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Emotional Intelligence in Medical Laboratory Science

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EMOTIONAL INTELLIGENCE IN MEDICAL LABORATORY SCIENCE

by

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ABSTRACT

Emotional Intelligence in Medical Laboratory Science

by

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Utah State University, 2013

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The purpose of this study was to explore the role of emotional intelligence (EI) in medical laboratory science, as perceived by laboratory administrators. To collect and evaluate these perceptions, a survey was developed and distributed to over 1,400 medical laboratory administrators throughout the U.S. during January and February of 2013. In addition to demographic-based questions, the survey contained a list of 16 items, three skills traditionally considered important for successful work in the medical laboratory as well as 13 EI-related items. Laboratory administrators were asked to rate each item for its importance for job performance, their satisfaction with the item's demonstration among currently working medical laboratory scientists (MLS) and the amount of responsibility college-based medical laboratory science programs should assume for the development of each skill or attribute. Participants were also asked about EI training in their laboratories and were given the opportunity to express any thoughts or opinions about EI as it related to medical laboratory science.

This study revealed that each EI item, as well as each of the three other items, was considered to be very or extremely important for successful job performance. Administrators conveyed that they were satisfied overall, but indicated room for improvement in all areas, especially those related to EI. Those surveyed emphasized that medical laboratory science programs should continue to carry the bulk of the responsibility for the development of technical skills and theoretical knowledge and expressed support for increased attention to EI concepts at the individual, laboratory, and program levels.

(168 pages)

PUBLIC ABSTRACT

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Medical laboratory scientists (MLSs) are responsible for performing highly complex biochemical analyses on samples collected from patients in hospitals and clinics. The performance of these tests often involves little patient exposure on the part of the MLS and as a result some have wondered about the role soft skills, like communication, conflict resolution and empathy, play in medical laboratory science. The aim of this study was to explore the importance that medical laboratory administrators place on these types of skills, collectively referred to as emotional intelligence (EI), as well as to assess how satisfied they were with the demonstration of emotional intelligence among MLSs. Additionally, this study explored the current state of EI training in medical laboratories as well as the responsibility that college-based medical laboratory science programs should assume for the development of EI skills, as perceived by medical laboratory administrators.

A survey was distributed to members of the Clinical Laboratory Management Association in January and February of 2013. Just over 400 completed surveys were collected and analyzed. Overall, medical laboratory administrators found all emotional

intelligence related items to be “very” or “extremely” important, but indicated that there is room for improvement in these skills. They conveyed that a certain level of EI-related training occurs in medical laboratories and hospitals, but that this training could be more effective. Medical laboratory administrators supported increased attention to the development of EI skills at the medical laboratory science program level, but indicated that individuals interested in a career in medical laboratory science should assume most of the responsibility for the development of these skills.

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I dedicate this dissertation to my parents. To my mother, Christine Price, for the confidence she instilled in me since birth. She's always cheered me on and buoyed me up. I also dedicate this to my late father, Ronald Price, for leaving me with a desire to always learn and for showing me the way to work, serve, and love.

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CHAPTER I

INTRODUCTION

Few aspects of American life are receiving more attention than the current healthcare system. Political movements, a downed economy and the explosion of technology have propagated remarkable and unprecedented changes in all healthcare related fields. Hospitals, healthcare systems and networks, insurance companies and even state health departments must face these changes head on in order to survive in the 21st century. The trickledown effect of these large-scale, systemic changes has been an evolution of the role of individuals in medical professions. This is especially apparent in the medical laboratory.

For decades medical laboratories functioned as generators of health information and did so with minimal interaction with patients and other healthcare workers. Recent changes in medicine have brought the idea of the "healthcare team" to the forefront and have given rise to a more customer-focused healthcare system (Davis, Chinnis, & Dunmire, 2006; Dooley, 2006). These changes have already, and undoubtedly will continue to expand the role of medical laboratory scientists (MLSs), increasing their conspicuousness in healthcare settings and intensifying the level of interpersonal communication and teamwork required of medical laboratory professionals.

As the skills required to navigate increased interpersonal interaction and heightened social involvement are added to the technical and theoretical skills that have dominated the field for decades, one might wonder how well MLSs perform in these areas. Currently, there are no published studies that examine the way MLSs are perceived

when it comes to the softer skills like communication, conflict resolution, empathy, and integrity. This study explored the perceived importance of soft skills, also referred to as emotional intelligence (EI), among MLSs.

This chapter will begin with a brief overview of the work performed by MLSs as well as the training that is required to work in the field. The construct of EI will be defined and briefly explained followed by a look at the way EI may impact the medical laboratory and those who work therein.

Training and Work of Medical Laboratory Scientists

The medical laboratory is staffed by a range of individuals with various levels of education and an array of skills and abilities. Entry-level positions that require only brief training and minimal education include technical support personnel, phlebotomists, and specimen processors who are also referred to as clinical laboratory assistants (CLA). The area of the medical laboratory where testing is performed is divided into a number of different departments. These departments may include chemistry, hematology, microbiology, immunology, coagulation, urinalysis, transfusion medicine (blood bank), histology, cytology, and toxicology.

The cytology and histology departments work closely with anatomic and clinical pathologists and often employ individuals who have completed training programs and are certified in the areas of cell and tissue preparation. The other departments most often employ personnel with associates or bachelor level degrees in clinical or medical laboratory science or related science fields. Shortly after completion of the associates of

science degree, medical laboratory science students will typically take a certifying exam administered by the American Society of Clinical Pathologists to become certified medical laboratory technicians (MLT). The process is similar for those completing bachelor's degrees; only the title of the certification is Medical Laboratory Scientist. Before recent collaboration between various governing bodies and certification agencies, many types of certification with an equal number of titles for laboratory scientists existed, including medical technologist (MT), clinical laboratory scientist (CLS), and clinical laboratory technician (CLT). The recent unification of the certifying agencies and the standardization of certification names have increased notoriety among laboratory professionals and have reduced confusion for those not familiar with the medical laboratory profession. The roles and responsibilities differ only slightly between MLTs and MLSs, so for simplicity, this study will refer to both groups collectively as MLSs.

The medical laboratory in general plays a central, although often unrecognized role in the diagnosis and treatment of disease. Some sources estimate that 70-80% of medical decisions are directly based on laboratory values (Wians, 2009). Currently, there are more than 10,000 diagnostic laboratory tests available to providers (Leibach, 2011). Spending on these types of tests is estimated to represent 2-3% of the gross domestic product (Nejat, 2006). For decades the medical laboratory was seen more as servant to the hospital and physician staff and not as much as a contributing partner. Recent changes in technology and healthcare management have led to a paradigm shift in the way the medical laboratory is viewed as well as the way in which MLSs will be expected to interact with patients and other healthcare professionals (Panteghini, 2004; Plebani, 2002).

The primary responsibilities for MLSs include the performance of biochemical tests on a variety of body fluids such as blood, urine and cerebral spinal fluid. The results of these tests must be verified for accuracy and are then reported to pathologists and other physicians. The type of laboratory where MLSs work varies from small physician's office labs that may hire only one or two part-time MLSs to large reference labs that run 24 hours a day, 7 days a week and employ hundreds or even thousands of MLSs. Regardless of where MLSs are employed, a number of characteristics are consistent among those who seek degrees and jobs in the medical laboratory.

MLSs must be very detail oriented and meticulous in their work. They appreciate a challenge, enjoy investigative work and do not mind working alone (Beck & Laudicina, 1999). In school, these individuals often excel in science courses such as chemistry, biology and math. MLSs are inquisitive, analytical, and systematic, often preferring instructions, routines, and procedures to freethinking and creativity (American Society for Clinical Pathology, ASCP Laboratory Professionals, 2012). MLSs operate sophisticated instruments, perform complex biochemical analyses and scrutinize thousands of pieces of medical information every day. Incorrect analysis or improper reporting of medical information can have devastating consequences on the treatment of patients.

The thousands of tests that are performed by MLSs influence a wide range of decisions including those made to amputate limbs, initiate chemotherapy, administer expensive medications with long lists of side effects and may even influence a family's decision to discontinue life support for a loved one. With so much riding on the quality of

laboratory testing, the focus for education and staff development has always been on technical skills and analytical abilities.

With such heavy emphasis on technical and analytical abilities, and recognizing the life-changing importance of their work, one might wonder do those who possess such qualities lack in areas of a more emotional nature. Few would argue that many are drawn to the field of laboratory medicine because of the lack of patient interaction, not in spite of it. With almost every other healthcare profession involving a certain degree of patient contact, the medical lab serves as somewhat of a collecting point for those who may be uninterested in patient interaction but still desire to work in a healthcare field. Whether as a root cause or a self-fulfilling prophecy, laboratory scientists have gained the reputation of being less socially and emotionally capable than other healthcare professionals (Adams, McCabe, Zundel, Price, & Dahl, 2011). This reputation would imply that laboratory professionals are less capable of, or perhaps less interested in recognizing and managing their own emotions as well as understanding and managing the emotions of others. This attention to emotions and their management is a fundamental component of what has been termed EI (Mayer, DiPaulo, & Salovey, 1990).

Emotional Intelligence

Research in character and personality has existed for hundreds, if not thousands of years (Mayer & Cobb, 2000). In the early 1930s, Edward Thorndike used the phrase "social intelligence" to describe the way an individual gets along with others (Thorndike & Stein, 1937). Over the 50 years that followed Thorndike's initial mention of social

intelligence, many researchers sought to identify and define the way in which the affective components of intelligence influenced behavior. During this time David Wechsler, Howard Gardner, and Abraham Maslow all published work in fields directly related to EI; however, it has only been within the last 30 years that the emotional side of intelligence, or EI, as its own type of intelligence has been actively studied by psychologists and educational researchers. The first definitions and measurements of EI appeared in journal articles by John Mayer, Maria DiPaulo, David Curuso, Rueven Bar-On, and Peter Salovey in the early 1990s (Mayer et al., 1990; Mayer, Salovey, & Caruso, 2004). Shortly thereafter, Daniel Goleman (2006), an American psychologist and journalist, popularized the concept with his bestselling book, *Emotional Intelligence: Why It Can Matter More Than IQ*. Claims such as "Emotional intelligence is as powerful, and at times more powerful, than IQ" and "emotional intelligence, more than IQ…is the most reliable predictor of success in life and school" quickly grabbed the attention of the general public as well as leaders in business and education (Sherer, 1997, p. 4). *Time* magazine and other popular media continued to fuel the establishment of business models that viewed EI as a critical component for group dynamics, hiring practices, and supervisor training (Bellizzi, 2008).

The article in *Time* cited the now famous experiment where children were given the choice between one marshmallow immediately or two marshmallows if they waited a few minutes while the researcher ran some errands. This ability to control one's emotions, in this case by delaying gratification, is often described as one of the key components of EI. The conclusion of the study pointed to EI as a predictor for life success, essentially

curbing a long standing idea that traditional, rational intelligence was the most significant predictor for success (Gibbs, Epperson, Mondi, Graff, & Towle, 1995).

The theory of EI is very complex and conceptualized and interpreted differently by psychologists and other researchers. As a result there is no single, concrete definition widely accepted by those in the field. The definition of EI adopted for this study describes EI as an individual's ability to recognize, assess and manage their own emotions as well as their ability to interpret and evaluate the emotions of others. Furthermore, it is the ability to use that information about emotion to guide thinking and behavior (Mayer et al., 1990). This process involves the ability to perceive emotions, both of self and of others, as well as the ability to reason with emotion, understand emotion and finally manage emotion (Mayer & Salovey, 1997). A wide variety of affective skills and attributes can be found under the umbrella of EI and are sometimes referred to as soft skills. These skills and attributes include interpersonal communication, conflict resolution, anger management, respect, integrity, honesty, self-control, teamwork, adaptability, and empathy.

Emotional Intelligence Among Medical Laboratory Scientists

It was not until 1999 that studies exploring the affective side of medical laboratory science began to appear in scientific journals. The lack of attention paid to the emotional abilities among laboratory scientists most likely stemmed from the role laboratory scientists have played in healthcare during most of the 20th century. Until recent changes in healthcare administration, MLSs have remained unseen generators of

patient health information (Plebani, 1999). Many people acknowledge the presence of a hospital laboratory but cannot identify the people who staff such laboratories, beyond the entry-level phlebotomist (Wilding, 1995). The advent of computers and computer assisted automation and test result reporting further pushed medical laboratory personnel into the shadows. Ryman and Leach (2000) stated, "Many physicians and healthcare workers view patient test results as objective data that is generated with minimal patient-MLS interaction" (p. 93). Without question, the lack of visibility among patients and healthcare workers alike has contributed to stereotypes about medical laboratory professionals.

New technologies and changes in healthcare management are causing dramatic changes in the role of the MLS. As the complexity and highly technical nature of tests increases, the need for medical laboratory personnel who can explain such procedures to healthcare workers and patients also increases. The personal interaction between physicians and laboratorians has increased drastically since 1990 and will continue to increase as the value of the clinical laboratory and those who staff it expands (Lundberg, 1999). The end result of these changes and advancements will likely lead to increased interpersonal communication for MLSs and a subsequent increase in the demand for those who are talented, not just in technical skills, but also in soft skills.

Current practices in medical laboratory science education do not appear to address soft skills or the development of EI as part of their curricula. Most college-based medical laboratory science programs focus almost entirely on the specific tasks and knowledge that surround laboratory tests and results. Beck and Doig (2002) suggested that "because

entry-level MLSs are expected to have extensive technical skills, medical laboratory science educators devote most of their curricula to the principles, performance, and interpretation of laboratory testing" (p. 221). A certain level of "teaching-to-the-test" occurs in medical laboratory science programs as educators work to prepare students in the area of theoretical knowledge to enable them to pass national certifying examinations. Certification is necessary for employment in most hospital laboratories and is often a requirement for licensure in those states that require it. Similarly, newly hired MLSs need to be proficient in technical skills, which can be defined as the ability to accurately perform biochemical tests and appropriately interpret the reactions and results. Medical laboratory science programs also teach basic mechanical skills, which can be summarized as the ability to diagnose instrumentation issues and efficiently troubleshoot and repair broken equipment.

The majority of medical laboratory science programs solicit the counsel of advisory boards, which are typically comprised of pathologists, physicians and medical laboratory administrators from area hospitals and clinics. These advisory boards influence the focus and attention of medical laboratory science programs. If laboratory administrators and physicians networks value the technical skills above others, their encouragement to medical laboratory science programs would be to produce students talented primarily in those specific areas. Graduates of medical laboratory science programs must be competent in the performance and interpretation of complex biochemical analyses; however, the expanding role of the MLS might suggest more emphasis should be placed on the development of soft skills to complement those of a

more technical nature. Beck and Laudicina (1999) stated, "Traditionally clinical laboratory science (CLS) educators have focused on the development of students' technical knowledge, practical skills, and problem solving abilities…these skills are still important; however, interpersonal skills and the ability to adapt to change are even more important" (p. 101). Likewise, studies have identified distinct differences in what is required for successful job performance and what is being addressed in medical laboratory science programs, indicating that many facilities value skills beyond the technical, however this valuation has not led to a subsequent change in medical laboratory science program curricula (Ryman & Leach, 2000). Beck and Doig (2002) generated findings that were "…consistent with the description of future CLS practitioners generated at the NAACLS conference and that they validate the need for non-technical skills…in the CLS curriculum" (p. 226). The current need, therefore, is to assess the value given to these soft skills with reference to the more traditionally valued technical skills and to determine the emphasis that should be placed on the development of EI related skills at the college program level.

Increasing the amount of attention paid to EI whether at the college level or within a medical laboratory carries with it a number of challenges. Perhaps the most significant of these is the way in which EI may be perceived by laboratory personnel as well as medical laboratory science students. It is logical to assume that the amount of time and energy devoted to EI skills acquisition will be a direct function of its perceived importance among those who dictate policy and practice. Currently, there is no available information regarding the perceived importance of EI among laboratory science

professionals.

Another challenge lies in who should be responsible for teaching soft skills to laboratory scientists. If soft skills are deemed important, should it be the responsibility of the college-based programs or should such skills be incorporated into on-the-job training? If college-based programs assumed responsibility for soft skills education, it might decrease the amount of time that is devoted to technical skills and the type of education practices that have direct bearing on graduate pass rates on certifying exams. There are few schools that would welcome additions to their curricula that might negatively impact certifying exam pass rates, as these are often used to draw students to programs and are a critical component of the accreditation process (Kimball, 2001). That is unless the general body of laboratory administrators indicated that EI was a necessary quality for success in the medical laboratory environment. In this case, the practical need for soft skills might offset the potential negative perceptions surrounding EI related additions to medical laboratory science curricula.

Laboratory managers and supervisors expend great amounts of time and resources in training MLSs to be competent in the various aspects of their job. New techniques, new instrumentation, increased test menus and relentless safety regulations spur what seems to be unending employee training. Adding even more training, specifically in the area of soft skills acquisition, might be viewed as extraneous and even a waste of resources and time without concrete data to suggest such skills are necessary for work in the medical laboratory. Unfortunately there are no studies that look at the perceived importance of EI for successful job performance or job satisfaction among MLSs.

Finally, there are no studies that indicate that currently practicing MLSs do, in fact, lack EI. The stigma and stereotypes surrounding medical laboratory practitioners may be only anecdotal and not truly reflective of the level of EI demonstrated by MLSs as a whole.

Summary and Problem Statement

Advances in technology, increases in healthcare options, a wider range of the types of medicine being practiced, and the immense amount of information available to patients through online sources has transformed the average patient from a passive recipient of doctor determined treatment to an active and informed consumer of healthcare. As a result, all healthcare professionals have had to shift the way they both view and treat patients. The impact on the medical laboratory has been to expand the role of the MLS to include increased interaction with patients as well as with other healthcare workers. Such a drastic change in the daily routine of the MLS will undoubtedly bring about changes in the skill set required for successful job performance and satisfaction. Technical skills always have been and likely always will be a crucial component of work as a MLS. But what is to be said of EI? How important is it currently and are practicing medical laboratory professionals already demonstrating the type of EI that is likely to be required in the very near future? And what role does the college-based medical laboratory science program play in the development of EI related skills?

The aim of this study, therefore, was to explore the role of EI among currently practicing MLSs, as perceived by lab supervisors, managers, and administrative directors.

These laboratory administrators play the most significant role in hiring practices in the medical laboratory and shape the policies and procedures that govern medical laboratory work. They have extensive one on one contact with practicing MLSs and are required to devote significant amounts of time to verifying that MLSs are competent in all facets of medical laboratory work. Furthermore, administrators sit on advisory committees that work closely with educators to develop curricula that prepare students for work in the medical laboratory.

Medical laboratory science programs are in a state of constant change, working to keep up with advances in technology and changes in healthcare. They endeavor to produce graduates who are strong in all areas deemed important by the medical laboratory community. Despite an abundance of research on the role of EI in a variety of other fields, even healthcare fields, there have been no studies that explore the way in which the medical laboratory community is influenced and impacted by EI. With added emphasis on customer care, and with the expanding role of the MLS, the need to understand the softer side of this traditionally technical field is even more apparent.

Research Questions

To shed much needed light on the role of EI in the medical laboratory science, this study seeks to answer the following questions.

1. How important is emotional intelligence to successful job performance among MLSs as perceived by laboratory administrators?
2. How satisfied are laboratory administrators with the level of emotional

intelligence among medical laboratory scientists currently working in the field?

3. According to medical laboratory administrators are there gaps between the perceived importance of emotional intelligence skills for successful job performance and their satisfaction with the demonstration of these skills among practicing MLSs?

4. How do the ratings of importance and satisfaction given to emotional intelligence traits and abilities compare with the technical skills, mechanical abilities and theoretical knowledge expected of MLSs?

5. How much responsibility do laboratory administrators perceive college-based medical laboratory science programs should assume in preparing students in technical and emotional intelligence trait and ability areas?

6. Do perceptions of the importance of emotional intelligence skills or abilities for successful job satisfaction (importance of EI scale); level of satisfaction with EI abilities among current MLSs (satisfaction with EI scale); and the level of responsibility colleges should assume in developing EI traits and abilities (program responsibility for EI scale) vary with lab size, proximity to a college-based medical laboratory science program, distribution of MLTs and MLSs, number of recently graduated MLSs per year or the years of experience, age, or gender of the laboratory administrator?

7. Are laboratories currently offering training in emotional intelligence related areas? If so, what are laboratory administrators' perceptions of these efforts?

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

This review of the literature is divided into three sections. The first section will explore EI in general. A look at the most prominent authors and articles in the field of EI will be useful in establishing a clear idea of what EI is as well as the way it has been viewed and used in a number of different fields. The second section will review the literature that surrounds EI in healthcare. While there are no studies to date that explore EI specifically among MLSs, there are many studies that have investigated the role of EI in fields such as nursing and physician training. A review of these literatures will greatly inform what has been done previously in some areas of healthcare. Although these studies look at various ways in which EI concepts impact medicine, they are not entirely applicable to medical laboratory sciences, particularly due to the differences in the amount of patient interaction among MLSs, especially when compared to physicians and nurses. The third section of this literature review will explore studies that looked at EI among students and professionals in highly technical fields like engineering and information technology. These studies are applicable in that the scientific and technical nature of the education and training required for these careers as well as the amount of interpersonal interaction that engineers and information technology professionals experience in the day to day performance of their responsibilities seems to closely mirror that of MLSs. Due to the complex nature of the construct of EI as well as the unique

conglomeration of skills and qualities needed for work in the medical laboratory science field, it is necessary to review these three areas of literature in order to best inform the current study.

Review Procedures

Article databases were accessed through Utah State University and Weber State University libraries. Scholarly work such as journal articles and dissertations were searched for using databases such as MEDLINE, CINAHL, Health Source, PubMed Central, ScienceDirect, ERIC, Education Full Text and Google scholar between January of 2011 and September of 2012. The terms used included EI or soft skills with the combination of medical+laboratory+science, clinical+laboratory+science, nursing, pharmacy, medicine, dental+hygiene, respiratory+therapy, engineering, information+technology, technical, science, and laboratory. With the exception of those seminal articles tied to the early work in EI, exclusion criteria were used to limit findings to only those works published in the last fifteen years. These searches yielded no studies that explored EI among MLSs or medical laboratory science programs, more than 100 articles with EI or soft skills and nursing as key words and a dozen or so literatures that explored the role of EI in technical fields such as engineering.

Quality of Outcomes

The quality of the study outcome for those studies that explored EI in different fields was measured using a number of variables and was ranked as poor, fair or good. Good study outcomes came from studies that had a clear, research-based definition of EI

that guided the study, used random selection of participants, had clear measurements of both EI and outcomes, identified the validity of the EI measure and controlled for extraneous variables. An example of a high-quality study can be seen in Por, Barriball, Fitzpatrick, and Roberts' (2011) study of EI and nursing student performance. Por and colleagues did a thorough introduction about EI and its relation to nursing education, while citing relevant articles. Their correlation study made use of the Schutte EI Scale (SEIS) that has been shown to be a reliable and valid measure of EI (Schutte et al., 1998). They compared scores on SEIS with Short Nursing Competence Questionnaire (SNCQ) as well as with the students' GPA. Statistical analysis included Cronbach's alpha to determine internal reliability of measurement scales as well as Spearman's Rho, Kruskal-Wallis Test, and multiple regressions to support their conclusions.

