edu or by phone at 775-784-3538.

APPENDIX D (cont.)

Research Script (for residency program personnel)

Hello, residents. Jennifer Bennett, a faculty member at UNR Med, is a PhD student in Educational Leadership. For her dissertation, she is conducting a research study about leadership practices among medical residents in relation to peer teaching experiences during medical school.

I am handing out her brief survey that will take about 15 minutes of your time to complete. For this survey, you will be asked to provide a brief response to one open-ended question about leadership, complete the widely-used Leadership Practices Inventory, and respond to a few peer-teaching, residency, and demographic characteristic questions. Your participation is entirely voluntary. Jennifer will only use aggregated data in her research study report. Some of you may wish to see your own scores on the Leadership Practices Inventory. If so, you may add your email address at the end of the survey and your results will be sent to you. Email addresses will not be stored with the data, nor will they be used in data analysis. Individual residency program aggregate data will be made available to program directors, but no individual data will be released. I'm also giving you an information sheet, which provides more detail about the study.

Are you ready to begin?

[After survey completion.] Thank you for your participation in this research study. If you have any questions, you may reach Jennifer by email at jbennett@med.unr.edu or by phone at 775-784-3538.

APPENDIX E

Information Sheet

University of Nevada, Reno
Educational Research Information Sheet



University of Nevada, Reno
Institutional Review Board
Approved on: October 7, 2016

| | |
|--------------------------------|---|
| Title of Study: | The Relationships Among Peer Teaching Experiences and Leadership Practices of Medical Residents |
| Principal Investigator: | Janet Usinger, PhD, usingerj@unr.edu, 775-682-9083 |
| Co-Investigator: | Jennifer Bennett, MPH jbennett@med.unr.edu, 775-784-3538 |

You are being invited to participate in a research study. The purpose of this study is to explore the relationships among peer teaching experiences during medical school and leadership skills in medical residency. We are asking you to be in this study because you are a resident in the University of Nevada, Reno School of Medicine. We expect to enroll 395 participants.

If you agree to be in this study you will complete a three-part survey consisting of one open-ended question, the Leadership Practices Inventory (LPI), and a few questions related to your residency, peer teaching, and a few demographic questions. The survey will take about 15 minutes to complete.

Your participation in this study is completely voluntary. If you choose not to participate, you may simply return a blank survey.

This study is considered minimal risk. The LPI is a commonly used survey; no sensitive or personal questions will be asked.

Although we cannot promise that you will benefit from being in this study, you may learn more about your own leadership practices. If you would like to receive your personal leadership scores, you may include your e-mail address at the end of the survey. Once we have sent you your results, your e-mail address will be physically removed from the survey and shredded.

We will treat your identity with professional standards of confidentiality and protect your private information to the extent allowed by law. We will do this by only allowing access to your study records to the researchers identified above and the University of Nevada, Reno Institutional Review Board. All data will be reported at the aggregate level and we will not use your name or other information that could identify you in any reports or publications that result from this study.

At any time, if you have questions about this study or wish to report an injury that may be related to your participation in this study, contact **Janet Usinger, PhD, at 775-682-9083, or Jennifer Bennett, MPH, at 775-784-3538**. You may discuss a problem or complaint or ask about your rights as a research participant by calling the University of Nevada, Reno Research Integrity Office at (775) 327-2368. You may also use the online *Contact the Research Integrity Office* form available from the [Contact Us page](#) of the University's Research Integrity Office website at: <http://www.unr.edu/research-integrity/contact-rio>.