Studies with poor outcomes were typically deficient in one or more category listed above. Although Wood (2010) offered good information about the role of soft skills in higher education, her methodologies are fraught with deficiencies and threats to internal validity. All but one of her measures for both outcomes and EI are self-reported surveys with no attention paid to the validity of these instruments, except for limited use of the chi-squared goodness of fit test. Her definition of EI and its connection to soft skills is overly broad, so as to include factors such as personality and motivation (Wood, 2010). Although the sample population was randomly selected from a group of college math majors, their attrition rate is high and the remaining sample size of 18 is weak at best. While poor studies can provide important information and may inform other studies, the bulk of this review will stem from studies deemed to be fair or good by the reviewer.

Literature Review Results

Emotional Intelligence

An operational definition of EI lies at the foundation for any attempt to review the literatures that explore it; however, finding a consensus in the literatures as to what exactly is EI and all that is included under its umbrella is virtually impossible. The very nature of EI as a construct renders it difficult to define. Some define a construct as a theoretical, intangible quality or trait in which individuals differ (Gregory, 2007). The many different names given to EI, such as emotional literacy, personal intelligence, emotional quotient, and interpersonal intelligence has complicated the creation and acceptance of an all-encompassing definition. There has been extensive debate over the last twenty years as to what components of personality, intelligence and social intelligence fit within the model of EI as well as the extent to which these fields overlap. Even today there is no concrete, widely accepted definition; however, many researchers go back to the early work of Mayer and Salovey (1993) to define the construct. Summarizing their work as well as the work of other notable researchers in the field, Van Rooy and Viswesvaran (2004) defined EI as "a set of abilities (verbal and non-verbal) that enable a person to generate, recognize, express, understand and evaluate their own and others' emotions in order to guide thinking and action and successfully cope with environmental demands and pressures" (p. 72).

Mayer and Salovey (1993) are often credited with defining the term emotional intelligence; however, it first appeared in a doctoral dissertation entitled *A Study of Emotion: Developing Emotional Intelligence* by Wayne Payne in 1985. Prior to this first

appearance and definition of EI, many researchers, most of whom were psychologists, studied the way in which affective characteristics differed from traditional beliefs and accepted definitions of intelligence. As early as the 17th century, Spinoza (trans. 1677/ 1994) put forth the idea that cognition was best described as both intellect and emotion. Edward Thorndike made distinctions between different types of intelligence, suggesting that intellectual functioning could be divided into abstract intelligence, mechanical intelligence and social intelligence (Thorndike, 1920). David Wechsler expanded on Thorndike's ideas by proposing that the "nonintellective" elements were part of total intelligence and were critical components for life success and appropriate interpersonal relationships (Wechsler, 1943). He stated that these affective components of intelligence gave a man "the global capacity to act purposefully and to think rationally, and to deal effectively with his environment" (p. 101). Leeper (1948) added to the building volume of literature on the emotional side of intelligence with his use of the term emotional thought, opining that emotional thought contributed to logical thought and intelligence in general. Silvan Tomkins (1962, as cited in Sharma, 2008), who is most closely linked to affective theory, but who contributed to the idea that emotion is an important component of what is considered human intelligence, believed that "reason without affect would be impotent, affect without reason would be blind" (p. 59).

An increase in interest in achievement and motivation during the seventies continued to fuel interest in the way in which noncognitive abilities contributed to success and satisfaction. Sternberg (1985) made the connection between achievement and EI, as well as the separation of standard definitions of intelligence and emotional

intellgience more pronounced by suggesting that intelligence in academic settings is separate and distict from intelligence in social or practical settings. He maintained that analytical intelligence and more practical types of intelligence, such as EI are different and that "…measures of both kinds of intelligence can be important in a variety of situations (Sternberg et al., 2001, p. 403). The work of Howard Gardner corroborated the work of Sternberg and others by supporting the idea that there are multiple, separate intelligences and that among those resides intelligences that could be categorized as interpersonal, intrapersonal, and naturalistic (Gardner, 1983).

As the work of Sternberg, Gardiner, and others started to become more widely accepted, many looked to the social and emotional components of intelligence as a way to explain and even predict success in almost all aspects of life. John Mayer and Peter Salovey were among the very first to focus their work specifically within the realm of EI. Their earliest work attempted to build off previous work in intelligence and emotion to define and separate emotional intelligence as its own form of intelligence (Mayer & Salovey, 1993; Salovey & Mayer, 1990). They then looked at the way individuals perceived emotion and how that emotion guided thinking and action (Mayer et al., 1990), as well as the way individuals recognize and regulate their emotion (Mayer & Salovey, 1995; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). Research in EI gained popularity during the 1990s and expanded to include the role EI played in areas such as education and business. Mayer and Salovey continued to publish research and author texts about EI in these areas (Mayer & Beltz, 1998; Mayer & Cobb, 2000; Mayer & Geher, 1996; Mayer & Salovey, 1997).

Not long after research in EI took hold, Mayer and colleagues began to explore ways to measure EI. Mayer and colleagues broke EI into four branches, namely perceiving, using, understanding, and managing emotions and created assessment survey points under each (Mayer et al., 2004; Reid, 2003). The test, referred to as the Mayer Salovey Caruso Emotional Intelligence Test (MSCEIT), is among the most popular tests of EI, depsite criticisms of its structural validity (Keele & Bell, 2008; Rossen, Kranzler, & Algina, 2008; Van Rooy & Viswesvaran, 2004).

Mayer and Salovey were not alone in their interest in this relatively new field of EI. An American psychologist and journalist named Daniel Goleman is closely tied to EI, not soley for his scholarly work in the field, but also for his popular book entitled *Emotional Intelligence, Why it Can Matter More Than IQ*. The book, which became a New York Times Best Seller, is credited with popularizing the construct of EI among mainstream Americans (Cherniss, Extein, Goleman, & Weissberg, 2006). Goleman's book, first published in 1995, sparked widespread interest in the construct of EI and its potential applications in fields such as industry, education and healthcare. Claims such as "Emotional intelligence is as powerful, and at times more powerful, than IQ" and "emotional intelligence, more than IQ…is the most reliable predictor of success in life and school" quickly grabbed the attention of businesses and educational policy makers (Sherer, 1997, p. 4). New curricula and training programs emerged almost overnight, despite a lack of empirical evidence supporting many of the claims about the role EI might play in these areas (Humphrey, Curran, Morris, Farrell, & Woods, 2007).

A psychologist named Rueven Bar-on coined the term "emotional quotient" in

1985 and remained a leader in EI research and measurement. His tool, the Emotional Quotient Inventory, or EQ-i, is another popular EI assessment tool and is still used today (Bar-on, 2004). Others have developed and implemented measurment tools for EI. The validity of these tools often comes under fire and many maintain that measurement of EI is still unreliable at best (O'Connor & Little, 2003; Roberts, Zeidner, & Matthews, 2001). Despite these criticisms, many researchers continue to show positive correlations and predictive value in measurements of EI and satisfaction with life, happiness, well-being, and general psychological health (Austin, 2010; Heydari, Liyaghatdar, Mirshah, & Isanejad, 2011).

Research in EI is ongoing with the volume of published literature on the topic increasing almost exponentially. A simple search of the PsychINFO databases (performed on September 22, 2012) using the title criterion "emotional intelligence" and year restrictions of 1900 to 2000 yielded only 94 total results. The same search of years 2000 to 2012 yielded more than 1,900 articles. One review of these literatures explored the various approaches made to defining and contextualizing EI and concluded that three major branches or models exist, namely the ability model, the personality model and models that mixed the two (Muyia, 2009). This distinction is particularly helpful as research in recent years has shown a division within the field of EI, with many in the field accepting trait EI to be most closely related to personality and ability EI falling more in line with traditional intelligence and cognition (Cherniss et al., 2006; Rosete & Ciarrochi, 2005). In addition to delineating the different models of EI, Muyia (2009) reviewed the significant positive correlations seen in many studies that explored measured EI using

several of the instruments previously mentioned and factors such as leadership effectiveness, military performance, parent-child relationships, academic success, and job performance.

Zeidner, Roberts, and Matthews (2002) conducted a significant review of EI literature that specifically explored the role of EI in education and addressed the question, can EI be taught? They conclude that almost all programs labeled as EI interventions contain surprisingly little emotional content. They illustrated the lack of reliable and validated measures and controlled evaluation of EI in studies performed in educational settings and suggest that more rigorous research is needed before broad claims to the effectiveness of EI in education can be substantiated. They did, however, concede that "…the EI concept has proven itself a catalyst to the thinking and planning of educators and policy makers with respect to training and social and emotional skills in the schools" (p. 229).

The lack of empirical evidence substantiating many of the claims made of EI, as suggested by Zeidner and colleagues (2002), was only one area of criticism addressed in the literature. Becker (2003) argued that EI is immeasurable with reasonable accuracy and reliability and that without valid measurement it cannot be differentiated from personality, character or other forms of intelligence. Others maintain that EI is poorly defined and measured and may simply be a new term for constructs and ideas previously identified and explored (Matthews, Emo, Roberts, & Zeidner, 2006; Woodruffe, 2001). Much of the controversy surrounding EI may stem from a lack of consensus as to how exactly EI should be defined and in what ways that definition should be conceptualized

and operationalized (Hedlund & Sternberg, 2000). In a critical review of EI, Waterhouse (2006) supported these limitations and suggests that EI cannot be the basis for educational practice. Cherniss and colleagues (2006) were quick to respond to Waterhouse's criticisms and maintain that the many criticisms of EI are explained by the fact that "EI is a young theory, still at an early stage in development and hypothesis testing" (p. 239).

Emotional Intelligence in Nursing

The construct of EI took hold quickly in those fields where it seemed most logically suited. Nursing is a prime example of this. Many would support the idea that a nurse who is able to recognize and properly assess her or his own emotions as well as the emotions of others and then use that information to guide decisions and actions is going to be more effective in a role that is heavy on interpersonal interaction. This logical connection led to an explosion of research that explored EI in nursing education and practice. A database search of EI plus nursing following the inclusion and exclusion criteria mentioned previously yielded more than 250 articles. Fortunately, there have been many who have sought to review the literature surrounding nursing and EI. As a result, this current study will look most closely at the reviews that have been performed by others. A systematic review of all of the literatures that have been published since the latest review included in this study would be impractical, and of limited value to the current study.

The first review, by Freshwater and Stickley (2004), investigated the role of EI in nursing education and practice, with attention paid to the connection between experiential

knowledge and theory. Freshwater and Stickley's review lacked many of the characteristics of a strong literature review, such as the analysis of study outcome quality, and exhaustive inclusion of studies on the subject, but nonetheless yields important information. Specifically, they noted how "many (nursing) curricula now make reference in some way to the notion of an emotionally intelligent practitioner, one for whom theory, practice and research are inextricably bound up with tacit and experiential knowledge" (Freshwater & Stickley, 2004, p. 91). Their review is helpful in the way they illustrate how nursing education is often viewed as an essentialist education that emphasizes the production of an individual who is fit for practice and how the classroom is devoted to propositional knowledge while practical knowledge is left for the clinical domain. They conclude, albeit without extensive statistical data, that both the rational intelligence and the EI dimensions are essential to healthcare practices. Freshwater and Stickley's review of EI in nursing education sheds light on the potential role EI might play in the medical laboratory sciences curriculum, however, the lack of data to support their conclusions as well as the differences that exist between nursing education and medical laboratory sciences renders this review somewhat limited in its application to the current study

The second review conducted by Arora and colleagues (2010), on the other hand, was much more exhaustive in its inclusion criteria. A team of researchers identified 485 articles from the initial keyword database search. These articles were narrowed to 38 total abstracts. An analysis of the abstracts left 16 articles that met all the criteria established by the authors. The authors included the quality of the study outcomes and some quantitative data; however, they did not include any measure of magnitude in their data

or data analysis. This review included measures that are often considered outside of the umbrella of EI, namely leadership behavior, organizational commitment, and teamwork. Despite these shortcomings, Arora and colleagues illustrated the way EI might be applicable to acceptance into and success in medical education. Overall, they were able to show that "higher EI is positively associated with more compassionate and empathetic patient care, improved teamwork and…communication" (p. 760). Furthermore, they maintained that "EI components provide evidence based classification of the type of nontechnical skills that medical training has traditionally found hard to address and incorporate into the standard curriculum" (p. 761). They conclude by highlighting the lack of empirical work done in the area of EI and medical curricula, suggesting that, "A conspicuous lack of these (empirical studies) to date has meant that medical educators have been unable to assess the impact of clinical training on EI skills." (p. 762)

The third review of EI and healthcare by Birks and Watt (2007) yielded findings similar to the Arora and colleagues (2010) review. Although Birks and Watt incorporated many aspects of a strong literature review, such as the use of a common metric, exhaustive searching and estimations for effect size, the overall tone of their review appears biased against the possibility that EI may play a significant role in aspects such as job satisfaction, stress and empathy within the healthcare environment. The review references more than 40 studies on EI and healthcare, however only five are systematically reviewed and used to formulate conclusions. Many of the other studies only mentioned in the review suggested a more positive connection between EI and EI related aspects of healthcare, but appeared to have been excluded from the meta-analysis

because they were not empirical in nature. Overall, Birks and Watt maintained that there was promise in many aspects of EI research in healthcare, but are quick to add that the amount of empirical research to support many of the claims previously made about EI in general, and specifically EI within healthcare is lacking (Birks & Watt, 2007). Birks and Watt brought up an excellent point about the nature of EI and EI training in healthcare. With reference to EI as a trait or a more dynamic ability that can be improved through training they propose that "If the construct appears more trait-like, then the clinical professions will need to confront a more difficult issue of whether selection needs to take an account of an individual's EI" (p. 373). Overall, these reviews highlight deficiencies in EI research in nursing but emphasize that EI skills, whether already present in the individual or developed throughout the training process, hold significant value to those who have extensive contact with others in the medical environment.

Emotional Intelligence in Technical Fields

A database search of five major journal collections using Academic Search Premier for articles published in the last 10 years with the term "emotional intelligence" in the title yielded thousands of results. When limiting terms such as technical, clinical, engineering, and even science were added, the list dropped to about 150 total articles. The overwhelming majority of these articles focused on the role of EI in management and leadership in technical fields. To date, there are very few articles that explore the role of EI in technical fields similar to medical laboratory sciences. An extensive search of the literatures yielded 18 studies that looked specifically at the role of EI among persons in highly technical fields such as engineering, computer science, and information

technology. For inclusion in this review, the studies had to be peer reviewed, published between 2002 and 2012, specifically explore EI or soft skills among a group of students or professionals from a highly technical field with relatively low interpersonal contact, such as that of the medical laboratory. The studies also had to contain some sort of measurement of soft skills or EI as an independent variable and some sort or measured dependent variable, such as GPA, score on a job performance appraisal or a self-reported measure. No exclusions were made for the location of the study, as most of the studies found were performed outside of the United States. The scarcity of such studies performed in the United States supports the need for the study being proposed. With the mentioned limitations, nine articles were identified and reviewed. A summary of the review is displayed in Table 1.

Although the nine studies of EI in technical fields differ in a number of ways, collectively, they shed important light on the current research question at hand. Only one of the nine studies (Fatt, 2004) failed to produce significant differences in levels of EI between the groups in their study. This study had several limitations, including a survey created by the researcher that had neither been piloted nor validated in any way. Similarly, the divisions made between technical and nontechnical fields appear arbitrary at best. For example, "communications and media" was considered to be a technical course, while "dental surgery" was considered to be nontechnical. Despite the null findings, Fatt enthusiastically endorsed programs aimed at increasing students' level of EI (p. 205).

Dasgupta (2010) and Belanger, Lewis, Kasper, Smith, and Harrington (2007) used Schutte's scale for EI measurement and looked at the correlation between EI

Table 1

Analysis of Studies of Emotional Intelligence in Technical Fields

Study	Research aim(s)	Research design	Sample characteristics	Findings
Al-Faouri (2011)	What is the relationship between EI and technology learning among IT professionals?	Cook et al. scale for EI measurement, Dabnoon's scale for technology learning level	124 IT professionals	Significant positive correlations (all r values significant at $p = 0.01$) between EI and all levels of technology learning.
Belanger et al. (2007)	In addition to other questions about coping strategies, do computing students with high levels of EI have higher self-efficacy and higher in-major GPAs?	Schutte's scale of EI compared to self-reported in-major GPA and self-efficacy.	$N = 613$, students from IT, IS and CS and software engineering. 63% male, 37% female.	Significant ($r^2 = 33\%$, $p < 0.000$) positive correlation between EI and self-efficacy and self-efficacy and GPA. Recommended increased EI training for Computing students.
Blom & Saeki (2011)	Explored the perceived importance of EI-related items as well as current levels of satisfaction with those items	Survey methodology with satisfaction and perceived importance ratings for a number of EI-related items	157 employers of recently graduated Indian engineers.	Soft skills ranked high on the scale or importance. Satisfaction in those areas was relatively low.
Dasgupta (2010)	What is the relationship between EI and happiness, quality of work life and role conflict among female IT professionals	Schutte's scale for EI measurement. Self-report on Degupta Quality of Life, Lyubomirsky and Leeper Subjective Happiness, and Netemeyer conflict scales.	$N = 30$, all female, IT professionals, 25-35 years old and married.	Significant positive correlations between EI and happiness ($r^2 = .53$, $p < 0.01$) and EI and quality of work life ($r^2 = .54$, $p < 0.01$). Significant negative correlations with role conflict (-0.46, $p < 0.05$).
Fatt (2004)	Explored differences in EI among graduate students in technical and nontechnical fields	Survey based on Goleman's five elements of EI.	186 graduate students in technical and nontechnical fields	No significant differences between technical/nontechnical fields. Still recommended increased attention to EI in technical education programs.

(*table continues*)

Study	Research aim(s)	Research design	Sample characteristics	Findings
Kafetsios, Maridaki-Kassotaki, Zammuner, Zampetakis, & Vouzas (2009)	Explored the relationship between EI characteristics and career streaming into science and non-science fields. Reported two similar studies.	MSCEIT, EQI and self-reporting of career field choice.	Study 1: 260 Greek university students. 80% women, 20% men. Study 2: 638 university students in their last year of studies in 3 countries. 37% men, 63% women.	Significant differences (at $p > 0.05$) seen between science and nonscience students on all levels of EI assessed. On average, when compared to nonscience students, science students scored higher on some EI components and lower on others.
Nair, Patil, & Mertova (2009)	Looked at differences between engineering students' skills and employers' perceptions of importance and level of satisfaction.	Surveys completed by employers about recently hired engineering students.	109 engineering related employers completed a survey of 23 attributes	Significant gap between university-based skills development and industry expectations, especially in social and EI related areas.
Noll & Wilkins (2002)	Investigated employers' perceptions of importance of a variety of skills for information science graduates	Surveys were distributed to top employers of Midwestern University IS graduates	60 completed surveys of 25 items each.	Current IS curricula are not meeting the employers' needs for IS professionals, especially in the areas of soft skills.
Scott & Yates (2002)	Investigated which capabilities were perceived to be the most important for, professional engineering practice.	Mixed methods with qualitative and survey methods.	Interviews with 2 graduates, 49 item survey from 30 other recent graduates and their employers	Soft skills were judged to be very significant success factors by both recent graduates and employers.

components and outcomes such as self-efficacy, self-efficiency, grade point average, happiness, quality of work-life and role conflict. Both studies found positive correlations between these outcomes and the EI-related components found on the Schutte instrument. Al-Faouri (2011) did similar work and drew similar conclusions among information technology professionals using an EI scale adopted from the work of Cook et al. and measurements of technology learning. The Dasgupta and Al-Faouri studies were important because they explored the role of EI among students in technical fields, while Belanger et al. looked more closely at EI among currently working IT professionals. Combined, these studies indicate high levels of perceived importance of EI in both the academic and professional setting for these technical fields.

Kafetsios and colleagues (2009) used more widely accepted measurements of EI, namely the Mayer Salovey Curuso Emotional Intelligence Test (MSCEIT) and the Emotional Quotient Inventory (EQI), to determine if meaningful differences existed between students in technical or science fields differed from students in less technical or nonscience fields. In comparison, they found that science students had significantly higher levels of ego-strength related EI and personality traits and lower levels of those EI components more closely tied to management and understanding of emotions. In their summary, they concluded that "…participants following a science career path had higher trait EI scores than those who followed social science studies, specifically, adaptability, positivity in mood, self-awareness, social awareness, self-management, and social skills" (p. 379). Conversely, they found social science career-oriented students had higher EI abilities (as measured on an EI performance test) than their peers in science or business.

This suggests that perception of one's abilities may not reflect actual performance in these areas. This study is meaningful in its reports that science majors in college have positive perceptions of their emotional skills but that these skills may not be used at the optimal level (p. 380).

Surveys were the predominant methodology of the remaining five studies reviewed. Noll and Wilkins (2002) and Scott and Yates (2002) explored the EI-related skills and attributes that employers of recent graduates found to be most important. Noll and Wilkins focused on information science graduates while Scott and Yates studied engineering graduates. Both studies concluded that EI-related skills and abilities were perceived to be very important by employers of recent graduates from technical fields. Noll and Wilkins went on to highlight the existing gap between what employers want and what training programs address. Said they, "The so-called soft skills have typically been important to the user support staffing area; however, this research shows that these skills are becoming increasingly more important to all areas of IS" (p. 153). Scott and Yates included both students and employers in their study and concluded that "A range of EI capabilities appears to be judged by graduates and their supervisors alike as being very significant success factors" (p. 363). They continued, "…[I]tems ranked highest on importance for successful engineering practice during the early years of professional work come predominantly from the areas termed emotional intelligence" (p. 368).

Finally, Blom and Saeki (2011) and Nair and colleagues (2009) explored both the perceived importance of EI related skills as well as the satisfaction employers had with the level of competency in those areas among recently hired engineering professionals.

Nair and colleagues highlighted a gap between the skills and abilities employers deemed most important and the level of competency demonstrated by their employees in those areas. They remarked, "The three highest differences were observed in 'oral communication skills,' 'interpersonal skills with colleagues and clients,' and 'written communication skills'" (p. 136). Bloom and Saeki found similar gaps between the skills and abilities of recent graduates and the expectations of engineering employers. They said, "…while professional skills remain important, employers consider soft skills the most important skills. Employers look for engineering students who show integrity, are reliable, can work well in teams and are willing to learn" (p. 27).

In summary, the majority of studies on EI in technical fields point to increased need for EI-related qualities and attributes among students and professionals. Some of the studies that focused on EI among students in technical fields indicate that students seem to possess abilities and attributes commonly categorized as soft skills or EI, even more so than their nontechnical counterparts in some cases; however, the demonstration of these skills in the workplace seems to be less apparent. The research that compared the traits and abilities of recent graduates from technical programs to the skills and attributes employers deemed most important revealed significant gaps. It stands to reason that similar gaps may be seen among medical laboratory professionals; however, there are currently no studies that address EI among MLSs.

CHAPTER III

METHODS AND DATA ANALYSIS

Overview and Survey Design

The research questions that guided this study were best answered through descriptive, survey research methodology. Survey methodology has been described as a technique used "to answer questions that have been raised, to solve problems that have been posed or observed…to establish baselines against which future comparisons can be made, to analyze trends across time, and generally, to describe what exists, in what amount, and in what context" (Isaac & Michael, 1997, p. 136). Furthermore, survey methodology is an excellent tool to gather information about the attitudes, characteristics, actions or opinions of large groups of people (Pinsonneault & Kraemer, 1993; Salant & Dillman, 1994). Attitudes and perceptions, especially those related to a construct such as EI, cannot be directly measured or observed. As a result, researchers must rely on surveys to obtain information and draw conclusions about how a person feels or the attitudes she/he has towards a particular construct.

The study of EI further justifies the use of self-reported surveys. Those who attempt to measure EI do so with elaborate tests that require significant amounts of training in order to achieve any level of acceptable reliability (Austin, 2010). While there logically would be some benefit to measuring the actual level of EI among MLSs through an accepted, quantitative method, the aim of this study was to assess the level of importance placed on EI as well as satisfaction with the level of EI demonstrated by

practicing MLSs as percieved by laboratory supervisors, managers and administrative directors. Similarly, the attitudes and perceptions concerning the role that college-based medical laboratory science programs play in the development of EI skills as well as the way in which laboratory administrators feel the responsibility for EI development should be divided between individuals, labs and medical laboratory science programs would be extremely difficult to observe directly or measure quantifiably. A thorough survey instrument, therefore, was the best approach to obtain the information needed to answer the current research questions.

Survey Instrument

The survey instrument that was designed for use in this study was intended to gather information about role of EI in medical laboratory science as perceived by laboratory managers, supervisors, and administrative directors. See Appendix A for a copy of the survey. The first section gathered basic demographic information about the administrator including gender, age, race or ethnicity, years of experience, and basic job responsibilities. This section also gathered information about the lab where the respondent was employed, and included questions about the size of the lab, the state where the lab is located, the number of recent graduates hired each year, the distribution of MLTs and MLSs, and the proximity of the lab to a college-based medical laboratory science program.

Sections two, three, and four of the survey were intended to gather information about administrators' perceptions about a variety of skills and attributes and their importance for successful job satisfaction, the supervisor's or manager's satisfaction with

the way the MLSs they work with perform in these areas, and the responsibility they feel college-based programs should assume for the development of these skills and attributes. The same list of skills and attributes was used for each section to allow for the analysis of gaps that might exist between the perceived level of importance and the current level of satisfaction, and to determine the responsibility the college-based program should assume in the development of each attribute or skill.

The final section was designed to obtain information about the current practices regarding EI related training being conducted and included questions about the availability of hospital or lab-based training in EI related areas and the perceived impact of such training. Although these questions may not speak directly of the laboratory administrator's perceptions of the role EI plays in laboratory medicine, they were useful in assessing the value given to these concepts by laboratories or hospitals as a whole. The survey concluded with a question that asked respondents to divide the responsibility for the development of EI-related skills and attributes between the individual, the lab or hospital that employs the individual and the college-based medical laboratory science program. By asking this question, the supervisor or manager's perception of the importance of EI is triangulated with the questions on previous sections of the survey that asked about the importance of specific components of EI.

The questions in sections two, three, and four were answered using Likert-type items. The response options and their values for sections two and three were extremely = 4, very = 3, somewhat = 2, not very = 1, and not at all = 0. The response options and values for section four allowed the respondent to express that the college-based program

should assume “most of the responsibility,” “some of the responsibility,” “only a small portion of the responsibility,” or that the program is “not responsible at all.” The values for those four response options were 3, 2, 1, and 0, respectively.

Sections two, three, and four each included 16 different skills or characteristics. Three of these skills or characteristics were of a technical or theoretical nature while the remaining 13 items focused specifically on attributes or skills related to EI. These 13 items related to EI were combined to form scale scores for each section of the survey. Statistical analysis of these scale scores was useful in answering research question number 6. As discussed later in this section these scales were piloted and found to be reliable.

The components that comprise the three middle sections of the survey were developed through extensive research in EI and were based loosely on a survey used by the World Bank to evaluate the skill sets employers found to be most important among recently hired engineers in India. The World Bank study used a single list of qualities and skills and applied two question types to the list, namely “Rate importance for successful performance of the job” and “Rate satisfaction with this employee’s qualities.” This structure allowed for clear graphical representations of the data as well as meaningful statistical analysis (Blom & Saeki, 2011). The first three attributes and abilities on the list were derived from studies that looked specifically at needed skills in the medical laboratory. Technical skills, mechanical skills and theoretical knowledge are widely accepted as being important for MLSs and are often the core focus of medical laboratory science programs (Beck & Doig, 2002, 2007; Beck & Laudicina, 1999; Bureau of Labor

Statistics, 2010).

Although the first three items on this list of attributes and skills have previously been deemed important for successful work in a medical laboratory (Karni et al., 1998), it was useful to compare the current sample's perceptions and attitudes towards these skills with the perceptions and attiudes they had towards those that fall under the umbrella of EI. The 13 EI-related items on the survey are dependability, communication with coworkers, communication with other healthcare workers, respect for others, ability to work as part of a team, self-awareness, adaptability, empathy, tact and diplomacy, positive attitude, self-control, positive conflict resolution, and integrity/personal ethics. Below each item was a brief example or clarifying sentence to help the respondent conceptualize the item on the survey. For example, under tact and diplomacy was written "responds appropriately when challenged, communicates without offending" (see Appendix A). There was no particular order to the presentation of these items on the survey.

Pilot Survey

After gaining IRB approval through Weber State University, the survey was piloted among a convenience sampling of currently practicing MLSs and supervisors who are currently enrolled in Weber State University's online medical laboratory science program. Approximately 250 students were invited to take the survey through announcements in their online courses and were subsequently directed to the SurveyMonkey link. Although there were no rewards or benefits offered for participation in the pilot, 68 currently practicing MLSs responded. Pilot participants were from 28

different states and were fairly well distributed across all demographic categories, with the exception of gender. Approximately 88% of respondents were female. This disparity was not unexpected as the ratio of females to males in medical laboratory science is high. Participants were instructed to answer the questions as they related to their coworkers, even if they were not in positions of supervision or administration. Feedback was solicited for each section of questions and for the survey overall.

The overwhelming response to the survey in general was that it was interesting and well organized. Respondents found the time it took to complete the survey was reasonable, between 10 and 15 minutes, and felt that the information obtained through the survey would be very useful. The pilot revealed adequate distribution of responses for each item. The pilot also revealed that many respondents appreciated the option to add comments or thoughts, with approximately 20% of respondents adding written comments at the end of each section. Overall, it was determined that the survey instrument was understandable and reasonable in both the time it took to complete as well as the level of question wording and order of items. The pilot study also emphasized the need for a larger sample size to account for the difference in male and female representation in medical laboratory science.

A Cronbach's alpha reliability analysis was performed for each section of the pilot survey. The internal consistency for all three scales was found to be acceptable. For section two, the scale referred to as "importance of EI," had an alpha level of 0.95. For section three, the scale, "satisfaction with EI," had an alpha level of 0.95 and for section four, the scale, "program responsibility for EI" had an alpha level of 0.98. Such high

alpha values may indicate scale items that are redundant (Tavoakol & Dennick, 2011). This is to be expected given the intentional similarities between the EI-related items that comprise each scale. For example, the way in which MLSs communicate with each other as well as the way they communicate with other healthcare workers are very similar and will therefore have high levels of internal consistency among responses. Further analysis indicated that the alpha level for any of the scales mentioned would have only decreased by about 1/100 of a point or less, should any of the scale components have been removed.

Content Validity

Cognitive interviews were conducted with three current medical laboratory supervisors and one current medical laboratory manager during the initial development of the survey instrument. These semistructured interviews served the purpose of assessing whether the survey adequately addressed the skills and attributes those in management felt were most influential in the medical laboratory. The decision to separate simple "communication" as an EI skill into "communication with coworkers" and "communication with other healthcare workers" stemmed from these conversations and the reflected concern that MLSs might treat communication differently depending on the individual with whom they are communicating.

Similar changes and additions were made to items related to conflict resolution, positive attitude and respect for others. For example, the survey item "respect for others" was clarified with the descriptive sentence, "Treats others like equals, respects their time and personal space." The medical laboratory manager and supervisors highlighted the specific ways in which MLSs may fail to demonstrate healthy respect for others. They

specifically mentioned condescending behavior from MLSs with more experience than others as well as inappropriate boundaries and invasions of personal space.

Of those who completed the initial pilot survey, seven categorized themselves as supervisors or managers. Their responses were evaluated to further establish the content validity of the survey. When compared to the respondents who did not classify themselves as supervisors or managers, better separation of answers and increased variability between responses was observed. Their responses to the essay type questions requesting feedback on the survey were also used to verify that pertinent information had not been missed and that meaningful questions were included in the survey and worded in a way that would effectively answer the research questions at hand.

After the initial piloting, a group of medical laboratory science educators was contacted via a medical laboratory science educator listserve for further help in assessing content validity. Subscribers to this listserve are typically college-level instructors and professors, many of who are also current laboratory administrators or who have, at some point in their careers, been laboratory administrators. This unique combination of supervisors, managers, administrative directors, and educators was an ideal source for feedback about the validity of the survey content. Following a solicitation for help via the medical laboratory science educator listserve, 55 individuals read through the survey and provided feedback about the questions and design of the survey. Minor changes were made to reflect the comments made by the reviewers. Overall, the feedback was very positive, indicating that the survey was effective, asked the right questions, and was easy to understand and complete. The majority of those who reviewed the survey expressed

interest in the content and described their desire to read the results of the study.

Sampling

Data collection for this study was performed through surveys distributed to laboratory administrators throughout the U.S. The distinction between laboratory supervisor, administrative director, and laboratory manager varies with the size and function of the laboratory itself. In larger hospital labs and reference labs, it is common to see several managers or administrative directors who attend to the various managerial affairs of the individual departments of the lab. Laboratory managers and administrative directors are often members of the hospital administration team and have responsibilities that include the overall laboratory budget, employee wages and compensation, and the acquisition of new instrumentation and supplies. Although managers spend the majority of their time planning, monitoring and maintaining the business side of medical laboratories, in most cases their position provides them with a unique vantage point from which to observe MLSs and the way EI affects what they do.

Supervisors, who work in conjunction with, or under the direct supervision of managers, are often responsible for the affairs related more to personnel issues and employee competency. Administrative directors, managers, and supervisors often work together to coordinate and ensure the effectiveness of the laboratory in general. In smaller labs with fewer employees, a single individual may carry out the duties of both supervisor and manager. Regardless of the specifics of the title, laboratory administrators have close, daily contact with MLSs and were therefore the ideal target population for this study. In addition to daily contact, laboratory administrators must perform regular

employee evaluations and are often involved in the resolution of interpersonal problems that may arise among MLSs. They also have responsibilities to provide a friendly work environment that is conducive to efficient testing and superior customer service.

The Clinical Laboratory Managers Association currently has more than 3,000 members internationally, with the majority of those managers residing in the United States. During the months of December and January, 2013, medical laboratory supervisors, managers, and administrative directors were chosen at random from the CLMA website chapter lists, to participate in this study. Random selection was made by retrieving three participant email addresses from a list of contacts for a given chapter and then skipping each fourth name on the list. The titles that the members listed with their contact information were ignored, unless they listed themselves as a commercial representative or an educator, as these groups of individuals do not have direct, daily contact with practicing MLSs and do not meet the inclusion criteria of being laboratory administrators. Following this procedure 1,780 email addresses were compiled.

Potential participants were contacted via email, with the initial email containing a brief explanation of the study and a link to the online survey, hosted by Survey Monkey. The emails also contained instructions that any recipient could respond with the word "remove" to be taken off the email list. Twenty-two individuals opted to be removed from future communications. Two follow-up emails were sent to increase response rate, with the first follow up email being sent one week after the initial email and the second follow up email being sent one week after that. Approximately 180 surveys were received after the initial email request. This number increased to 350 after the second email

request. Following the third email request, 437 surveys were received. Of the initial 1,780 emails sent out, 310 were returned as being undeliverable, leaving 1,470 viable addresses giving a final response rate of 30%. The completion rate for the survey was 94%, leaving 413 completed surveys that could be analyzed. Although 413 respondents completed the survey, some skipped a question or marked more than one answer on questions that allowed respondents to do such. As a result, the totals for some questions are slightly more or slightly less than 413.

The minimum number of surveys to be collected was calculated using past response rates for studies in this field and the need to have adequate numbers of males and females to look at ANOVA interaction effects should gender be a significant variable. Simmons, Nelson, and Simonsohn (2011) suggested an a priori determination of a minimum of 20 responses or observations "per cell" as a way to ensure truthful statistical analysis and valid hypothesis rejection or acceptance (p. 5). Medical laboratory science is a female dominated field. Anticipating a 70% to 30% ratio of females to males, and recognizing that some variables contained five different possible responses, it was determined that at least 350 surveys would be needed to ensure the 20 responses per cell mentioned previously. The actual female-to-male ratio of respondents on the survey was higher than anticipated at 75-25%, respectively; however, the 413 completed surveys allowed for statistically sound data analysis.

Research Questions and Data Analysis

The research questions for this study and the type of analysis used for each

question is listed below.

RQ1. How important is emotional intelligence to successful job performance among MLSs as perceived by their supervisors or managers? Descriptive statistics including *SD* and mean scores were used to establish the importance of each EI related skill or characteristic. Mean scores were compared to generate an idea of which survey components were perceived to me more important than others, however the statistical significance of these differences was not determined as it was not directly relevant to the research question.

RQ2. How satisfied are lab supervisors and managers with the level of emotional intelligence among MLSs currently working in the field? The data from this question were analyzed similarly to RQ1. Descriptive statistics were used to generate an overall sense of how satisfied participants were with the demonstration of EI among MLSs in their lab. Comparisons were made to shed light on the relative satisfaction with each item in reference to the others, but, once again, statistical significance of the differences was not computed, as it was not necessary to answer the research question.

RQ3. According to medical laboratory administrators are there gaps between the perceived importance of emotional intelligence skills for successful job performance and their satisfaction with the demonstration of these skills among practicing MLSs? Mean scores for the perceived importance of each item and the level of satisfaction with each item were compared. The difference between these scores was used to establish the gap between importance and satisfaction. These values were graphed to visually demonstrate the magnitude of the gaps.

RQ4. How do the ratings of importance and satisfaction given to emotional intelligence traits and abilities compare with the technical skills, mechanical abilities and theoretical knowledge expected of MLSs? Mean scores from technical skills, mechanical skills and theoretical knowledge were compared to the mean scores for the EI skills and attributes for both satisfaction and perceived importance.

RQ5. How much responsibility do laboratory supervisors and managers perceive college-based medical laboratory science *programs should assume in preparing students in technical and emotional intelligence trait and ability areas?* The data from this question were analyzed similar to the data from sections one and two, using descriptive statistics to determine the average amount of responsibility that medical laboratory science programs should assume for the development of each EI item, as perceived by laboratory administrators.

RQ6: Do perceptions of the importance of emotional intelligence skills or abilities for successful job satisfaction (Importance of EI scale); level of satisfaction with EI abilities among current MLSs (Satisfaction with EI scale); and the level of responsibility colleges should assume in developing EI traits and abilities (Program Responsibility for EI Scale) vary with lab size, proximity to a college-based medical laboratory science *program, distribution of MLTs and MLSs, number of recently graduated MLSs per year or the years of experience, age, or gender of the laboratory administrator?* Using SPSS, a series of one way, between subjects analyses of variance (ANOVA) were performed to determine if any of the scale scores varied significantly with any of the independent variables. A Levene's test for homogeneity of variance was performed prior to ANOVA

testing to verify that this assumption of ANOVA testing was satisfied. Post hoc comparisons were made using Fisher's LSD to better understand the significant variations among the independent variables.

RQ7. Are laboratories currently offering training in emotional intelligence related areas? If so what are laboratory supervisors and managers perceptions of these efforts? Simple descriptive statistics were used once again to describe the current state of EI related training in medical laboratories and administrators' perceptions of their effect.

The survey instrument contained one final question that asked participants to divide the responsibility to develop EI skills and characteristics among the individual, the laboratory and the medical laboratory science program. Responses to this question were averaged to give a final breakdown of responsibility for EI development.

The last piece of the survey was a prompt that instructed the participants to leave any comments they felt were relevant to EI in medical laboratory science. These comments added richness and depth to the survey findings. Participants' comments were read, annotated, and coded to reveal meaningful patterns and significant grouping of responses. From this content analysis, all participant comments were categorized into at least one of 14 general ideas. These ideas were then collapsed or compiled to create six major themes. Each theme was presented and substantiated with direct quotes from the respondents' written comments.

CHAPTER IV

RESULTS

Introduction

The purpose of this research was to explore the role of EI among MLSs as perceived by laboratory administrators who have extensive contact with them and who determine or influence policies and practices in both practical settings as well as in medical laboratory education. After a description of the demographic information of the survey respondents, the results of this study will be partitioned among the seven previously mentioned research questions. A qualitative analysis of the participants' written comments is also included in this chapter.

Demographic Information

Descriptive statistics were calculated for all demographic information generated through the use of the survey instrument. As can be seen in Table 2, the most common age category of those who responded to the survey was 51 to 60 years old, accounting for 48.9% (n = 202) of all respondents, with 60 and older being the second most common age category with 22.8% (n = 94) of respondents selecting it. It is not surprising to see few respondents selecting lower age groups as the pathway to laboratory administration typically involves many years of experience as an MLS.

The overwhelming majority (75.1%, n = 308) of those who completed the survey were women, with men accounting for only 24.9% (n = 102) of the total respondents.

Table 2

Age—Frequencies and Percentages

Age group	Frequency	Percent
21 – 30	2	0.5
31 – 40	31	7.5
41 – 50	83	20.1
51 – 60	202	48.9
60 or older	94	22.8
Total	412	100

Almost 92% (*n* = 378) of participants identified themselves as white, with about 3% (*n* = 12) self-identifying as Asian. Black/African American and Hispanic/Latino both had representations of about 2% with eight respondents and seven respondents, respectively.

Responses were collected from administrators in 42 states, with the strongest response rate coming from the Midwest region of the country, which accounted for almost 48% of all responses. This is likely due to a strong presence of CLMA in that region. California had the largest representation for a single state in this sample with 10.4% (*n* = 43) of respondents choosing it as the state where their lab is located. New York, Wisconsin, Minnesota, and Iowa each had representation above 6% (*n* = 34, 29, 26, and 26, respectively). See Appendix B for more details on gender, ethnicity, and state data. The representativeness of the sample will be discussed in Chapter V.

It is difficult to clearly define different administrative positions in the medical laboratory. Job titles and responsibilities vary with the type of laboratory, the size of the laboratory and even geographic location. The email petitioning participation explained

the purpose of the research and emphasized the need for participants who had extensive interaction with MLSs. Specifications as to the type of administrative position they held were not made. As evident in Table 3, the most common position title among those who completed the survey was general laboratory manager, comprising 43.5% (n = 182) of all responses. Department or division supervisor was the next most common job title with 19.0% (n = 79) of participants identifying themselves as such. Although not a listed job title, 14.6% (n = 61) of respondents chose "other" and identified themselves as administrative directors. The remaining responses were divided over general lab supervisor, medical director, general lab supervisor with management responsibilities and other/nonspecified.

Approximately 50% (n = 207) of those who completed the survey reported that they had more than 10 years of experience in their current position. Slightly more than 20% (n = 85) reported having between 5 and 10 years of experience. Only 4.1% (n = 17) reported having less than a year of experience. Table 4 shows the breakdown of

Table 3

Job Title—Frequencies and Percentages

Job Title	Frequency	Percent
General lab manager	182	43.5
Department or division supervisor	79	19.0
Administrative director	61	14.6
Other/nonspecified	39	9.3
General lab supervisor with management responsibilities	28	6.7
General lab supervisor	21	5.0
Medical director	8	1.9
Total	418	100

Table 4

Years in Current Position—Frequencies and Percentages

Years	Frequency	Percent
Less than 1 year	17	4.1
Between 1 and 3 years	62	15.0
Between 3 and 5 years	41	10.0
Between 5 and 10 years	85	20.6
Longer than 10 years	207	50.2
Total	412	100

experience among administrators. Most (85.3%, *n* = 319) of those who responded described their administrative responsibilities as being split between financial and personnel issues. Only 8.6% (*n* = 32) described their role as being primarily concerned with employee issues like scheduling, training, hiring and firing. The remaining 6.1% (*n* = 23) described their responsibilities as being primarily focused on financial issues such as payroll, purchasing and billing.

As can be seen in Table 5, respondents came from a wide variety of medical laboratory sizes, with 28.4 (*n* = 115) indicating that the lab where they worked had between 10 and 50 employees. Only 30 (7.4%) respondents described the lab where they work as having less than 10 employees. The remaining respondents were relatively evenly split between lab sizes of 50 to 100 employees, 100 to 200 employees or over 200 employees.

Data were collected to gain a better understanding of the hiring practices of the medical laboratories where these administrators worked. As shown in Table 6, the relative frequency of MLSs and MLTs in the medical laboratories of those surveyed

Table 5

Size of Medical Laboratory—Frequencies and Percentages

Description of lab	Frequency	Percent
More than 200 employees	93	23.0
More than 100 employees but less than 200	82	20.2
Between 50 and 100 employees	85	21.0
Between 10 and 50 employees	115	28.4
Less than 10 employees	30	7.4
Total	405	100

Table 6

Distribution of MLTs and MLSs—Frequencies and Percentages

Distribution of MLTs and MLSs	Frequency	Percent
Lab employs mostly MLSs with some MLTs	207	51.4
About the same amount of MLTs as MLSs	75	18.6
Lab employs mostly MLTs with some MLSs	66	16.4
Lab employs only MLSs	49	12.2
Lab employs only MLTS	6	1.4
Total	403	100

appear to match the distribution of those completing the MLT and MLS certification exams (Carden, Allsbrook, & Thomas, 2009), with those who completed the survey indicating that in most cases (50.9%, $n = 201$) labs are staffed mostly by MLSs with some MLTs. The next most common response (18.7%, $n = 74$) described an even mix of MLSs and MLTs. Table 7 shows the most common response to the question of how many newly graduated MLSs a lab hires was less than one per year (35.2%, $n = 145$). A little

Table 7

Number of Recent MLS Graduates Hired Per Year—Frequencies and Percentages

Number of new hires	Frequency	Percent
Less than 1	145	35.2
1	107	26.0
2	60	14.6
3	39	9.5
4	25	6.1
5-10	29	7.0
More than 10	7	1.7
Total	412	100

more than one fourth (26.0%, $n = 107$) of respondents indicated their lab hires one recently graduated MLS per year. Only about 9% ($n = 36$) reported that their lab hires more than five per year. As can be seen in Table 8, of those surveyed, more than 80% ($n = 331$) indicated that there was a college-based medical laboratory science program in the city where their lab was located or that there was a program within 50 miles of their lab.

In summary, the average respondent on this survey would best be described as a White woman over the age of 50 with more than 5 years of experience as a laboratory manager or department supervisor. She would most likely work in a laboratory that hires one or less recent graduates per year and has a staff comprised of more 4-year degree holders (MLSs) than 2-year degree holders (MLTs). This description fits what has been seen in other surveys of laboratory administration and is representative of the general body of laboratory administrators, many of who are members of the Clinical Laboratory Management Association, with the only exception being the number of years of

Table 8

Proximity of Medical Lab to a College-Based Medical Laboratory Science Program—Frequencies and Percentages

Distance	Frequency	Percent
The city where my lab is located has an MLT or MLS program	168	41.3
There is a program within 50 miles of where my lab is located	163	40.0
The closest program is between 50 and 100 miles away	60	14.7
The closest program is more than 100 miles away	16	3.9
Total	407	100

experience (Beacham, Askew, & William, 2009). The CLMA website claimed that 48% of their members have four years of experience or less (Clinical Laboratory Management Association, 2010). This study found that only 30% claimed to have less than five years of experience. Thus, it could be that more experienced administrators are overrepresented in this study. Given the purpose of this study, that is not considered to be a limitation.

Results by Research Question

Research Question 1

How important is emotional intelligence to successful job performance among MLSs as perceived by their supervisors or managers? The list of skills and attributes on the survey instrument included 13 EI-related items and three items representing skills more traditionally accepted as essential for successful lab work. See Appendix A for a copy of the survey. All responses for the question that asked administrators to rate the importance of various EI and non-EI items had average mean scores of 3.0 or higher, indicating that, on average, participants considered each skill or characteristic to be "very"

or “extremely” important. As seen on Table 9, technical skills (correctly performs and results tests) had the highest average rating at 3.87 (*SD* = .358). Integrity/personal ethics (performs tests without cutting corners or skipping steps, is honest with others) and respect for others (treats others like equals, respects their time and personal space) were the next two highest rated skills with average ratings of 3.84 (*SD* = .382) and 3.66 (*SD* = .556), respectively. Of these three, technical skills and integrity/personal ethics are notable as well because of their small SDs. Empathy (desire to understand thoughts and feelings from another’s perspective) and theoretical knowledge (understands the principles, theories and reactions behind the tests) tied for the lowest rated skills or characteristics with average ratings of 3.0 (*SD* = .710 and .684, respectively). It is important to note, however, that even a rating of 3.0 indicates that that skill or attribute was still on average considered to be “very important” by laboratory administrators.

Research Question 2

How satisfied are lab supervisors and managers with the level of emotional intelligence among MLSs currently working in the field? The same list of skills and attributes from RQ1 were used to answer this question. Mechanical skills, theoretical knowledge, and technical skills were included in this section as well for comparison purposes. Each component of this section of the survey had an average rating of at least 2.5, which is halfway between “somewhat satisfied” and “very satisfied” (see Table 10). The highest rated item was technical skills, once again, with an average rating of 3.42 (*SD* = .581). Integrity was again the second highest rated item with an average rating of 3.34 (*SD* = .638). Dependability ranked third with an average rating of 3.19 (*SD*= .699).

Table 9

Importance of Technical Skills, Mechanical Skills, Theoretical Knowledge, and Emotional Intelligence-Related Skills

Skill/characteristic	Average rating	*SD*
Technical skills (correctly performs and results tests)	3.87	.358
Integrity/personal ethics (performs tests without cutting corners or skipping steps, is honest with others)	3.84	.382
Respect for others (treats others like equals, respects their time and personal space)	3.66	.556
Dependability (arrives on time, stays on task during their shift)	3.65	.516
Communication with co-workers (has positive day-to-day interactions with others in the lab)	3.60	.530
Ability to work as part of a team (works well with others, sacrifices personal interests for the benefit of the group)	3.49	.573
Communication with other healthcare workers (positively interacts with nurses, physicians etc.)	3.47	.648
Adaptability (is flexible and open to new ideas and information)	3.45	.608
Positive attitude (appreciates challenges, looks for the good in others, is often upbeat and happy)	3.45	.635
Self-control (manages negative emotions, reacts appropriately to intense situations, appropriately expresses frustration)	3.44	.607
Positive conflict resolution (appropriately approaches conflict without blaming or becoming overly defensive)	3.33	.653
Tact and diplomacy (responds appropriately when challenged, communicates without offending)	3.28	.682
Self-awareness (understands their own thoughts, feelings and behaviors and recognizes how they impact others)	3.17	.665
Mechanical skills (can troubleshoot and repair basic instrument/mechanical issues)	3.10	.651
Empathy (desires to understand thoughts and feelings from another's perspective)	3.00	.710
Theoretical knowledge (understands the principles, theories and reactions behind the tests)	3.00	.684

Note. Respondent ratings: Extremely = 4, very = 3, somewhat = 2, not very = 1, not at all = 0.

Table 10

Satisfaction with Technical Skills, Mechanical Skills, Theoretical Knowledge, and Emotional Intelligence-Related Skills

Skill/characteristic	Average rating	*SD*
Technical skills (correctly performs and results tests)	3.42	.581
Integrity/personal ethics (performs tests without cutting corners or skipping steps, is honest with others)	3.34	.638
Dependability (arrives on time, stays on task during their shift)	3.19	.699
Mechanical skills (can troubleshoot and repair basic instrument/mechanical issues)	2.96	.664
Ability to work as part of a team (works well with others, sacrifices personal interests for the benefit of the group)	2.87	.688
Respect for others (treats others like equals, respects their time and personal space)	2.85	.758
Communication with coworkers (has positive day-to-day interactions with others in the lab)	2.82	.736
Communication with other healthcare workers (positively interacts with nurses, physicians etc.)	2.80	.741
Theoretical knowledge (understands the principles, theories and reactions behind the tests)	2.78	.714
Adaptability (is flexible and open to new ideas and information)	2.78	.775
Positive attitude (appreciates challenges, looks for the good in others, is often upbeat and happy)	2.66	.772
Self-control (manages negative emotions, reacts appropriately to intense situations, appropriately expresses frustration)	2.64	.734
Tact and diplomacy (responds appropriately when challenged, communicates without offending)	2.54	.706
Empathy (desires to understand thoughts and feelings from another's perspective)	2.51	.738
Self-awareness (understands their own thoughts, feelings and behaviors and recognizes how they impact others)	2.50	.752
Positive conflict resolution (appropriately approaches conflict without blaming or becoming overly defensive)	2.49	.777

Note. Respondent ratings: Extremely = 4, very = 3, somewhat = 2, not very = 1, not at all = 0.

Positive conflict resolution, self-awareness, and empathy ranked lowest for level of satisfaction with average ratings of 2.49 (*SD* = .777), 2.50 (*SD* = .752), and 2.51 (*SD* = .738), respectively.

Research Question 3

According to medical laboratory administrators are there gaps between the perceived importance of emotional intelligence skills for successful job performance and their satisfaction with the demonstration of these skills among practicing MLSs?

By taking the mean difference between the level of importance placed on each item and the level of satisfaction for that item, a numerical value was generated that represents the magnitude of the gap. Table 11 demonstrates how this analysis revealed the highest discrepancy between level of importance and satisfaction was with the item Positive Conflict Resolution with a gap score of 0.84. Respect for others had the next highest gap score with 0.81. Self-control was third with a gap score of .80.

Although not directly related to EI, it is noteworthy that the gap between importance and satisfaction was lowest for mechanical skills and theoretical knowledge with gap scores of 0.14 and 0.21, respectively. It is also noteworthy that these skills were among the lowest rated for importance (ranked 15th and 13th, respectively, out of 16). Technical skills, which was rated highest in importance, had the third smallest gap score of 0.44. These data indicate that administrators are quite satisfied with the skills that have traditionally been valued among MLSs. Figure 1 displays the ratings of importance and satisfaction for each survey item.

Table 11

Gaps Between Ratings of Importance and Level of Satisfaction

Skill/characteristic	Rating of importance	Rating of satisfaction	Gap
Positive conflict resolution (appropriately approaches conflict without blaming or becoming overly defensive)	3.33	2.49	0.84
Respect for others (treats others like equals, respects their time and personal space)	3.66	2.85	0.81
Self-control (manages negative emotions, reacts appropriately to intense situations, appropriately expresses frustration)	3.44	2.64	0.80
Positive attitude (appreciates challenges, looks for the good in others, is often upbeat and happy)	3.45	2.66	0.79
Communication with co-workers (has positive day-to-day interactions with others in the lab)	3.59	2.82	0.77
Tact and diplomacy (responds appropriately when challenged, communicates without offending)	3.28	2.54	0.74
Communication with other healthcare workers (positively interacts with nurses, physicians etc.)	3.47	2.8	0.67
Adaptability (is flexible and open to new ideas and information)	3.45	2.78	0.67
Self-awareness (understands their own thoughts, feelings and behaviors and recognizes how they impact others)	3.17	2.5	0.67
Ability to work as part of a team (works well with others, sacrifices personal interests for the benefit of the group)	3.49	2.87	0.62
Integrity/personal ethics (performs tests without cutting corners or skipping steps, is honest with others)	3.85	3.34	0.51
Empathy (desires to understand thoughts and feelings from another's perspective)	3.00	2.51	0.49
Dependability (arrives on time, stays on task during their shift)	3.65	3.19	0.46
Technical skills (correctly performs and results tests)	3.87	3.43	0.44
Theoretical knowledge (understands the principles, theories and reactions behind the tests)	3.00	2.79	0.21
Mechanical skills (can troubleshoot and repair basic instrument/mechanical issues)	3.10	2.96	0.14

Note. Respondent ratings: Extremely = 4, very = 3, somewhat = 2, not very = 1, not at all = 0.

Figure 1. Gaps between level of perceived importance and level of satisfaction.

Research Question 4

How do the ratings of importance and satisfaction given to emotional intelligence traits and abilities compare with the technical skills, mechanical abilities and theoretical knowledge expected of MLSs? Some have described technical skills, theoretical knowledge and mechanical skills as key skills necessary for work in the medical laboratory (Beck & Doig, 2002; Beck & Laudicina, 1999). No one has explored whether or not the skills related to EI, like those listed in the survey instrument for this study, are also important for work in the medical laboratory, so a comparison of two types of skills is both logical and necessary. As shown in Tables 9 and 10, technical skills were the highest rated item in both perceived importance and level of satisfaction among medical laboratory administrators. Although mechanical skills and theoretical knowledge both received average ratings that would indicate they are on average perceived to be "very important" for successful performance in the medical laboratory, they were two of the three lowest rated items when all 16 items (the 13 EI related items and the three traditionally valued skills and abilities) were evaluated. In other words, medical laboratory administrators rated all but one of the EI items to be more important than mechanical skills and theoretical knowledge. In terms of level of satisfaction, Mechanical Skills was rated fourth highest for satisfaction among all skills and characteristics with Theoretical Knowledge just below the middle of the group at ninth. Notably, the gaps between level of satisfaction and perceived importance are smallest for these three traditionally valued skills and characteristics.

Research Question 5

How much responsibility do laboratory supervisors and managers perceive college-based medical laboratory science *programs should assume in preparing students in technical and emotional intelligence trait and ability areas?* Administrators indicated the level of responsibility they felt the college-based programs should put on each item by selecting one of four responses. These responses were no responsibility at all (0), only a small portion of the responsibility (1), some of the responsibility (2), or most of the responsibility (3). Although theoretical knowledge had the lowest average rating for importance, it had the highest average rating for the amount of emphasis that college-based programs should place on its development, with an average rating of 2.92 (*SD* = .284) out of a possible 3.00 (see Table 12). Technical skills had the second highest average rating with 2.69 (*SD* = .493). Integrity/personal ethics and the ability to work as part of a team were the next highest rated items with average ratings of 2.37 (*SD* = .658) and 2.23 (*SD* = .551), respectively. The lowest rated items were self-control (1.92, *SD* = .778), self-awareness (1.90, *SD* = .751), and empathy (1.81, *SD* = .741). The SDs for technical skills and theoretical knowledge were lower than the SDs for any of the other items. This lower *SD* indicates higher agreement among administrators about the role of technical and theoretical skills compared to EI related skills or characteristics. Administrators see technical skills and theoretical knowledge as clearly being under the purview of college-based medical laboratory science programs. However, they also see EI skills development as having a place in college programs that prepare MLSs.

Table 12

College-Based Programs' Responsibility for the Development of Technical Skills, Mechanical Skills, Theoretical Knowledge, and Emotional Intelligence-Related Skills

Skill/characteristic	Average rating	*SD*
Theoretical knowledge (understands the principles, theories and reactions behind the tests)	2.92	.284
Technical skills (correctly performs and results tests)	2.69	.493
Integrity/personal ethics (performs tests without cutting corners or skipping steps, is honest with others)	2.37	.658
Ability to work as part of a team (works well with others, sacrifices personal interests for the benefit of the group)	2.23	.551
Communication with co-workers (has positive day-to-day interactions with others in the lab)	2.19	.590
Communication with other healthcare workers (positively interacts with nurses, physicians etc.)	2.15	.615
Respect for others (treats others like equals, respects their time and personal space)	2.15	.683
Adaptability (is flexible and open to new ideas and information)	2.10	.652
Dependability (arrives on time, stays on task during their shift)	2.09	.726
Positive conflict resolution (appropriately approaches conflict without blaming or becoming overly defensive)	2.04	.642
Mechanical skills (can troubleshoot and repair basic instrument/mechanical issues)	2.01	.652
Tact and diplomacy (responds appropriately when challenged, communicates without offending)	2.01	.667
Positive attitude (appreciates challenges, looks for the good in others, is often upbeat and happy)	1.94	.767
Self-control (manages negative emotions, reacts appropriately to intense situations, appropriately expresses frustration)	1.92	.778
Self-awareness (understands their own thoughts, feelings and behaviors and recognizes how they impact others)	1.90	.751
Empathy (desires to understand thoughts and feelings from another's perspective)	1.81	.741

Note. Respondent ratings: Most of the responsibility = 3, some of the responsibility = 2, only a small portion of the responsibility = 1, no responsibility at all = 0.

Research Question 6

Do perceptions of the importance of emotional intelligence skills or abilities for successful job satisfaction (Importance of EI scale); level of satisfaction with EI abilities among current MLSs (Satisfaction with EI scale); and the level of responsibility colleges should assume in developing EI traits and abilities (Program Responsibility for EI Scale) vary with lab size, proximity to a college-based medical laboratory science *program, distribution of MLTs and MLSs, number of recently graduated MLSs per year or the years of experience, age, or gender of the laboratory administrator?*

The dependent variables that were analyzed were the Importance of EI Scale, The Satisfaction with EI Scale and the College Responsibility for EI Scale. The administrator-specific independent variables analyzed were the gender of the laboratory administrator, their age, and the number of years of experience in their current position. The lab-specific independent variables were the size of the laboratory in terms of number of employees, the distance of the laboratory from an medical laboratory science program, the number of recent graduates hired per year, and the distribution of MLTs and MLSs in the lab. The 13 items were found to be highly agreeable on each scale, with a Cronbach's alpha of .92 for the Importance of EI scale, .94 for the Satisfaction with EI scale and .95 for the College Responsibility for EI scale. The Importance of EI scale had a range of scores from 23-52 with a mean of 44.9 and a *SD* of 5.49 (n = 409). The Satisfaction with EI scale had a range of scores from 13 to 52 and had an average of 35.8 with a *SD* of 7.34 (n = 397). The scores on the College Responsibility for EI scale ranged from 5 to 39 and had a mean scale score of 26.9 (*SD* = 6.95, n = 400).

After determining the reliability and descriptive statistics of the scale items, a series of Levene's *F* tests for the homogeneity of variance were performed to verify that this assumption was met prior to ANOVA testing. The differences in variance among all scales and independent variables were insignificant ($p > .05$). A series of one-way, between subject's analyses of variance (ANOVA) were conducted to compare the effects of the independent variables on the dependent variables.

In order to have adequate numbers in each data set to be compared through ANOVA testing, some independent variable data categories were collapsed if they initially contained very few responses. For example, the first survey question, which asked participants to indicate their age range, yielded only two responses from administrators who were between 21 and 30 and 30 total responses from those between 31 and 40 years old. These two possible choices were combined to form one category "under 40" with 32 total responses.

Question 5 asked respondents how many years they have held their current position. Only 17 indicated that they had been in their position for less than a year, so those 17 were combined with the 62 who responded that they had been in their position for between 1 and 3 years. The new category, "less than 3 years" had 79 responses. Question 9 asked participants to indicate the distance between their hospital or lab and the next closest medical laboratory science program. The 16 respondents that described the medical laboratory science program as being more than 100 miles away were combined with the 60 who said the closest program was between 50 and 100 miles away to form one category, "greater than 50 miles away" with 76 responses. Data were

collapsed over three categories for question 10, which asked participants to describe the number of recent medical laboratory science graduates they hired in an average year. Only seven individuals indicated that their lab hired more than 10. Another 29 described hiring to be between 5 and 10 MLSs per year with another 25 responding that their lab hires four MLSs per year. Collapsing these categories yielded one response option, "four or more" with 61 total responses. Finally, question 11 asked respondents to describe the distribution of MLTs and MLSs in their lab. Only six administrators selected the answer "my lab employs only MLTs" so their responses were combined with the response "my lab has mostly MLTs with some MLSs" to form the category "my lab has only MLTs or mostly MLTs with some MLSs" with a total response count of 72. Collapsing and recoding these data enabled more reliable statistical analysis.

Importance of EI. As shown in Table 13, there were no significant relationships between the dependent variable, perceived importance of EI, and any of the laboratory administrator specific independent variables or among any of the laboratory specific independent variables.

It is of interest to note, that although not initially defined as independent variables, whether or not EI-related trainings were offered by the lab or hospital where the administrator worked and the perceived effect of those trainings had significant relationships with participants' perceptions about the importance of EI. After excluding the four respondents who marked that they were unsure whether trainings related to EI were offered, and after verifying homogeneity of variance (Levene's $f = 1.232$, $p = .298$), a one way, between subjects ANOVA was performed. As can be seen in Table 14,

Table 13

ANOVA Results of Perceived Importance of Emotional Intelligence by Independent Variable

Independent variable	*n*	Mean	*SD*	*F*	*p*
Gender				1.66	.199
Male	101	44.28	5.74		
Female	305	45.09	5.41		
Age				.563	.640
40 and under	33	45.42	5.48		
41 – 50	83	44.26	6.50		
51 – 60	199	45.11	5.34		
Over 60	93	44.90	4.88		
Years of Experience				2.000	.114
Less than 3 years	79	43.86	6.13		
Between 3 and 5 years	40	44.45	4.65		
Between 5 and 10 years	85	44.58	5.72		
More than 10 years	204	45.51	5.23		
Size of laboratory				.731	.571
More than 200 employees	92	44.72	5.72		
Between 100 and 200 employees	82	45.79	5.15		
Between 50 and 100 employees	83	44.78	5.24		
Between 10 and 50 employees	115	44.50	5.86		
Less than 10 employees	29	44.93	4.87		
Hired recent graduates per year				.699	.593
Less than 1	142	44.47	5.83		
1	107	44.72	5.51		
2	60	45.43	4.91		
3	39	45.10	5.36		
4 or more	60	45.68	5.37		
Distance from MLS program				.550	.578
Program in the same city	167	45.29	5.58		
Within 50 miles	161	44.66	5.39		
Farther than 50 miles	75	44.85	5.66		
Distribution of MLTs and MLSs				2.209	.306
Only MLSs	48	46.31	5.76		
Mostly MLSs with some MLTs	200	44.74	5.25		
Only MLTs/mostly MLTs and some MLSs	70	45.27	4.77		
Evenly distributed MLTs and MLSs	73	44.82	5.80		

Table 14

ANOVA Results of Perceived Importance of Emotional Intelligence and Emotional Intelligence Training

Independent variable	*n*	Mean	*SD*	*F*	*p*
EI trainings offered				4.015	.008
Trainings not offered	43	43.72	6.05		
Offered but infrequent	151	44.26	5.78		
Occur somewhat regularly	143	45.16	4.84		
Occur regularly	63	46.80	5.49		
Perceived benefit of EI trainings				4.285	.015
Neutral effect	48	42.94	6.73		
Slightly positive effect	219	45.27	5.14		
Positive effect	63	45.68	5.14		

ANOVA revealed significant, $F(3, 396) = 4.02$, $p = 0.008$, differences between the four possible responses. As shown in Table 15, the results of post HOC comparisons using Fisher's LSD, which demonstrated that the Importance of EI mean scale score for those who indicated that EI related trainings occur regularly was higher than the mean scale scores for those who indicated that trainings occur somewhat regularly, those who indicated that trainings occur infrequently, and those who indicated that trainings are not offered. As shown in Table 15, there was no statistically significant difference in scores among those who described the EI trainings as not offered, being offered infrequently or occurring somewhat regularly.

A similar pattern with similarly significant, $F(2, 329) = 4.28$, $p = .015$, results existed among those with differing opinions about the perceived effect of the EI related trainings. Two respondents (0.5%) indicated that the EI trainings had an overall negative effect. These respondents were excluded from analysis due to insufficient sample size

Table 15

Fisher's LSD Analysis of Frequency of Emotional Intelligence-Related Trainings and Importance of Emotional Intelligence

Offering of EI-related training		Mean difference	Std. error	*p*
Not offered	Occur infrequently	-.537	.942	.569
	Occur somewhat regularly	-1.440	.947	.129
	Occur regularly	-3.073	1.078	.005*
Occur infrequently	Not offered	.537	.942	.569
	Occur somewhat regularly	-.902	.636	.156
	Occur regularly	-2.535	.817	.002*
Occur somewhat regularly	Not offered	1.440	.947	.129
	Occur infrequently	.902	.636	.156
	Occur regularly	-1.633	.824	.048*
Occur regularly	Not offered	3.073	1.078	.005*
	Occur infrequently	2.535	.817	.002*
	Occur somewhat regularly	1.633	.824	.048*

* Differences are significant at the $p < 0.05$ level.

needed for meaningful statistical analysis. As shown in Table 14, respondents who felt the training had a positive or slightly positive effect also tended to have higher scores on the Importance of EI scale than those who rated the training outcomes as neutral. A positive linear relationship existed between the perceived effect of EI trainings and the level of perceived importance of EI in general. As seen in Table 16, Fisher's LSD revealed that significant differences existed between all levels of perceived benefit of EI training, except between those who responded that the effects of the trainings were positive and those who thought the effects were only slightly positive. A two-way ANOVA was conducted to examine any interaction effects between the offering of EI

Table 16

Fisher's LSD Analysis of Perceived Effect of Emotional Intelligence-Related Trainings and Importance of Emotional Intelligence

Perceived effect of EI-related training		Mean difference	Std. error	*p*
Neutral effect	Slightly positive effect	-2.332	.860	.007*
	Positive effect	-2.745	1.034	.008*
Slightly positive effect	Neutral effect	2.332	.860	.007*
	Positive effect	-.413	.771	.593
Positive effect	Neutral effect	2.745	1.034	.008*
	Slightly positive effect	.413	.771	.593

* Differences are significant at the $p < 0.05$ level.

training and the perceived benefit of these trainings on the importance of EI. This analysis revealed the interaction to be insignificant, $F(3, 316) = .788$, $p = .502$.

Satisfaction with EI. The level of satisfaction with EI varied significantly with the size of the laboratory and with the distribution of MLTs and MLSs within the laboratory. Similar to the perceived importance of EI, the level of satisfaction administrators had with EI demonstration also varied significantly with the perceived effect of the EI trainings. As can be seen in Table 17, one-way, between-subjects ANOVA testing revealed that the differences in the level of satisfaction with EI skills and characteristics was significantly, $F(4, 385) = 3.463$, $p = 0.009$, different between the five possible responses for the size of the lab where the administrator worked. In general, the labs with the fewest number of employees had administrators with the highest levels of satisfaction with EI skills. Table 18 shows the Fisher's LSD analysis that demonstrated that significant differences exist mostly between labs with less than 10 employees and labs of other sizes; however, there were significant differences between labs with 10 to 50 employees and labs with 100 to 200 employees. The largest mean difference in level

Table 17

Satisfaction with Emotional Intelligence and Size of Laboratory, Distribution of MLTs and MLSs, and Perceived Benefit of Emotional Intelligence Training

Independent variable	*n*	Mean	*SD*	*F*	*p*
Size of laboratory				3.463	.009
More than 200 employees	89	35.43	7.40		
Between 100 and 200 employees	82	34.33	7.40		
Between 50 and 100 employees	80	34.96	6.74		
Between 10 and 50 employees	111	36.89	7.48		
Less than 10 employees	28	39.36	7.11		
Distribution of MLTs and MLSs				2.769	.042
Only MLSs	46	37.33	6.49		
Mostly MLSs with Some MLTs	192	34.96	7.24		
Only MLTs/mostly MLTs and some MLSs	70	37.30	7.45		
Evenly distributed MLTs and MLSs	73	35.70	7.28		
Perceived benefit of EI trainings				10.926	.000
Neutral effect	46	32.39	6.90		
Slightly positive effect	219	35.38	7.53		
Positive effect	59	35.81	7.41		

of satisfaction with EI existed between labs with fewer than 10 employees and labs with 100 to 200 employees. A negative, linear relationship exists between level of satisfaction with EI and number of employees a lab hires among labs that range in size from fewer than 10 employees to 100 to 200 employees.

Ratings of satisfaction varied significantly, $F(3, 377) = 2.77$, $p = 0.042$, with the distribution of MLTs and MLSs. It would appear that satisfaction is highest where there is greater homogeneity in the type of laboratory professional employed. Table 19 shows Fisher's LSD post hoc analysis of the significant differences that exist between labs with homogenous MLT or MLS compositions and labs where MLTs and MLSs are mixed.

Once again, although not initially defined as an independent variable, analysis of the perceived effect of EI trainings and satisfaction with EI revealed a significant, *F*9(3,

Table 18

Fisher's LSD Analysis of the Size of the Laboratory and Satisfaction with Emotional Intelligence

Size of the laboratory (number of employees)		Mean Difference	Std. Error	*p*
More than 200	100 – 200	1.098	1.113	.325
	50 – 100	.464	1.120	.679
	10 – 50	-1.465	1.035	.158
	Less than 10	-3.930	1.576	.013*
100 – 200	More than 200	-1.0978	1.113	.325
	50 – 100	-.633	1.143	.580
	10 – 50	-2.563	1.056	.016*
	Less than 10	-5.028	1.592	.002*
50 – 100	More than 200	-.464	1.120	.679
	100 – 200	.633	1.143	.580
	10 – 50	-1.929	1.066	.071
	Less than 10	-4.395	1.597	.006*
10 – 50	More than 200	1.465	1.035	.158
	100 – 200	2.562	1.059	.016*
	50 – 100	1.929	1.066	.071
	Less than 10	-2.465	1.538	.110
Less than 10	More than 200	3.930	1.576	.013*
	100 – 200	5.028	1.592	.002*
	50 – 100	4.395	1.597	.006*
	10 – 50	2.465	1.538	.110

* Differences are significant at the $p < 0.05$ level.

377) = 7.99, $p < 0.001$, relationship (see Table 17). Similar to its relationship with the perceived level of importance, the level of satisfaction had a positive, linear relationship with level of perceived benefit of the EI trainings. Post hoc analysis, as shown in Table 20, revealed significant differences between all levels of perceived benefit of EI trainings. Table 21 shows the sample size, mean, *SD, F* values, and significance levels for those independent variables that did not yield significant variation in level of satisfaction with EI.

Program responsibility for EI. The third major component of the survey asked

Table 19

Fisher's LSD Analysis of MLT and MLS Distribution and Satisfaction with Emotional Intelligence

Composition of MLTs and MLSs		Mean difference	Std. error	*p*
Only MLSs	Mostly MLSs, some MLTs	2.368	1.187	.047*
	Only MLTs or Mostly MLTs with some MLSs	.026	1.372	.985
	Even distribution of MLTs and MLTs	2.244	1.361	.100
Mostly MLSs, with some MLTs	Only MLSs	-2.368	1.187	.047*
	Only MLTs or Mostly MLTs with some MLSs	-2.342	1.010	.021*
	Even distribution of MLTs and MLTs	-.124	.994	.901
Only MLTs or Mostly MLTs with some MLSs	Only MLSs	-.026	1.372	.985
	Mostly MLSs, with some MLTs	2.342	1.010	.021*
	Even distribution of MLTs and MLTs	2.218	1.210	.068
Even distribution of MLTs and MLTs	Only MLSs	-2.244	1.361	.100
	Mostly MLSs, with some MLTs	.124	.994	.901
	Only MLTs or Mostly MLTs with some MLSs	-2.218	1.210	.068

* Differences are significant at the $p < 0.05$ level.

respondents to indicate the responsibility that medical laboratory science programs should assume for the development of traditionally valued skills and EI skills. Table 22 demonstrates how the dependent variable, Program Responsibility for EI, did not vary significantly with any of the independent variables.

Research Question 7

Are laboratories currently offering training in emotional intelligence related areas? If so what are laboratory supervisors and managers perceptions of these efforts? When asked if the hospital or lab where they worked offered training in EI related areas, such as conflict resolution, customer service, character assessment or interpersonal communication, the majority of laboratory administrators indicated that such trainings do

Table 20

Fisher's LSD Analysis of Perceived Effect of Emotional Intelligence-Related Trainings and Satisfaction with Emotional Intelligence

Perceived effect of EI-related training		Mean difference	Std. error	*p*
Neutral effect	Slightly positive effect	-2.992	1.174	.011*
	Positive effect	-6.558	1.424	.000*
Slightly positive effect	Neutral effect	2.992	1.174	.011*
	Positive effect	-3.566	1.062	.001*
Positive effect	Neutral effect	6.558	1.424	.000*
	Slightly positive effect	3.566	1.062	.001*

* Differences are significant at the $p < 0.05$ level.

exist, however the frequency with which these trainings occur seems to vary. Less than 1/6 of respondents marked that such trainings occur regularly. About 1/3 of respondents indicated that such trainings occur somewhat regularly while another 1/3 indicated that the trainings occur infrequently. Only about 1/10 indicated that such trainings are not offered. This survey question had the option to respond with an "other" response, which prompted a written response. Of the 17 participants who wrote in a response, 11 wrote that these types of trainings exist but are mostly offered only to management. The other written in responses spoke of casual discussions, personal coaching, or offering of trainings only when necessary.

A follow-up question was asked regarding the attendance at EI related trainings. The greatest number of respondents (45.1%, $n = 184$) indicated that their lab or hospital offered such trainings but that the trainings were not mandatory. The next highest response category was that such trainings were offered and some are mandatory with 30.6% ($n = 125$) of participants responding this way. Only 31 (7.6%) indicated that such

Table 21

Level of Satisfaction with Emotional Intelligence and Nonsignificant Independent Variables

Independent variable	*n*	Mean	*SD*	*F*	*p*
Gender				.002	.966
Male	99	35.81	7.16		
Female	295	35.84	7.42		
Age				.888	.447
40 and under	32	34.47	7.91		
41 - 50	81	36.78	7.63		
51 - 60	195	35.61	7.23		
Over 60	88	36.00	7.35		
Years of experience				1.856	.136
Less than 3 years	79	36.01	7.19		
Between 3 and 5 years	40	33.48	8.27		
Between 5 and 10 years	79	35.40	7.14		
More than 10 years	198	36.37	7.21		
Hired recent graduates per year				1.005	.405
Less than 1	138	36.51	7.41		
1	103	36.24	7.82		
2	56	35.52	8.17		
3	39	34.64	5.61		
4 or more	61	34.72	6.42		
Distance from MLS program				2.903	.056
Program in the same city	163	34.77	7.32		
Within 50 miles	157	36.36	7.30		
Farther than 50 miles	71	36.93	7.35		

trainings are offered and all are mandatory. There were ten individuals who chose the "other" option, half of whom indicated that the trainings are mandatory only for management. The other five respondents who wrote in answers indicated that managers could request training if they felt their staff needed it, that training existed in a web-based format, or that EI related trainings "should be" mandatory.

Table 22

Program Responsibility for Emotional Intelligence and Independent Variables

Independent variable	*n*	Mean	*SD*	*F*	*p*
Gender				1.66	.199
Male	101	44.28	5.74		
Female	305	45.09	5.41		
Age				.994	.395
40 and under	33	25.85	7.00		
41 - 50	82	26.11	6.78		
51 - 60	196	26.96	6.98		
Over 60	88	27.70	7.08		
Years of Experience				.529	.663
Less than 3 years	78	26.37	6.55		
Between 3 and 5 years	40	26.00	6.23		
Between 5 and 10 years	81	26.81	7.33		
More than 10 years	200	27.24	7.13		
Size of laboratory				1.434	.222
More than 200 employees	91	26.45	7.04		
Between 100 and 200 employees	81	26.21	7.41		
Between 50 and 100 employees	80	28.38	6.54		
Between 10 and 50 employees	111	26.73	6.97		
Less than 10 employees	30	26.81	6.28		
Hired recent graduates per year				2.012	.092
Less than 1	139	26.11	7.13		
1	101	27.37	6.59		
2	59	28.80	7.18		
3	39	26.87	7.83		
4 or more	61	25.85	6.10		
Distance from MLS program				.008	.992
Program in the same city	164	26.88	6.67		
Within 50 miles	158	26.91	7.14		
Farther than 50 miles	73	27.00	6.91		
Distribution of MLTs and MLSs				1.741	.158
Only MLSs	49	27.94	4.97		
Mostly MLSs with some MLTs	194	27.08	7.24		
Only MLTs/mostly MLTs and some MLSs	68	25.35	6.71		
Evenly distributed MLTs and MLSs	72	27.44	6.76		

The third question in this series of survey questions asked respondents what they perceived to be the benefit of EI related trainings, if any were offered at their hospital or lab. The majority (56.6%, *n* = 223) of those surveyed indicated that the overall effect was slightly positive and that employees "became more aware of EI related concepts but may not change their behavior much." Another 63 (16.0%) participants responded by choosing the option that the overall effect was positive and that employees' "understanding of EI related concepts increases and positive changes in behavior are visible." A small portion of respondents (12.2%, *n* = 48) replied that the overall effect was neutral and that employees "did not experience change in understanding or skill in EI related concepts." Only two participants (0.5%) responded that the overall effect was negative.

Those who chose the "other" option (*n* = 21) wrote in a variety of responses. A qualitative analysis of the content of these responses revealed three meaningful themes. The first of these themes was that these trainings occur mostly for management and that staff MLSs or MLTs did not receive as much or any training in these areas. One respondent wrote in that the trainings "need to have more widespread involvement" and that the trainings had an "excellent effect" on the leadership group but that "more opportunity exists" to improve EI for those at the staff/bench level. Another theme that emerged was that it is hard to determine the overall effect of these trainings. Some respondents indicated that the trainings were new to their hospital or lab and that their effects had not really been evaluated. The final theme was that these types of trainings take time and reinforcement to bring about change. Said one respondent, "The overall

effect is positive. Some understanding increases. Positive change only comes with repetition and time."

Finally, those who took the survey were asked if it was decided that MLSs needed to improve their level of EI, who should be responsible for these improvements? They were then asked to divide the amount of responsibility between the individual MLS, the college-based medical laboratory science program and the lab where the MLS was employed. The average percent of the responsibility that the individual should assume was approximately 55%. Respondents felt that the college-based medical laboratory science program should assume about 22% of the responsibility and that the lab where the MLS works should assume about 23% of the responsibility.

Qualitative Analysis of Respondents' Comments

The survey ended with a place where respondents were told to feel free to add any additional comments they might have about EI as it relates to medical laboratory science. About 30% (n = 120) of those who completed the survey chose to leave comments in this section. The comments in this section add substantially to the data that were collected through the more quantitative analysis of the Likert-style survey questions. Overall, six major themes can be gleaned from participants' comments. These themes include the differences in soft skills across generations (n = 6), the nature or personality of MLSs in general (n = 11), the individual's responsibility for development of EI (n = 15), concern over the nature of EI and whether it can be taught and learned (n = 22), the need for EI components for successful job performance and satisfaction (n = 24), and the need for

increased attention to EI concepts at the program level (n = 31).

The first theme from the content analysis of the survey responses was that many of the issues related to EI can be traced back to differences among generations and that the younger generation of MLSs does not seem as capable in areas of interpersonal communication. Several respondents attributed these deficiencies to the use of personal electronic devices. One laboratory administrator said, "I am concerned that current and future generations are losing or never developing key soft skills that have to do with successful human relationships and communication, because of the pervasive and constant connectivity to PCDs and other electronic devices." Others described differences in work ethics and commitment to ones employer as being evidence of generational disparities. One respondent described it this way, "Younger employees in general have little concept that working is a privilege. Some feel they are entitled and are owed. This is frustrating…." Another commented, "We don't see young techs that are dedicated and have the same work ethic as the older techs." Although most comments described deficiencies among younger MLSs, some expressed that older generations also had shortcomings. On respondent described it by saying, "The aging population in the clinical laboratory is often threatened by younger medical technologists. This creates difficult work environment and alienates new professionals from the field."

The second theme relevant to the current study was that EI skills might simply not be as prevalent among MLSs due to their unique personalities. Said one respondent, "We are analytical and detailed by nature and many of the soft skills are not intuitive to this personality type." Another described those who go into the medical laboratory science

field as “loners and not people oriented.” A few others described MLTs and MLSs as “introverts” and people who “are not high in emotional intelligence.” Many of those who commented on these aspects of EI spoke of the changing responsibilities of the MLS. Said one, “The laboratory profession for many years attracted the more introverted people. As we become more a part of the care team we are in need of people willing to work outside of their comfort zone.” This idea was reiterated by another administrator who said, “Laboratory employees are no longer ‘behind the scenes’ healthcare workers. We are required to interact more and more with our providers and nurses.” From these comments it is evident that the changing nature and function of the medical laboratory have drawn attention to the need for MLSs who are capable in EI areas.

Many of those who chose to leave comments spoke of who should be responsible for the development of EI attributes and skills. A subtheme of this was the way in which individuals must take personal responsibility for EI. One respondent said it this way, “Ultimately everyone is responsible for their own emotional intelligence.” The general sentiment of most of those who wrote in responses of this nature can be summarized in the comment, “Each individual must accept personal responsibility for EI and work on it throughout their life.” Another respondent described the individual’s role in developing these skills by saying, “…the desire to change to improve emotional intelligence must come from the individual.” These comments confirm the conclusions drawn from the previous survey question, which revealed that laboratory administrators feel the majority of responsibility for EI development should fall on the individual MLS.

Another important theme that emerged from the written responses was the idea

that many aspects of EI may be tied to character and personality and that these types of skills or traits are not easily taught or developed once one has reached adulthood. These feelings are not uncommon in literatures about EI, especially among those that do not support its distinction from other forms of intelligence or personality (Matthews, Roberts, & Zeidner, 2004). The ability to teach and learn EI related skills is also a hotly debated topic among those who study personality and intelligence, although many in the field maintain that EI can be learned and developed, even later in life (Mayer & Cobb, 2000). One laboratory administrator made the comment, "Unfortunately, a person's character is well established by the time we hire them." Another expressed the need to find employees with already developed EI when they said, "I can supplement skills at the bench level, but you can't teach reliability, dependability, tact and courtesy by the time techs are in the workplace. They have to come in with these values and capabilities." One participant left a simple question as their response. They asked, "Can we teach empathy, integrity, and positive attitude? Probably not or with great difficulty." Many of those whose comments fell in line with this theme expressed the opinion that EI is learned at an early age, often in the home.

Another major theme that was observed was that EI skills are extremely important to successful job performance in the medical laboratory. Said one respondent, "Emotional intelligence is what differentiates good from great in an associate." Another administrator echoed this sentiment on a personal level by saying, "I think the reason I have been promoted several times to higher administrative roles is my people skills." Others spoke of the importance of EI as being equal to or even greater than technical skills. One

respondent made the comment, “It should be stressed that emotional intelligence is likely as or more important than technical skills in job success.” Several participants commented on the importance of hiring those who are talented in EI areas. For example, one participant said, “We have turned down competent MLS candidates because their personalities were not going to fit with the staff. We hire for positive emotional intelligence and will work with new hires to increase their shortcomings.” Another commented by saying, “Just having technical skills is not providing the service that is expected in today’s lab environment.” One final comment on the importance of EI in the medical laboratory seems to sum up the other comments well. Said this individual, EI skills are “highly underrated, misunderstood, and sorely needed.”

Finally, respondents overwhelmingly supported increased emphasis on EI at the program level. One administrator stated, “Stressing integrity and interpersonal interaction is vital during the education process. If students do not show qualities of EI, this is not the career for them.” Another respondent reiterated this feeling by saying, “If the MLT/MLS program feels a student cannot be successful in a hospital environment based on their behavior, they should not be passed along to their hospital internship. The student will not be employable in the long term. Passing the student along does not do anyone any favors, least of all the student.” One respondent simply wrote, “…programs need to add training in emotional intelligence if they want their graduates to succeed in the workplace.” These comments in conjunction with the high ratings of perceived importance for all EI skills and characteristics on the survey emphasize the need for programs, labs and individuals to do more to prepare themselves for the emotional side of

medical laboratory work.

Summary of Results

This chapter reported the findings of the survey that focused on laboratory administrators' attitudes and feelings pertaining to EI in the medical laboratory. Generally speaking, most of those who responded indicated that EI concepts are very or extremely important. They also felt satisfied overall with EI among the MLSs they work with but indicated there is room for improvement. Medical laboratory administrators indicated that the medical laboratory science college programs' responsibilities should be focused more on technical skills and theoretical knowledge than on EI-related items, but that these items should still be addressed by the program. These attitudes and perceptions did not vary significantly among any of the administrator specific variables such as age, gender or years of experience. There was some variation among laboratory specific variables such as the size of the laboratory and the composition of MLTs and MLSs. The offering of EI trainings and the perceived effect of those trainings had significant relationships with perceptions of importance and satisfaction with EI. Respondents felt that individuals should assume about half of the responsibility for the development of EI skills, with the college medical laboratory science program and medical laboratory splitting the remaining half of the responsibility. Administrators reiterated these findings with their written comments.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Introduction

The purpose of this study was to explore the role of EI among MLSs, paying specific attention to laboratory administrators' perceptions of the importance of EI skills and attributes, their satisfaction with the way practicing MLSs perform in those areas and the level of responsibility for the development of soft skills that college-based medical laboratory science programs should assume. Survey data from 413 medical directors, laboratory managers, laboratory supervisors, and administrative directors were analyzed to answer seven key research questions. The mode of analysis was primarily quantitative, using basic statistics to describe laboratory administrators' responses to the various survey items. ANOVA statistics were used to determine if significant connections existed between these perceptions about EI and the different administrator and laboratory characteristics. Some minor qualitative analysis was employed to flush out meaningful themes that existed in the responses to the open-ended question at the end of the survey instrument.

This chapter begins with a discussion of the study participants. This is followed by a discussion of the findings for each research question as well as a discussion of the themes gleaned from the participants' written comments. Also included in this chapter are implications for medical laboratory science programs and medical laboratories as well as limitations to the study in general.

Demographics

The demographics of survey respondents match that of medical laboratory administrators as described by Chapman, Franks, Lindler, and Ward-Cook (2005), who described medical laboratory administrators as being typically white women in their 50s and 60s. This study found greater than 90% of respondents self-identified as White. This may be explained by a general underrepresentation of those from diverse backgrounds in health professions as a whole and even more so in healthcare management (Grumbach et al., 2003). Other studies of healthcare workers in general as well as studies of the medical laboratory workforce have shown white predominance close to the 90% as seen in this study (Beacham et al., 2009; Laudicina, 1999). The strong female predominance is typical for the profession as shown in other studies and career surveys (Bamberg, Akroyd, & Moore, 2008).

State-to-state representation is good for the greater U.S., with larger response rates from areas with higher populations concentrations such as New York and California. The highest participation was from the midwest region where CLMA has a strong presence. Participants of this study were similar in age to those who participated in a recent wage survey of laboratory managers and supervisors across the US, who had an average age of 50 to 59 years (Medical Laboratory Observer, 2011). A survey of MLSs in the Wisconsin area revealed median ages for laboratory professionals to be in the mid 50s as well. (Wisconsin Department of Health Services, 2010). The CLMA website claimed that 48% of their members had four or less years of experience, while this sampling of CLMA members found only 30% of respondents claimed to have less than 5 years of

experience. The discrepancy may either be attributed to misrepresentation on the website, perhaps in an effort to attract more freshman managers and supervisors, or may be a reflection of a lack of free time, such as required to complete this survey, on the part of less experienced administrators. If the CLMA website is correct, experienced administrators were overrepresented in this study. Overall, it appears that the average participant of this study is representative for medical laboratory administrators in general.

Discussion of Findings by Research Question

Research Question 1

How important is emotional intelligence to successful job performance among MLSs as perceived by their supervisors or managers? Each of the 13 EI items received an average rating of 3.00 or higher, indicating that laboratory administrators perceive EI-related skills and characteristics to be "very important" or "extremely important." Of skills such as theoretical knowledge, mechanical skills and technical skills, only technical skills ranked higher than the EI components, indicating that laboratory administrators perceive skills such as conflict resolution and the ability to work as part of a team as being more important than mechanical skills or even theoretical knowledge. In a study about the competencies required for successful work in the medical laboratory, Beck and Laudicina (1999, p. 98) found similar perceptions among practicing MLSs. They surveyed graduates who recently began work in the medical laboratory about the skills and competencies they felt were most important for success in their new jobs. Beck and Laudicina reported, "The skill or competency mentioned most frequently…was

interpersonal skills followed by flexibility" (p. 99).

Of the EI-related items, integrity/personal ethics was rated highest in importance among the laboratory administrators in this study. This is most likely a result of the absolute necessity for accurate and reliable laboratory test results. The paramount importance of truthful medical information coupled with the laws and severe penalties surrounding the unethical sharing of protected patient information has generated complete intolerance for any form of dishonesty with regard to patient information and test values in the medical laboratory (Burkhartsmeier, 2001; Lebowitz, 2002).

Respect for Others had the second highest rating among the EI skills. Respect has long been considered a fundamental component of a successful healthcare workforce. Said Karnieli-Miller and colleagues (2010), "Respect for others is recognized in the medical literature and society as an essential attribute of the good medical professional." (p. 1309). While some studies point to a level of respect that is apparent, and even natural between nurses, physicians, and other healthcare workers (Pullon, 2008), others suggested that such respect may not be as prevalent and may need more direct attention at both the program and hospital levels (Lipworth, Little, Markham, Gordon, & Kerridge, 2013; Milton, 2005). Healthcare literature is repleat with disucssions of the importance of morals and ethics in medicine. Demonstrating respect for patients and for other healthcare workers often falls under this umbrella of moral conciousness, or simply "doing what is right" (McGrath, Henderson, & Holewa, 2006). It is not surprising these sentiments about the importance of respect in healthcare in general are reflected by medical laboratory administrators.

Dependability also received particularly high ratings for importance. Laboratory supervisors and managers often use dependability as a key component of yearly performance evaluations, referencing time clock records as an indicator of reliability and dependability. The catalogue of medical tests that physicians order is expanding every day. As a result, MLSs must perform a wide variety and high volume of analyses during a typical shift. If one MLS is absent from work or fails to arrive on time, the amount of extra work, and consequently, stress that must be assumed by other MLSs increases. As a result, the tasks described in the phrases that were included with dependability on the survey, specifically "arrives on time" and "stays on task during their shift" would likely be given value by anyone in a position that is responsible for personnel and satisfactory work environments. Dasgupta (2010) described the way in which increased EI, especially in these areas, directly contributes to improved quality of work.

Both forms of communication from the survey, namely communication with co-workers and communication with other healthcare professionals were included in the top third of important skills or attributes, confirming Beck and Laudicina's (1999) finding from practicing MLSs. Beck and Laudicina found that recent medical laboratory science graduates ranked communication skills to be among the most important skills needed for MLSs entering the workforce and described the need for MLSs who could effectively communicate with other healthcare team members (p. 99). Other studies have highlighted the need for better communication between laboratory professionals and other healthcare workers, many of which tie effective communication of laboratory results with quality patient care (Scheuner, Hilborne, Brown, & Lubin, 2012). Communication of important

medical information, both among MLSs and with other healthcare workers is a well understood and accepted responsibility of almost any MLS, which explains communication skills were rated high among the EI items.

Empathy was tied for the lowest rated item from the list, indicating that laboratory administrators, on average, perceive empathy to be very important (mean = 3.0), but rated it as less important to MLSs than other skills or attributes such as positive attitude and adaptability. This is in contrast to Reynolds and Scott who found empathy to be among the most important characteristics in nurses and other healthcare workers (Reynolds & Scott, 2008). One possible explanation for this disparity is the limited amount of patient exposure among MLSs. The generation and conveyance of medical information, like laboratory tests and values, involves very little emotion, in fact, discussions about a patient's condition or diagnosis are often discouraged as they could be perceived as potential violations of HIPPA laws. The urgency with which extremely critical information is delivered to other healthcare professionals as well as the importance placed on the accuracy of the information being transmitted leaves little room for the types of conversations and discussion that would enable an MLS to demonstrate empathy. The lower rating of the importance of empathy compared to the other EI items, although still considered to be at least "very important," does not echo the U.S. Department of Labor Bureau of Labor Statistics' *Occupational Outlook Handbook* page about MLSs. In that document, they list empathy and compassion as important qualities, but do not mention integrity, dependability or communication skills (Bureau of Labor Statistics, 2013).

In summary, laboratory administrators found all EI concepts to be "very" or "extremely" important for job satisfaction, recognizing integrity, respect for others and dependability to be the most important of the EI related skills and attributes.

Research Question 2

How satisfied are lab supervisors and managers with the level of emotional intelligence among MLSs currently working in the field? The average ratings for the components of this survey question ranged from 2.49 to 3.42, indicating that overall satisfaction with all items to be from about halfway between "somewhat satisfied" and "very satisfied" to about halfway between "very satisfied" and "extremely satisfied." Integrity/personal ethics received the highest average rating of all the EI items, indicating that it is not only perceived to be important, but that laboratory administrators are more than "very satisfied" with its demonstration among practicing MLSs. Participants rated dependability high as well. One explanation for the higher ratings in these areas might be the nature of the items themselves in relation to the work of MLSs.

Honesty or integrity in the medical laboratory most often implies that one does not skip steps, cut corners or in some other way cheat on the performance of tests or procedures. The importance of avoiding shortcuts or unethical practices is taught very early on in college-based medical laboratory science training and is repeatedly emphasized in practical situations in the medical laboratory. Professors of healthcare majors have little to no tolerance for any level of academic dishonesty (Aaron, Simmon, & Graham-Webb, 2011). Many types of health professions programs have taken steps to ensure that the highest level of integrity and ethics are being demonstrated by students

prior to graduation (Wilk & Bowllan, 2011). The carryover from these educational practices should be graduates who understand and value integrity and demonstrate satisfactory levels of it in their work.

A laboratory administrator would likely assume that MLSs in their lab were being honest if there were no reports or incidents indicating otherwise. In reality, unscrupulous reporting of test values or untruthful analytic practices would be hard to detect without extensive fact checking or value verification practices. Such practices are expensive and time consuming, and as such are not commonplace in the medical laboratories (Duffy & Russell, 1997). As a result, it is possible that laboratory administrators consider their employees to be honest and moral unless given a reason to believe otherwise.

Dependability was the next highest rated EI skill or attribute. The reasoning behind this likely mirrors that of integrity, where emphasis at both the program level and the clinical laboratory level has led to its establishment as a core requirement for success in medical laboratory work. It is both easily and frequently evaluated in the medical laboratory and is therefore seen as a critical skill among MLSs. It is likely that an MLS with poor dependability would not last very long at any given job where high importance is placed on it. Given the critical nature of contribution from each MLS on any given shift, the tolerance for poor dependability is low. In other words, laboratory administrators are likely very satisfied with the dependability of the currently practicing MLSs because those who did not demonstrate adequate dependability are no longer employed.

The areas receiving somewhat lower satisfaction ratings on the survey include

empathy, self-awareness and positive conflict resolution. The average score for these items fell somewhere between "somewhat" and "very satisfied." The most obvious explanation of this finding is that practicing MLSs may actually demonstrate less of these qualities and characteristics than laboratory administrators would like to see. Another possibility is that these types of skills are difficult to define and observe and are therefore not as conspicuously demonstrated among MLSs (Fields et al., 2011). Once again, there are few opportunities in a typical daily routine of an MLS to demonstrate or observe empathy. With few opportunities come fewer chances to observe and be satisfied with the demonstration of empathy. Similarly, self-awareness is difficult to observe and objectively evaluate. There are few, observable, outward demonstrations of self-awareness, rendering it difficult to assess (Williamson et al., 2009).

The resolution of conflict, especially conflict that extends beyond individuals' abilities or willingness to resolve independently, often involves laboratory administrators. As a result, it would be expected that administrators would have lower levels of satisfaction with positive conflict resolution. It is possible that administrators are simply not aware of positive resolutions of conflict among practicing MLSs, but the more likely explanation for the relatively lower ratings for satisfaction with conflict resolution would be deficits in this area among MLSs.

Overall, it appears that satisfaction is highest for those items that are more consistently stressed by medical laboratory science educators and employers and are more directly tied to performance evaluation. It is also high for skills and attributes that are easier to observe and evaluate. Two of the items that were rated lower are more

difficult to observe and evaluate. It is important to remember that despite the order of ratings, all EI components had mean ratings of 2.49 or better, indicating that administrators' satisfaction is, on average, between "somewhat satisfied" and "very satisfied" for all items.

Research Question 3

According to medical laboratory administrators are there gaps between the perceived importance of emotional intelligence skills for successful job performance and their satisfaction with the demonstration of these skills among practicing MLSs? This section will first explore the gaps that existed between satisfaction and importance for the survey items. Following that discussion, the skills or attributes with the largest gaps, namely positive conflict resolution and respect for others will be discussed.

Gaps existed between the level of importance given to the skill or attribute and the level of satisfaction for that skill and attribute for all components on the survey. This is not surprising given that every item on the Importance of EI scale, as well as technical skills, theoretical knowledge, and mechanical skills had an average rating as either very or extremely important. It is noteworthy that these three attributes or skills most focused on at the program level, namely technical skills, theoretical knowledge and mechanical skills were the three components with the smallest differences between perceived importance and level of satisfaction. The most likely explanation for the smaller gaps in these items is the emphasis placed on their development at the program level. Blom and Saeki (2011) found similar findings in a study of engineers in India. Specifically they highlighted how a college programs emphasis on a subject can lead to smaller differences

between the level of importance given to a skill or attribute and the satisfaction with it.

Traditionally, these three areas have been primary areas of concentration, with the overwhelming majority of time in a medical laboratory science program being devoted to theoretical knowledge and the development of technical skills. Most medical laboratory science programs consist of a theoretical or didactic component as well as a hands-on, practical component. Students are assessed on their ability to learn and retain theoretical concepts as well as their ability to demonstrate technical skills in the practical setting. These findings indicate that emphasis on certain skills at the program level will lead to increased satisfaction in the workplace in that area (Steinert, Cruess, & Snell, 2005).

Positive conflict resolution. Although positive conflict resolution was rated 11th out of the 16 items on the survey for importance, it had the highest degree of disparity between its perceived importance and the level of satisfaction laboratory administrators had with its demonstration in the lab. Conflict in any healthcare field can have serious negative effects on the accurate performance of medical procedures, quality of patient outcomes, and the morale of the healthcare team (Lipcamon & Mainwaring, 2004). These deleterious effects of absent or poor conflict resolution in healthcare likely spurred its higher rating for importance among laboratory administrators. The reason for the lower ratings of satisfaction in this area is more difficult to explain. While there are no published studies that look at conflict specifically among MLSs, studies of other healthcare professionals describe patterns of poor conflict management. Haraway and Haraway (2005) used the terms avoidance, postponement, and even adversarial to describe conflict resolution strategies among healthcare workers. Forte (1997) explained

that the reason some healthcare workers avoid conflict altogether or do not appropriately manage it stems from a "knowledge deficit" in areas related to positive, effective interpersonal communication (p. 122). Kagan, Kagan, and Watson (1995) pointed to a lack of general awareness of the social and environmental elements that can contribute to stress and increase the occurrence of conflict in healthcare. It is likely that these factors contribute to the gaps that exist between the perceived importance and level of satisfaction with conflict resolution among MLSs.

Respect for others. Respect for others had the second highest gap and was also rated highly for importance for successful job performance. This perceived deficiency in respect for others may stem from the unique combination of intellectualism and decreased interpersonal interactions. Medical laboratory work relies on accurate and precise measurements and testing, operation of complex instrumentation, and near perfect interpretation and analysis of medical information. These types of activities foster a sort of personal efficiency and reliance on self that may contribute to an increased estimation of one's importance over another. Knowing the details of how to perform the tests and operate the equipment has traditionally been highly valued in the medical laboratory. The emphasis of personnel management in the lab is on timely, accurate, consistent testing and reporting of results. There are trends indicating that laboratory administrators are beginning to focus more on respect and positive communication with others as part of performance reviews and job performance appraisals; however, much of this focus is on the MLSs's communication with other healthcare workers or the patients themselves (Jackson et al., 2009). There is no published research that specifically explores the way in

which MLSs interact with each other, so it is difficult to define the role of respect in the medical laboratory. With the level of emphasis on technical skills, both at the program and laboratory level, one might conclude that the demonstration of these skills supersedes the role of skills and qualities like respect for others. Indeed, the gaining of employment and the successful keeping of a medical laboratory position seem much more dependent on technical skills than on EI-related performance (Beck & Doig, 2002). Nair and colleagues (2009) described similar disparities in what employers in highly technical fields determined to be important and what educators were emphasizing at the program level.

The next largest gaps existed in the items self-control, positive attitude and communication. From an analysis of these gaps it can be concluded that the areas where laboratory administrators see the most need for improvement are in those areas most closely tied to interpersonal communication and relationships. It is helpful to consider the stem that was given in addition to each item name on the survey. These short phrases were given to help respondents conceptualize each item. The item Positive Conflict Resolution contained the phrase "appropriately approaches conflict without blaming or becoming overly defensive." The item self-control contained the phrases "reacts appropriately to intense situations" and "appropriately expresses frustration." One might conclude that the way in which MLSs interact with each other, especially during stressful situations or while under pressure may be considered by some administrators to be an area where improvement is warranted.

Studies have shown that stress is a factor impacting almost every facet of work in

medicine (LeBlanc, 2009). Increased cost-saving efforts and an ever-expanding test catalog have increased the demands on MLSs and by so doing have increased stress among laboratory professionals (Laudicina, 2001). MLSs often spend great amounts of time working alone or in close contact with other MLSs, often enclosed in the small area of the medical laboratory. Others have shown that such work conditions can lead to increased amounts of stress, which in turn may increase discordance and contention (Aira, Mantyselka, Vehvilainen, & Kumpusalo, 2010). This kind of stress coupled with the added stress factors that exists in medical laboratories only exacerbates the situation. Factors such as STAT testing, agitated doctors or nurses calling for results, instrumentation failures and long work hours are all potential contributors to stress and anxiety, which may, in turn, contribute to a lack of positive conflict resolution or decreased level of self-control. The need for MLSs who can handle the stressful atmosphere of the medical laboratory likely explains the administrators' high evaluation of the importance of EI items, especially those specifically related to healthy stress management. The findings of this study indicate laboratory administrators, on average, feel that currently practicing MLSs may not be as effective at managing their own emotions as well as the emotions of others during stressful situations as they would like them to be.

Another possible explanation for MLSs not exhibiting as much EI as desired by administrators might be that MLSs may choose clinical laboratory work because they have less desire for the type of work that involves extensive interaction with patients and other healthcare professionals. They might also perceive themselves to have less

developed interpersonal skills, thus choosing a medical position they perceive to be more in line with their skills. In addition, it could be that the scope and function of medical laboratory work are not naturally conducive to the development or maintenance of strong interpersonal skills. While there are no studies that specifically explore the communication and interpersonal skills of MLSs, deficiencies in these areas are often alluded to by those in healthcare (Adams et al., 2011).

One final, potential explanation for the differences in gaps may be the criteria used to screen applicants for employment in the medical laboratory. Items such as dependability, integrity and personal ethics, and the ability to work as part of a team may be easier to assess through personal interviews, group interviews or reference checks (all common hiring practices in medical laboratories) than skills such as positive attitude, self-control and positive conflict resolution (Weinberg, Cooney-Miner, Perloff, & Bourgoin, 2011). Issues with integrity, dependability, and teamwork are likely to surface early in a student's medical laboratory science education. It is likely that if these skills or characteristics were problematic for a student, he or she would likely pursue a different career path by choice or might not be accepted into a medical laboratory science program. Factors such as dependability and teamwork are often used as admission criteria for medical laboratory science programs. Faculty evaluations of applicants often include categories related to attendance, punctuality, ability to stay on task, and the ability to work as part of a team as well as affective components including positive attitude and stress management. Many laboratories, especially larger laboratories have adopted the use of group interviews as a first step in the hiring process. The purpose of these

interviews is often to assess the way in which applicants interact with each other and their ability to work as part of a team (J. Turner, personal communication, November 12, 2011). If both the medical laboratory science program and the hiring laboratory use factors such as dependability and teamwork as criteria for consideration, then satisfaction with those skills should be higher than for those skills that may not be an integral part of the application and acceptance process.

In conclusion, gaps between perceived importance for job satisfaction and level of satisfaction among laboratory administrators existed between all the items on the survey but were smallest for those skills that have traditionally received the most attention at the college level and during hiring practices in the medical laboratory. These skills also seem to be the easiest to evaluate. The skills or characteristics that are more difficult to observe or evaluate tended to have larger gaps. There may also be a discrepancy between what is emphasized for admission to an medical laboratory science program or for obtaining employment in the medical laboratory and what is actually required to perform the job. The most likely explanation for these gaps, however, is that, although perceived to be important by laboratory administrators, MLSs do not fully demonstrate competency in EI areas.

Research Question 4

How do the ratings of importance and satisfaction given to emotional intelligence traits and abilities compare with the technical skills, mechanical abilities and theoretical knowledge expected of MLSs?

Technical skills. The relatively few studies that have explored factors that

influence job performance and satisfaction in medical laboratory sciences have focused on skills and characteristics of a more technical nature. These skills, therefore, serve as a sort of benchmark with which to compare EI-related skills. It stands to reason that if EI skills are perceived to be as important as the technical skills that others have established as being critical for success in medical laboratory sciences then one could argue for increased emphasis on their development. The results of this study indicate that this is very much the current situation. Technical skills remain the most important of all the skills and attributes listed in the survey. The *SD* accompanying the high average rating was the lowest of all survey items, indicating a high level of agreement across survey respondents. This finding is not surprising given the nature of medical laboratory work and the emphasis placed on the development of technical skills at the program level (Guiles & Ward-Cook, 2006). What is interesting, however, is the comparison of theoretical knowledge to the other survey items.

Theoretical knowledge. Theoretical knowledge has always been at the forefront of medical laboratory science program concentration and is the most significant contributing factor to certification as a MLS. The accreditation process for college and university programs involves detailed assessment of curriculum content (Delost & Nadder, 2011). In fact, the acquisition of theoretical knowledge is given more weight at the program level than the development of technical skills (Lynagh, Burton, & Sanson-Fisher, 2007). Even in programs with substantial hands-on or practical components, the key determining factor for grade assessment is performance on theory-based examinations. With such emphasis on theoretical knowledge at the program level, one

would expect to find a concordant level of importance being placed on it by laboratory administrators. Theoretical knowledge, however, had the lowest rating of all survey items for importance for successful job performance. Each individual EI-related item had a higher rating for perceived importance than theoretical knowledge, with the exception of only empathy, which received the same rating. It would appear that laboratory administrators do not see theoretical knowledge as being as important for successful job performance as skills such as tact and diplomacy and self-awareness. Even mechanical skills, whose development many believe is the responsibility of the employing laboratory, received higher ratings for importance.

Many university programs see the teaching of theoretical knowledge as central to their program goals. There are a few possible explanations for this stark disparity between the importance placed on theoretical knowledge at the college program level and the level of importance given to it by laboratory administrators in this study. Medical laboratories are ruled by competencies. National certification deems one competent to perform medical tests. Each test within a medical laboratory carries with it required competencies to be completed and passed off by any MLS who wishes to perform that test (Word, 2002). In contrast, college-based medical laboratory science programs have looked to the acquisition of theoretical knowledge as a competency that can be checked off by faculty and can be used to assess performance and understanding of laboratory concepts (Carden et al., 2009). Whether or not this type of knowledge has meaningful practical application has yet to be explored. Many would argue that an MLS does not need to understand the complexities of fluorescence polarization immunoassay

technology in order to run a thyroid stimulating hormone assay. Likewise, understanding the intricacies of plasmid-mediated transfer of genetic information in bacteria does little to help an MLS perform basic microbiology procedures. Despite the obvious disconnect, programs continue to focus on theoretical knowledge.

Another potential explanation for what is perceived to be important for successful job performance in the medical laboratory and what is emphasized most heavily in college programs may be the history of the profession. The field of medical laboratory science is one that has rapidly expanded over the last century, with thousands of new tests and procedures being developed and put into practice every year. Programs work diligently to remain up to date with changing technology and evolving test methodology. According to Gale and colleagues (2006) with the National Accrediting Agency for Clinical Laboratory Sciences, "The current CLS baccalaureate degree is jam-packed with a body of knowledge that continues to expand" (p. 5). This body of knowledge serves as a template for course development and delivery within medical laboratory science education and changes every few years. The way in which a program adheres to the body of knowledge is an important piece of the accreditation process. As a result, a great amount of time and attention is paid to the acquisition of theoretical knowledge. Findings from this study suggest a certain level of disagreement between the importance of theoretical knowledge for successful job performance, as perceived by laboratory administrators, and the emphasis placed on it at the program level.

It is important to take into consideration the fact that even though laboratory administrators rated theoretical knowledge lowest in perceived importance, they still

rated it higher than any other item when asked how much responsibility the college-based program should assume in the development of the skills or attributes on the survey. Careful analysis of the wording of the survey question is necessary here. The question was not intended to prompt respondents to decide whether or not the item should be part of the program's focus, but rather to explore the amount of responsibility that the program should assume for the development of that particular skill or attribute. When it comes to theoretical knowledge, it makes sense that participants would feel that the college should assume most of the responsibility for its development.

Mechanical skills. Another important finding in the comparison of EI-based skills and technical skills, mechanical skills, and theoretical knowledge is the relatively low level of perceived importance given to mechanical skills (second lowest) as well as the low level of responsibility respondents feel college programs should assume for their development (sixth lowest). When coupled with the small gap between importance and satisfaction (lowest), it is safe to infer that laboratory administrators do not perceive mechanical skills to be as important as other skills and characteristics and feel satisfied with the mechanical abilities of currently practicing MLSs. With this in mind, it seems that the current emphasis placed on the development of mechanical skills at the college level is adequate, if not more than adequate.

Overall, it appears that the EI-related items are consistently perceived to be more important for successful job performance than mechanical skills and theoretical knowledge but not more important than technical skills. Satisfaction was highest for technical skills, but was also very high for mechanical skills. Administrator satisfaction

with theoretical knowledge was greater than their satisfaction with more than half of the EI items, indicating the greatest need for improvement lies with the EI items. It is safe to say that technical skills, mechanical skills and theoretical knowledge all have a place in medical laboratory science, but that the emphasis on these skills should not completely overshadow the attention paid to EI skills.

Research Question 5

How much responsibility do laboratory supervisors and managers perceive college-based medical laboratory science *programs should assume in preparing students in technical and emotional intelligence trait and ability areas?* Based on the average ratings, the overwhelming response was that college-based programs should assume most of the responsibility for the development of theoretical knowledge and technical skills but only some of the responsibility for the EI-related traits or skills. Theoretical knowledge was the highest rated item with an average rating of 2.92 out of a possible 3.00, with a *SD* of 0.28, the lowest *SD* of any of the items on any question in the survey. Again, it is important to note that this does not mean that college and university medical laboratory science programs should focus solely on theoretical knowledge, but rather that programs carry most of the responsibility for imparting theoretical knowledge to those who will one day work in medical laboratories. Technical skills was the next item in order for the amount of responsibility programs should assume for the development of skills and attributes, confirming the conclusions already made about its importance and the role medical laboratory science programs play in its development.

There is a considerable gap between technical skills and the next item on the list,

integrity and personal ethics, indicating a difference in the perceived role of college-based medical laboratory science programs in the development of nontechnical skills. Most of the remaining survey items are clustered closely around an average of 2.00, indicating that laboratory administrators feel that college-based medical laboratory science programs should assume only "some of the responsibility" for the development of EI related skills and mechanical skills. Once again, empathy was the lowest rated item, indicating that its development should not be a primary focus of medical laboratory science programs. It appears that laboratory administrators favor a program model that focuses on theoretical knowledge and technical skills while including at least some components intended to increase a student's level of EI.

A follow up question to the one of how much responsibility college-based programs should assume for the development of the various survey items was included towards the end of the survey. The question asked, "If it was decided that medical laboratory scientists needed to improve their level of EI, who should be responsible for these improvements?" They were then instructed to divide the responsibility between the individual, the laboratory that employs the MLS and the medical laboratory science program. Respondents indicated that about half of the responsibility should fall to the individual, with the other half being split fairly evenly between the medical laboratory science program and the medical laboratory. Such sentiment echoes the notion that many feel EI is something that develops over time and is not something that is easily taught or learned in college or on the job (Mayer & Cobb, 2000). Respondents placed the burden of EI development mostly on the individual, which may support the need for program

acceptance practices or hiring policies that favor those with higher demonstration of EI. In other words, if only one quarter of the responsibility to develop EI falls on the program, and only another one quarter on the laboratory, then the burden of closing the gap between the level of importance given to EI items and the current level of satisfaction with those items must fall primarily on the individual MLS. Medical laboratory science training programs and laboratories should not ignore EI development, but might benefit most through admissions and hiring practices that emphasize personal responsibility for EI competency. It is likely that if programs and employers made it clearer that EI skills were important for successful performance in medical laboratory jobs, students and those seeking employment might worker harder to develop those skills and characteristics within themselves.

Research Question 6

Do perceptions of the importance of emotional intelligence skills or abilities for successful job satisfaction (Importance of EI scale); level of satisfaction with EI abilities among current MLSs (Satisfaction with EI scale); and the level of responsibility colleges should assume in developing EI traits and abilities (Program Responsibility for EI Scale) vary with lab size, proximity to a college-based medical laboratory science *program, distribution of MLTs and MLSs, number of recently graduated MLSs per year or the years of experience, age, or gender of the laboratory administrator?* Careful analysis of the survey revealed some interesting patterns among the independent variables for both the importance of EI and the level of satisfaction with it. Statistical analysis of the third section revealed no significant relationships between any of the independent variables

and the college-based medical laboratory science programs' responsibilities towards skill development in these areas.

Importance of EI. The importance given to EI items did not vary with any of the independent variables pertaining to the laboratory or the laboratory administrator. This was unexpected, as other studies have shown significant differences in the perceptions of EI between males and females as well as among individuals of different ages (Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006). There was significant variation, however, with the extent to which EI related trainings were offered at the hospital or lab where the administrator worked. Additionally the importance given to EI varied significantly with the perceived benefit of these trainings. There appears to be a positive linear relationship between the offering of EI trainings and the perceived importance given to EI.

Those who indicated that no such trainings were offered where they work had the lowest mean scale score for the importance of EI. Those who indicated that EI related trainings existed but only infrequently had a slightly higher mean scale score for the importance of EI. The mean scale scores continue to rise as the frequency of EI trainings increases, with the highest scale scores belonging to the respondents who indicated that such trainings occur regularly. Most often, training in EI related areas is intended to raise participants' awareness of the importance of these concepts (Eales-Reynolds & Clarke, 2012). It seems that the more frequently a laboratory offers this type of training, the more likely administrators are to perceive EI concepts to be important. It can also be concluded that a laboratory administrator who sees EI as important might encourage, and may even organize or sponsor trainings intended to increase its awareness and demonstration

among those he or she leads. The differences in perceived importance of EI were only significant between the group who reported the most frequent occurrence of EI trainings and the other groups. The differences between those who reported somewhat frequent EI trainings, infrequent EI trainings and no EI trainings were insignificant. This may indicate that a certain level of frequency or consistency of EI related trainings must be met before noticeable differences in perceptions of EI importance can be detected.

Variation in perceived importance of EI was related to the different levels of perceived benefit of EI trainings. This variation was not significantly influenced by the variation in frequency with which the trainings were offered. The explanation for the difference in the importance given to EI characteristics and qualities between those who perceived the trainings to be slightly positive or positive and those who perceived the trainings to have a neutral effect is not clear from this study. It could stem from the perception that the trainings lead to positive, beneficial changes in the workplace and thus EI trainings are perceived as important. In other words, if administrators saw improvements in job performance and connected those positive changes with the trainings that were offered then they would likely perceive the EI topics covered in those trainings to be important for successful job performance. Conversely, if administrators believe EI characteristics are important they may be more likely to perceive that workshops on these topics are making positive contributions to the workplace. Administrators who feel EI qualities are less important may be less inclined to see training sessions as adding value to the workplace.

Satisfaction with EI. The level of satisfaction with EI varied significantly with

the size of the lab and the distribution of MLTs and MLSs. The connection between the size of the laboratory and the level of satisfaction with EI skills and characteristics points to higher levels of satisfaction where the numbers of employees are smaller. The highest level of satisfaction was found among those from labs that employ fewer than ten employees. The lowest mean scale score was found among those from labs that employ 100 to 200 employees. The significant differences between these scores were seen primarily between the smallest labs (less than 10 employees) and the larger labs (more than 50 employees). There are a few possible explanations for this. One may be that in smaller labs, supervisors and managers have more opportunity to get to know those with whom they work, and by getting to know them better, their estimation of their performance increases. Or, they may be more willing to overlook shortcomings and deficiencies as a result of a closer personal relationship. Another possible explanation is that labs that employ fewer MLSs typically have lighter workloads and that a decreased workload most likely means lower levels of stress. Less stress in the workplace could lead to less contention between coworkers, less reliance on skills such as tact and diplomacy and greater opportunity for meaningful interpersonal communication and daily interaction.

The most common term for a laboratory technician that holds an associate's degree is medical laboratory technician, whereas the term MLS most often refers to those who have bachelor's degrees. Although combined for most of this survey and study, one survey question asked laboratory administrators do describe the composition of their lab in terms of how many MLTs and how many MLSs were employed. It was unexpected

that this distribution would have any sort of significant effect on administrators' perceptions of the importance of EI or their satisfaction with it. The significant differences seem to be related to the level of homogeneity in the laboratory. In other words, the differences that exist are not what one might anticipate knowing that MLTs have less schooling and, in many cases, less experience in the lab than MLSs. Rather, the administrators' ratings of satisfaction with EI among lab techs varied with the homogeneity or diversity of their group of laboratory technicians. Administrators from labs that employ only MLSs had virtually the same mean satisfaction with EI scale scores (37.33) as those from labs that employ only MLTs or Mostly MLTs with some MLSs (37.30). This is in contrast to labs where mostly MLSs with some MLTs are employed (34.96) or where the distribution of MLTs and MLSs is roughly even (35.08). Such tight concordance between the groups with similar homogeneity compared with groups with more of a balance between MLTs and MLSs seems to indicate that administrators are more satisfied with the level of EI when laboratory professionals with similar backgrounds and experience work together.

The balance of responsibility between MLTs and MLSs has been a topic of debate for some time. In many labs, there is almost no distinction between the two, with MLTs and MLSs performing the same tests and releasing the same results. In other labs, there is a more definite delineation in the types of testing that can be performed by MLTs and those that can be done by MLSs. For some, these differences may be a source of contention or may be a cause for discord in the medical laboratory. It may be denigrating to a bachelor's degree holder with 10 years of experience to see an associate's degree

holder with only a few months of experience performing the same tests. Conversely, it may be frustrating to an MLT to perform the same functions day to day as an MLS, yet get paid significantly less for doing so. To date, there are no studies that explore the interactions between MLTs and MLSs in the medical laboratory.

As seen with the importance of EI variable, the level of satisfaction with EI varied significantly with the perceived benefit of EI based trainings, although it did not have any significant relationship with the extent to which these trainings are offered. The same basic pattern exists between these variables as existed between the importance of EI and perceived benefit of the trainings. The level of satisfaction was positively related to the perceived benefit of the trainings, with significant differences between all three levels of perceived effect of EI training. The connection is intuitive. If the trainings are perceived to have a positive effect then satisfaction with the skills or techniques presented in the trainings should increase as well.

Program responsibility for EI. Statistical analysis revealed no significant variation in the amount of responsibility that administrators felt college-based medical laboratory science program should assume for the development of EI skills between any of the independent variables. The lack of significant variables and the lower overall SDs implies that administrators are mostly in agreement about the role of the college based medical laboratory science program in the development of EI related skills. Participants indicated that schools should assume at least some of the responsibility for the development of EI skills, a sentiment echoed by Freshwater and Stickley (2004) as well as Arora and colleagues (2010).

In summary, the level of importance given to EI appears to be high among laboratory administrators and does not vary significantly with any independent variables included in this study except for the frequency with which EI trainings are offered and the perceived benefit of those trainings. The level of satisfaction with EI does vary with the size of the laboratory and the distribution of the MLTs and MLSs, with higher levels of satisfaction being reported by administrators from labs with fewer employees. Higher levels of satisfaction were also seen among administrators from labs that were staffed predominantly by MLSs or predominantly by MLTs. The level of satisfaction also varied significantly with the frequency and benefit of EI-related trainings. Overall, it appears that administrators who see positive consequences from trainings or who report that trainings occur frequently have higher levels of satisfaction with the skills and concepts presented in those trainings.

Research Question 7

Are laboratories currently offering training in emotional intelligence related areas? If so what are laboratory supervisors and managers perceptions of these efforts? With the recent trends in healthcare that have encouraged a more customer service oriented approach to medicine, it is not surprising to find that almost 90% of laboratory administrators report that the hospital or lab where they work currently offers some type of training with content related to EI. A little less than 60% of those indicate that these trainings occur regularly or somewhat regularly. When asked if attendance at EI trainings is mandatory, more than half reported that the trainings are offered, but are not mandatory. Thirty-eight percent reported that at least some of the trainings are mandatory. When

asked what the perceived effect of the trainings was, the majority of respondents indicated that the overall effect was slightly positive and that employees became more aware of EI-related concepts but may not change their behavior much. Sixteen percent of respondents reported that positive changes in behavior were evident as a result of the trainings. Those who claimed that the trainings had a neutral effect or no effect at all comprise only 15% of all who reported that trainings are offered, indicating that the outcomes of these types of trainings is positive overall. It appears that many hospitals and labs are making an effort to improve areas related to EI; however, many of these trainings or workshops may not be reaching the widest possible audience because attendance at them is not mandatory.

Qualitative Analysis of Written Comments

The qualitative data presented in Chapter IV support the conclusions drawn throughout this chapter. The administrators who took the time to write in comments spoke of the difficulty of teaching EI skills to a workforce that may not be naturally inclined towards strong EI, or who may be somewhat set in their ways by the time they enter the medical laboratory workforce. They emphasized the importance of EI for successful job performance. While their comments supported increased emphasis on EI skills and qualities at the program level, they stressed personal responsibility for strong EI development and demonstration. Many of the literatures reviewed in this study found similar attitudes among employers in highly technical fields (Noll & Wilkins, 2002; Scott & Yates, 2002). These findings support the results from the question where participants indicated that half of all the responsibility to develop stronger EI should fall to the

individual. The qualitative analysis as well as much of the quantitative analysis of the survey items indicate that, despite the criticisms of EI, laboratory administrators still find EI to be a critical component for success in the medical laboratory.

Implications for Higher Education

The findings of this study bring to light a few significant areas of attention for those involved in medical laboratory science in higher education. The first of these areas is continued support of those skills and qualities previously deemed to be important for success in the medical laboratory. The item, technical skills, was rated highest for perceived importance and received high ratings for how much responsibility the medical laboratory science programs should assume for its development. It is interesting to note that it also received the highest mean rating for satisfaction, and had a low gap between importance and satisfaction indicating that medical laboratory science programs are currently doing a good job at preparing students in this area.

Although the average ratings indicate that administrators perceived mechanical skills and theoretical knowledge to be "very important," they were two of the three lowest rated items for importance for successful job performance. This may indicate a possible disparity between the level of importance given to these skills in the medical laboratory and the importance placed on them at the program level, at least relative to other skills like those related to EI. Despite these differences, ratings of satisfaction were high, yielding smaller gaps between importance and satisfaction, once again indicating relatively less need for increased emphasis in these areas on the part of the medical

laboratory science programs. The average ratings for how much responsibility medical laboratory science programs should assume for the development of these skills and attributes indicates that respondents feel college-based medical laboratory science programs should assume "most of the responsibility" for theoretical knowledge (mean = 2.92) and about 2/3 of the way between "some of the responsibility" and "most of the responsibility" for technical skills (mean = 2.69). Mechanical skills had an average rating of 2.01, which correlates to only "some of the responsibility" implying that medical laboratory science programs may not need to focus heavily on the development of mechanical skills.

The most substantial implication for higher education is the apparent disparity between the level of importance placed on EI skills and the level of satisfaction with those skills. Although all of the skills and characteristics were perceived to be at least "very" important, the largest gaps between importance and satisfaction exist among the EI skills. Positive conflict resolution, respect for others, self-control and positive attitude had the largest gaps between importance and satisfaction, indicating the greatest need for improvement in these areas. When polled about the responsibility the medical laboratory science program should assume for the development of these specific skills, as well as the other skills on the survey, respondents on average indicated that medical laboratory science programs should assume at least some of the responsibility.

It is not entirely clear how college-based medical laboratory science program should approach training in the area of EI. The analysis of the survey questions about frequency of EI trainings as well as the perceived benefit of those trainings would

indicate that a consistent, frequent inclusion of EI components throughout the medical laboratory science curriculum might yield the highest gains in satisfaction with EI. Research in EI suggests that the learning of skills such as positive conflict resolution, strong communication and tact require time and persistent effort (Cherniss et al., 2006). A more spread-out approach to EI development may be more realistic to educators who might already feel that the medical laboratory science curriculum is oversaturated with content. In other words, it might be easier for a medical laboratory science educator to include EI-related concepts in the already established course plan. Increased emphasis on skills such as interpersonal communication, conflict resolution and diplomacy in the classroom as well as the lab would benefit students greatly. Research has shown that role-playing can be an effective way to teach emotional intelligence skills and abilities (Poorman, 2002). Allowing students to simulate phone calls to angry nurses, or to act out the ways in which they might resolve conflict between employees in the laboratory would raise awareness and provide opportunity to develop skills that laboratory administrators have suggested are extremely important for successful work in medical laboratory.

It would be beneficial if college-based medical laboratory science programs helped students understand the importance of EI-related skills and attributes. While mention of these concepts is made in most MLS programs, the overwhelming emphasis is almost always on the acquisition of theoretical knowledge and the development of technical skills. It would serve the students better to not only emphasize these things, but to also demonstrate the value of EI. The importance of theoretical knowledge is conveyed every time an educator mentions the certifying exams, or tests the students' knowledge

through formative and summative assessment. Hands-on, laboratory-based activities stress the importance of technical skills and mechanical abilities. But little is being done to remind students of the importance of developing the type of EI skills that will enable them to be successful in their careers as MLSs. If students were reminded that their development and demonstration of EI would significantly impact their admission to the medical laboratory science program as well as their ability to obtain employment in a medical laboratory, the attention paid to it at the individual level might subsequently increase.

Finally, college-based medical laboratory science programs might benefit from increased attention to EI skills and attributes as admission criteria. Initially selecting those with higher emotional aptitude might lead to a cohort of graduates that are better prepared to meet the EI requirements of future work in the medical laboratory. EI as a significant component of the acceptance process might discourage those who do not naturally demonstrate EI ability or those who may be uninterested in developing EI skills. The result could also be an increase in applicants that consider themselves strong in EI related areas. Accurate and consistent assessment of EI may prove challenging for college-based programs and continues to be an area in need of exploration.

In summary, laboratory administrators feel EI skills and characteristics are very or extremely important, but are not equally satisfied with their demonstration among MLSs and feel that the college based medical laboratory science programs should assume some responsibility for narrowing this gap. Higher education medical laboratory science programs would better prepare students for work in medical laboratories if they increased

the level of attention paid to EI concepts and skills and did more to stress the importance of these skills to their students. Recruiting students with higher levels of EI or using EI components as admissions criteria might also serve to reduce the deficits that exist between perceived importance and level of satisfaction with EI skills and characteristics among medical laboratory science employers.

Implications for Medical Laboratories

The findings of this study have several implications for medical laboratories. First, they highlight a high level of perceived importance of EI among MLSs, which may facilitate increased attention given to EI among those who work in laboratories, students of medical laboratory science programs and medical laboratory science educators. The need for increased attention to these concepts is supported by the differences between importance and satisfaction demonstrated in this study. Medical laboratories might benefit from increased evaluation of the level of EI among applicants during the hiring process. Likewise, medical laboratories might see gains in EI areas through skills development workshops and trainings and through consciously seeking to mentor recently hired MLSs in these areas. This study showed that laboratory administrators from labs with frequent EI-related trainings had significantly higher levels of satisfaction with the demonstration of EI among their employees. Increased awareness of and attention to soft skills carries the potential to lessen the gap between importance and satisfaction and would better prepare MLSs for the future of laboratory medicine.

Discussion Summary

According to medical laboratory administrators, technical skills remain the most important skill or attribute for successful job performance. It is also the area where satisfaction is greatest. The administrators who responded to this survey strongly support continued emphasis on technical skills by college-based medical laboratory science programs. Theoretical knowledge was considered to be "very" important for successful job performance, however, it received the lowest average rating for importance of all the survey items, indicating it may not be as important to administrators as other skills such as those related to EI. The small gap between importance and satisfaction with theoretical knowledge was very small, indicating less need for improvement in theoretical knowledge than in other skills. Mechanical skills were considered to be "very" important as well, although their average rating was still below many EI items. The gap between importance and satisfaction for mechanical skills was small.

All of the skills and characteristics related to EI were considered very or extremely important for successful job performance. Each EI item, except for empathy, ranked higher than theoretical knowledge for importance for successful job performance. Most EI skills or attributes ranked higher than mechanical skills. Of the EI items, integrity/personal ethics received the highest average ratings for importance for successful job performance. Satisfaction was high for integrity/personal ethics as well as for dependability and the ability to work as part of a team. The largest disparity between importance and satisfaction existed for positive conflict resolution and respect for others, indicating areas of needed improvement. Overall, the satisfaction with EI varied

significantly with the size of the laboratory and the distribution of MLTs and MLSs, with smaller labs and more uniformity in MLTs or MLSs being influencing factors for higher satisfaction.

The majority of hospitals and laboratories offer some type of EI related training. Laboratory administrators perceive the overall effects of these trainings to be positive. The offerings of these trainings and the perceived benefits of them seem to be positively related to laboratory administrators' feelings of the importance of EI skills and attributes as well as their satisfaction with them. Despite high levels of importance placed on all EI components, laboratory administrators still feel that the majority of the responsibility for the development of these skills and characteristics falls on the individual MLS and that the remaining responsibility should be split evenly between the college-based medical laboratory science program and the medical laboratory.

The comments written in by the survey respondents reiterate the conclusions drawn in this study. These comments stressed the importance of EI in the medical laboratory, despite what stereotypes might exist about MLSs being less talented in EI related areas. The respondents also expressed the importance of MLSs taking personal responsibility for their level of EI. Finally, the comments point to increased attention to EI at the program level as a way to increase the demonstration of these skills that were perceived to be important for success in the medical laboratory.

Limitations

The sample for this study could be considered to be a convenience sample taken

from an organization of medical laboratory administrators known as The Clinical Laboratory Management Association. While CLMA is typically accepted to be the largest organization of medical laboratory administrators in The United States, it is not inclusive of every individual in laboratory management. Furthermore, there are dues associated with CLMA membership, which may limit both the number of members as well as the socioeconomic status of the members. Additionally, the benefits or membership in CLMA may not be fully appreciated by more junior administrators, which may explain what appears to be a disproportionately high amount of older survey respondents.

The response rate for this survey was roughly 30%. Some laboratory administrators chose not to complete the survey. There is no information suggesting that those laboratory administrators who did not complete the survey share the same thoughts and perceptions as those who did. Administrators who were more interested in the issue of EI may have been more likely to complete the survey.

The reliability and validity of any survey-based research are limited to the honesty of the participants' responses to the survey items and their ability to objectively observe and reflect on the behavior of those they are asked about. The ratings for satisfaction with the demonstration of EI related skills and characteristics were based on personal perceptions and opinions and not standardized observations. It is possible that the perceptions of laboratory administrators do not completely describe the actual performance of MLSs.

Administrators were asked to rate their level of satisfaction with the demonstration of each survey item among the MLSs they currently work with. An overall

rating of satisfaction does little to differentiate between variables that exist among MLSs including age, years of experience, and level of education. Overall ratings also required participants to blend together individuals who may be strong in EI with those who may lack EI skills. More detailed attention to individual differences among MLSs might yield different findings.

The alpha reliability values of the scale items Importance of EI, Satisfaction with EI, and Program Responsibility for EI were all extremely high. While this effectively demonstrates the high level of congruence between items, the high values may indicate a certain degree of redundancy or replication among them.

Recommendations for Further Research

This study arose from a significant lack of research concerning the medical laboratory and those who staff it. The results of this study support further need to explore those who staff these laboratories, with specific attention on the personality and characteristics of MLSs. Suggestions that MLSs may be deficient in EI related areas may explain the discrepancies between what is considered important and the level of satisfaction as perceived by laboratory administrators, but any published support of this conclusion is anecdotal at best. A study that actually measured the EI of MLSs would shed significant light on the subject.

The level of attention currently being given to EI concepts at the medical laboratory science program level has yet to be explored. A survey similar to the one used in this study, only given to students, faculty, and program directors of medical laboratory

science programs would be extremely informative and would help to bridge the gap between what is currently perceived among medical laboratory science administrators and the current state of medical laboratory science education.

Finally, an exploration of the trainings currently used to improve EI among healthcare workers, especially among MLSs, would shed important light on the current efforts to improve customer service, communication, conflict resolution and other EI-related items and would help guide these efforts to produce a healthcare workforce that is more emotionally competent

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APPENDICES

Appendix A

Survey Instrument

Emotional Intelligence Among Medical Laboratory Scientists

Simply put, emotional intelligence (sometimes called soft skills) is an individual's ability to assess, manage, and use their own emotions as well as the emotions of others to guide decision making and behavior.

To date, no one has studied emotional intelligence among medical laboratory scientists. Your participation with this survey will help us understand the role emotional intelligence plays in laboratory medicine. Thank you very much for participating!

Section 1. Demographic Information

1. Which category below includes your age?

- ○ 21-30
- ○ 31-40
- ○ 41-50
- ○ 51-60
- ○ 60 or older

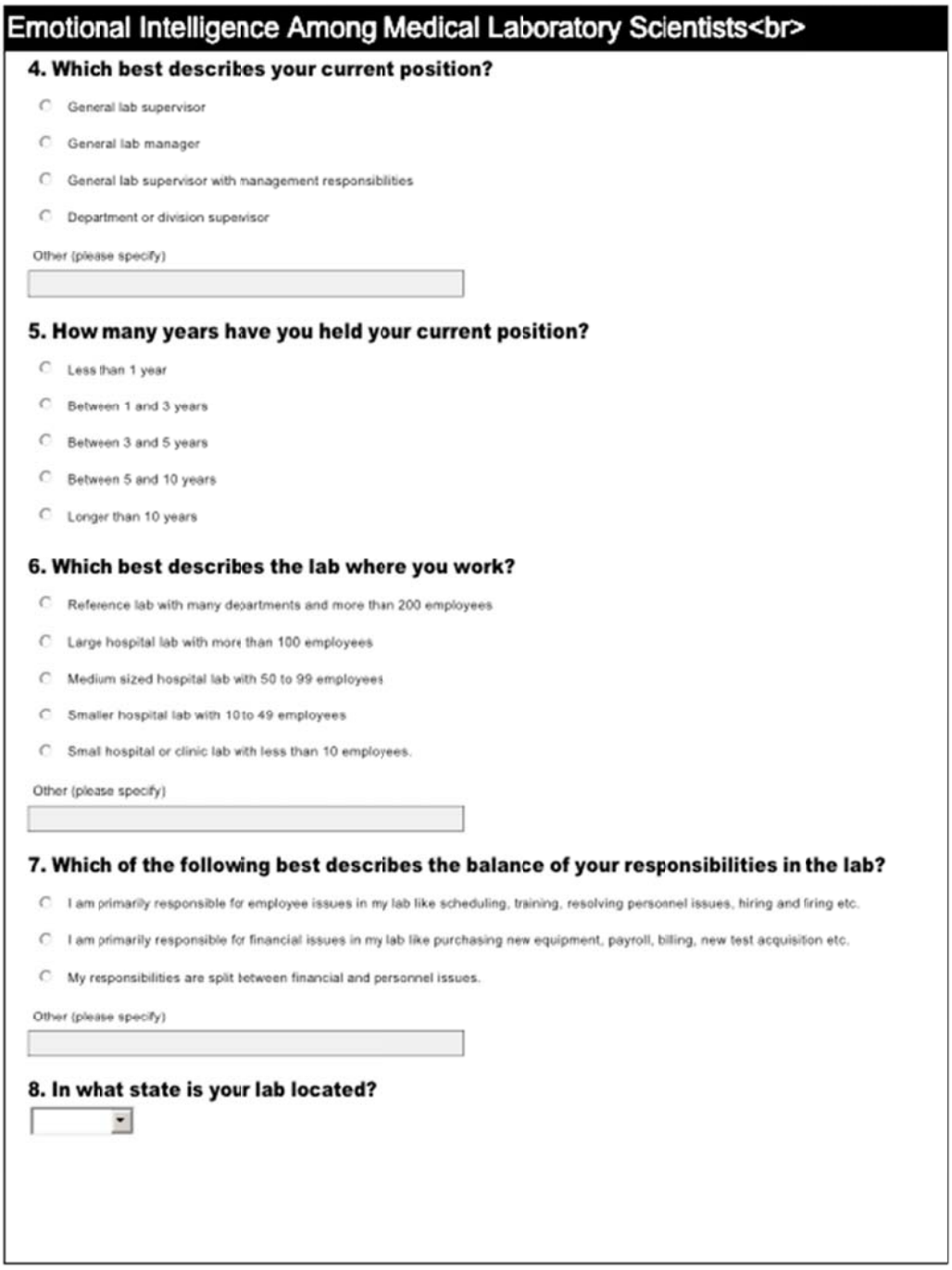
2. What is your gender?

- ○ Male
- ○ Female

3. How would you describe yourself?

- ☐ American Indian/Native American
- ☐ Asian
- ☐ Black/African American
- ☐ Hispanic/Latino
- ☐ White/Caucasian
- ☐ Pacific Islander

Other (please specify)



Emotional Intelligence Among Medical Laboratory Scientists

4. Which best describes your current position?

- General lab supervisor
- General lab manager
- General lab supervisor with management responsibilities
- Department or division supervisor

Other (please specify)

5. How many years have you held your current position?

- Less than 1 year
- Between 1 and 3 years
- Between 3 and 5 years
- Between 5 and 10 years
- Longer than 10 years

6. Which best describes the lab where you work?

- Reference lab with many departments and more than 200 employees
- Large hospital lab with more than 100 employees
- Medium sized hospital lab with 50 to 99 employees
- Smaller hospital lab with 10 to 49 employees
- Small hospital or clinic lab with less than 10 employees.

Other (please specify)

7. Which of the following best describes the balance of your responsibilities in the lab?

- I am primarily responsible for employee issues in my lab like scheduling, training, resolving personnel issues, hiring and firing etc.
- I am primarily responsible for financial issues in my lab like purchasing new equipment, payroll, billing, new test acquisition etc.
- My responsibilities are split between financial and personnel issues.

Other (please specify)

8. In what state is your lab located?

Emotional Intelligence Among Medical Laboratory Scientists

9. Which of the following best describes the colleges or universities in your area that offer MLT or MLS programs?

- ○ The city where my hospital or clinic is located has an MLT or MLS program
- ○ There is a program within 50 miles of the city where my lab is located
- ○ The closest program to my hospital is between 50 and 100 miles away
- ○ The closest program to my hospital is more than 100 miles away

Other (please specify)

10. On average, about how many new Medical Laboratory Technicians or Medical Laboratory Scientistis (Medical Technologists) does your lab hire annually?

- ○ Less than one per year
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5-10
- ○ More than 10

Emotional Intelligence Among Medical Laboratory Scientists

Section 2. Importance

The following questions relate to the skills and characteristics of medical laboratory technicians and medical laboratory scientists (medical technologists). When answering the questions, please consider those who work in your lab specifically, and not laboratory scientists in general.

11. Rate the importance for successful job performance.

	Extremely	Very	Somewhat	Not Very	Not at All
Technical Skills (Correctly performs and results tests)	○	○	○	○	○
Mechanical Skills (Can troubleshoot and repair basic instrument/mechanical issues)	○	○	○	○	○
Theoretical Knowledge (Understands the principles, theories and reactions behind the tests)	○	○	○	○	○
Dependability (Arrives on time, stays on task during their shift)	○	○	○	○	○
Communication with co-workers (Has positive day-to-day interactions with others in the lab)	○	○	○	○	○
Communication with other healthcare workers (Positively interacts with nurses, physicians etc.)	○	○	○	○	○
Respect for Others (Treats others like equals, respects their time and personal space)	○	○	○	○	○

Emotional Intelligence Among Medical Laboratory Scientists

Section 2. Importance (continued)

12. Rate the importance for successful job performance.

	Extremely	Very	Somewhat	Not Very	Not at All
Ability to Work as Part of a Team (Works well with others, sacrifices personal interests for the benefit of the group)	○	○	○	○	○
Self-Awareness (Understands their own thoughts, feelings and behaviors and recognizes how they impact others)	○	○	○	○	○
Adaptability (Is flexible and open to new ideas and information)	○	○	○	○	○
Empathy (Desires to understand thoughts and feelings from another's perspective)	○	○	○	○	○
Tact and Diplomacy (Responds appropriately when challenged, communicates without offending)	○	○	○	○	○
Positive Attitude (Appreciates challenges, looks for the good in others, is often upbeat and happy)	○	○	○	○	○
Self-Control (Manages negative emotions, reacts appropriately to intense situations, appropriately expresses frustration)	○	○	○	○	○
Positive Conflict Resolution (Appropriately approaches conflict without blaming or becoming overly defensive)	○	○	○	○	○
Integrity/Personal Ethics (Performs tests without cutting corners or skipping steps, is honest with others)	○	○	○	○	○

Emotional Intelligence Among Medical Laboratory Scientists

Section 3. Satisfaction

The following questions relate to the skills and characteristics of medical laboratory technicians and medical laboratory scientists (medical technologists). When answering the questions, please consider those who work in your lab specifically, and not laboratory scientists in general.

13. Rate your satisfaction with the Medical Laboratory Technicians and Medical Laboratory Scientists working in your lab.

	Extremely	Very	Somewhat	Not Very	Not at All
Technical Skills (Correctly performs and results tests)	○	○	○	○	○
Mechanical Skills (Can troubleshoot and repair basic instrument/mechanical issues)	○	○	○	○	○
Theoretical Knowledge (Understands the principles, theories and reactions behind the tests)	○	○	○	○	○
Dependability (Arrives on time, stays on task during their shift)	○	○	○	○	○
Communication with co-workers (Has positive day-to-day interactions with others in the lab)	○	○	○	○	○
Communication with other healthcare workers (Positively interacts with nurses, physicians etc.)	○	○	○	○	○
Respect for Others (Treats others like equals, respects their time and personal space)	○	○	○	○	○

Emotional Intelligence Among Medical Laboratory Scientists

Section 3. Satisfaction (continued)

14. Rate your satisfaction with the Medical Laboratory Technicians and Medical Laboratory Scientists working in your lab.

	Extremely	Very	Somewhat	Not Very	Not at All
Ability to Work as Part of a Team (Works well with others, sacrifices personal interests for the benefit of the group)	○	○	○	○	○
Self-Awareness (Understands their own thoughts, feelings and behaviors and recognizes how they impact others)	○	○	○	○	○
Adaptability (Is flexible and open to new ideas and information)	○	○	○	○	○
Empathy (Desires to understand thoughts and feelings from another's perspective)	○	○	○	○	○
Tact and Diplomacy (Responds appropriately when challenged, communicates without offending)	○	○	○	○	○
Positive Attitude (Appreciates challenges, looks for the good in others, is often upbeat and happy)	○	○	○	○	○
Self-Control (Manages negative emotions, reacts appropriately to intense situations, appropriately expresses frustration)	○	○	○	○	○
Positive Conflict Resolution (Appropriately approaches conflict without blaming or becoming overly defensive)	○	○	○	○	○
Integrity/Personal Ethics (Performs tests without cutting corners or skipping steps, is honest with others)	○	○	○	○	○

Emotional Intelligence Among Medical Laboratory Scientists

Section 4. Program Responsibility

15. How much responsibility should college-based MLT and MLS programs assume for the development of the following skills and characteristics?

	Most of the responsibility	Some of the responsibility	Only a small portion of the responsibility	No responsibility at all
Technical Skills (Correct performance of tests and solid understanding of results)	○	○	○	○
Mechanical Skills (Troubleshooting and repair of basic instrument/mechanical issues)	○	○	○	○
Theoretical Knowledge (Understanding of the principles, theories and reactions behind the tests)	○	○	○	○
Dependability (The importance of arriving on time and staying on task)	○	○	○	○
Communication with co-workers (Positive, effective communication with other laboratory personnel)	○	○	○	○
Communication with other healthcare workers (Positive, effective communication with clerks, nurses, physicians etc.)	○	○	○	○
Respect for Others (What it means to treat others with dignity and respect)	○	○	○	○

Emotional Intelligence Among Medical Laboratory Scientists

Section 4. Program Resporsibility (continued)

16. How much responsibility should college-based MLT and MLS programs assume for the development of the following skills and characteristics?

	Most of the responsibility	Some of the responsibility	Only a small portion of the responsibility	No responsibility at all
Ability to Work as Part of a Team (Understands group dynamics, has experience working in groups on lab-based projects)	○	○	○	○
Self-Awareness (Understands their own thoughts, feelings and behaviors and recognizes how they impact others)	○	○	○	○
Adaptability (Is flexible and open to new ideas and information)	○	○	○	○
Empathy (Desires to understand thoughts and feelings from another's perspective)	○	○	○	○
Tact and Diplomacy (Responds appropriately when challenged, communicates without offending)	○	○	○	○
Positive Attitude (Appreciates challenges, looks for the good in others, is often upbeat and happy)	○	○	○	○
Self-Control (Manages negative emotions, reacts appropriately to intense situations, appropriately expresses frustration)	○	○	○	○
Positive Conflict Resolution (Appropriately approaches conflict without blaming or becoming overly defensive)	○	○	○	○
Integrity/Personal Ethics (Performs tests without cutting corners or skipping steps, is honest with others)	○	○	○	○

Emotional Intelligence Among Medical Laboratory Scientists

Section 5. Emotional Intelligence Development

17. Does the lab or hospital where you work offer training in emotional intelligence related areas, such as conflict resolution, customer service, character assessment, or interpersonal communication?

- ○ No, such trainings are not ofered
- ○ Trainings similar to those mentioned exist, but occur infrequently
- ○ Trainings similar to those mentioned occur somewhat regularly
- ○ Trainings similar to those mentioned occur very regularly
- ○ I am not sure

Other (please specify)

18. Is attendance in emotional intelligence related trainings mandatory?

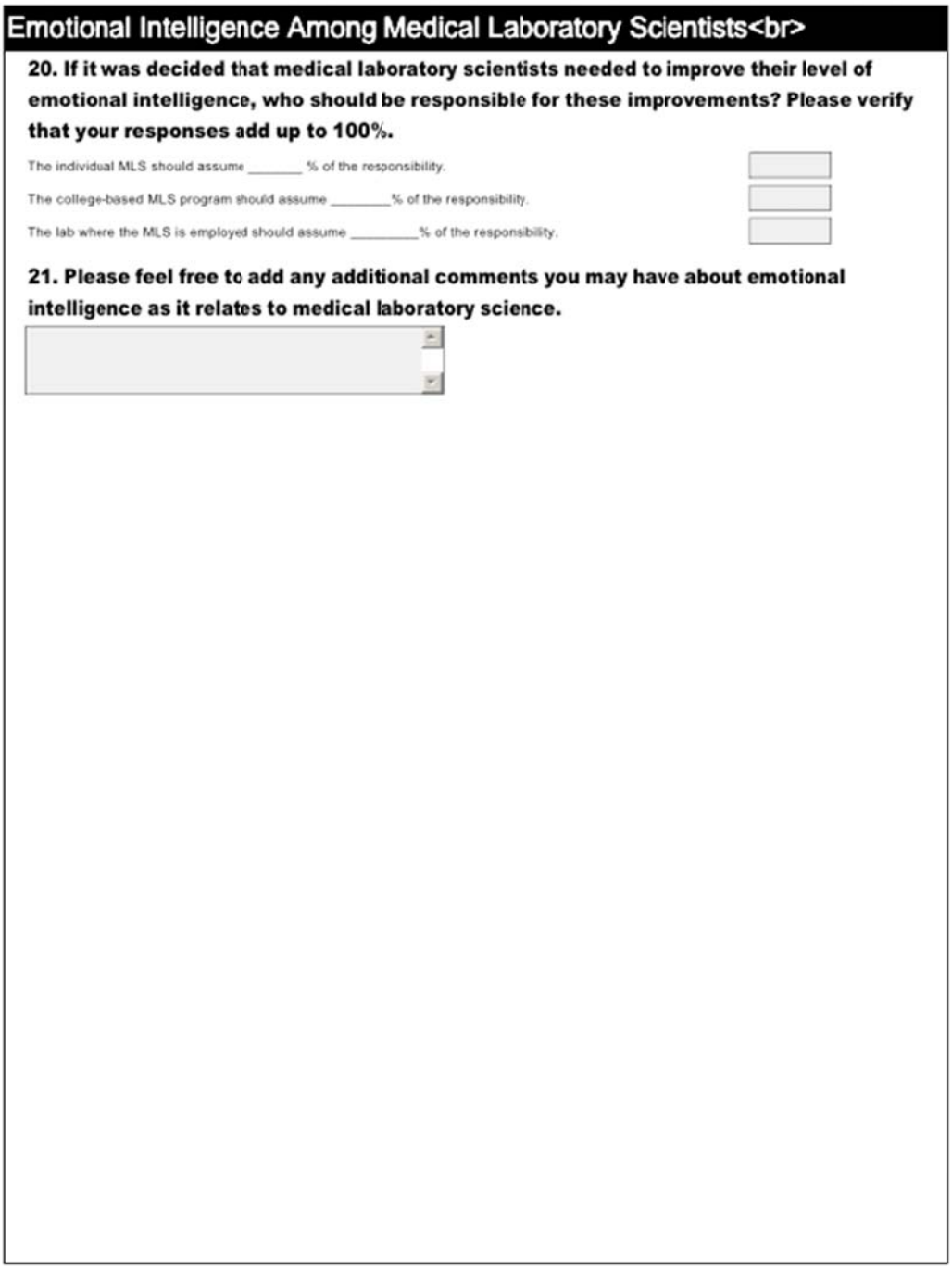
- ○ My hospital or lab does not offer such trainings
- ○ Such trainings are offered but are not mandatory
- ○ Such trainings are offered and some are mandatory
- ○ Such trainings are offered and all are mandatory

Other (please specify)

19. If the hospital or lab where you work offers any level of training in emotional intelligence related areas, what do you perceive to be the effect of these trainings?

- ○ The hospital or lab where I work does not offer any such trainings
- ○ The overall effect is negative, employees leave with less understanding and skill in emotional intelligence related concepts
- ○ The overall effect is neutral, employees experience no change in understanding or skill in emotional intelligence related concepts
- ○ The overall effect is slightly positive. Employees become more aware of emotional intelligence related concepts but may not change their behavior much
- ○ The overall effect is positive. Employee's understanding of emotional intelligence related concepts increases and positive changes in behavior are visible

Other (please specify)


Emotional Intelligence Among Medical Laboratory Scientists
20. If it was decided that medical laboratory scientists needed to improve their level of emotional intelligence, who should be responsible for these improvements? Please verify that your responses add up to 100%.
The individual MLS should assume _____ % of the responsibility.
The college-based MLS program should assume _____% of the responsibility.
The lab where the MLS is employed should assume _____% of the responsibility.
21. Please feel free to add any additional comments you may have about emotional intelligence as it relates to medical laboratory science.

Emotional Intelligence Among Medical Laboratory Scientists

Thank You!

Thank you very much for completing this survey. I really feel the information we can gain from this survey will help us better understand the role emotional intelligence plays in laboratory medicine. Your help with this study is invaluable. Thanks again!

Appendix B

Participant Demographic Information

Table B1

Participant Gender—Frequencies and Percentages

Gender	Frequency	Percent
Female	308	75.1
Male	102	24.9
Total	410	100

Table B2

Participant Race/Ethnicity—Frequencies and Percentages

Race/ethnicity	Frequency	Percent
American Indian/Native American	1	0.2
Asian	12	2.9
Black/African American	8	1.9
Hispanic/Latino	7	1.7
White/Caucasian	378	91.5
Pacific Islander	3	0.7
I'd rather not respond	5	1.2
Total	414	100

Table B3

Survey Participation by State—Frequencies and Percentages

State	Frequency	Percent
Alabama	7	1.7
Arizona	7	1.7
Arkansas	1	.2
California	43	10.4
Colorado	5	1.2
Connecticut	3	.7
Delaware	1	.2
District of Columbia	1	.2
Florida	9	2.2
Georgia	14	3.4
Hawaii	4	1.0
Idaho	1	.2
Illinois	21	5.1
Indiana	16	3.9
Iowa	26	6.3
Kansas	21	5.1
Kentucky	5	1.2
Maine	5	1.2
Maryland	1	.2
Massachusetts	7	1.7
Michigan	2	.5
Minnesota	26	6.3
Mississippi	1	.2
Missouri	17	4.1
New Hampshire	5	1.2
New Jersey	9	2.2
New Mexico	1	.2
New York	29	7.0
North Carolina	1	.2
Ohio	20	4.8
Oregon	2	.5
Pennsylvania	12	2.9
South Carolina	4	1.0
South Dakota	9	2.2
Tennessee	2	.5
Texas	3	.7
Utah	1	.2
Vermont	2	.5
Virginia	13	3.1
Washington	9	2.2
West Virginia	6	1.5
Wisconsin	34	8.2
Wyoming	1	.2
Total	407	98.5

CURRICULUM VITAE

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Thesis: A Flow Cytometric Exploration of Biomarkers in Patients Suffering from Hypereosinophilic Syndrome

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Clinical Laboratory Science

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Assistant Professor, 2012 – present
Weber State University
Department of Health Sciences

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Medical Technologist (Medical Laboratory Scientist), 2003 – 2004
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Medical Laboratory Technician, 2002 – 2003
McKay Dee Hospital

Behavioral Health Specialist (Certified Nurse's Assistant), 2001 – 2002
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CLS 1000	Core Clinical Laboratory Skills	WSU Online
MLS 1003	Introduction to Medical Immunology	WSU Online
MLS 1113	Introduction to Medical Laboratory Practices	WSU Campus/Online
MLS 2003	Applied Laboratory Mathematics and Statistics	WSU Campus/Online
MLS 3302	Advanced Medical Laboratory Practices	WSU Campus/Online
MLS 1113	LAB Introduction to Medical Laboratory Practices	WSU Campus
MLS 1123	LAB Principles of Hematology and Hemostasis	WSU Campus
CLS 2211	LAB Principles of Clinical Chemistry	WSU Campus
MLS 2212	LAB Principles of Clinical Microbiology	WSU Campus
CLS 4401	Working Laboratory Theory I and II	WSU Campus

CLS 4442	Applied Working Laboratory I and II	WSU Campus
MLS 4801	Research In Clinical Laboratory Sciences	WSU Campus/Online
HTHS 1101	Medical Terminology	WSU Campus/Online
HTHS 1110	Biomedical Core I	WSU Campus/Online
HTHS 1111	Biomedical Core II	WSU Campus/Online

PUBLICATIONS AND PRESENTATIONS

Articles in Peer Reviewed Journals

Westbroek, Mark, Crystal Davis, Lena Fawson, and Travis Price. "Interactions of *Lactobacilli* with Pathogenic *Streptococcus pyogenes*." *Infectious Diseases in Obstetrics and Gynecology*, 2010.

Adams, Austin, Kristin McCabe, Cassandra Zundel, Travis Price, and Corey Dahl. "Perceived emotional aptitude of clinical laboratory sciences students compared to students in other healthcare profession majors." *Clinical Laboratory Science*, 2011

Conference Presentations and Proceedings

Price, Travis. "Urinalysis: A Powerful Diagnostic Tool," Laboratory Education for North Dakota (LEND), Lab Science Seminar. December 4, 2005.

Price, Travis. "A Flow Cytometric Exploration of Biomarkers in Patients Suffering from Hypereosinophilic Syndrome." Clinical Laboratory Educators Conference, Louisville, KY, February 23, 2007. Poster Presentation.

Price, Travis. "The Most Common Diseases of the Urinary Tract and the Expected Laboratory Findings," Laboratory Education for North Dakota (LEND), Lab Science Seminar. April, 2007.

Price, Travis. "Making the Most of Technology in Blackboard," WSU Teaching with Technology Symposium. April 9, 2009.

Price, Travis. "Teaching Lab Math and Statistics Online: Making the Most of Technology" at the Clinical Laboratory Educators Conference in Biloxi, Mississippi February 26, 2010.

Price, Travis. "The National Conferences for Undergraduate Research, A Unique Opportunity for National Engagement" presented at the annual meeting for the Council for Undergraduate Research in Ogden, Utah. June 2010.

Price, Travis. "Issues and Challenges for the Less-than-Seasoned Clinical Laboratory Educator." Presented at the Clinical Laboratory Educators Conference in Salt Lake City, Utah. February 24, 2012.

Price, Travis and Zundel, Bill. "On-campus Wet Lab Preparation Techniques: What's in Your Lab? Presented at the Clinical Laboratory Educators Conference in Salt Lake City, Utah. February 24, 2012.

Price, Travis, Johnson, Gary, Eads, Adrian, Packer, Colleen and Utley, Jordan. "Assessing Technology in the Classroom Through Action Research." Presented at the WSU Teaching and Learning Symposium, Ogden, Utah. April 5, 2013.

Other Scholarly Work

Textbook Review, *The Phlebotomy Workbook*, 3rd Edition, F.A. Davis Company/Publishers, November 7, 2007

Textbook Review, *Quick Review Cards for Clinical Laboratory Science*, 2nd Edition, F.A. Davis Company/Publishers, March 3, 2008

Textbook Review, *Clinical Laboratory Mathematics*, F.A. Davis Company/Publishers, June 23, 2009

Textbook Review, *Contemporary Clinical Immunology and Serology*, Pearson PLC, October 2010

Textbook Review, *Clinical Laboratory Mathematics*, Pearson PLC, January 2011

Faculty Reviewer for ERGO (WSU Undergraduate Research Journal) Spring 2008

PROFESSIONAL SERVICE

Dumke College of Health Professions

Academic Advisor/Pre-Professional Advisor	2003 – 2012
CLS Advisory Committee	2003 – 2012
DCHP Community Services Task Force	2007 – 2008
DCHP Graduation Committee	2007 – 2012
DCHP IRB Sub Committee	2007 – present
DCHP Technology Committee	2012 – present

Weber State University

WSU Faculty Senate: Appointment, Promotion, Academic Freedom and Tenure Committee	2006 – 2007
WSU Faculty Senate: General Education Improvement and Assessment Committee	2007 – 2010
Faculty Writing Initiative Committee	2008 – 2011
Undergraduate Research Grant Committee	2008 – present
Teaching and Learning Forum Committee	2012 – present

Professional Organization Service

American Society for Clinical Pathology Associate Member/Global Outreach Consultant	2003 – present
American Society for Clinical Laboratory Sciences (ASCLS)Member	2002 – present
Awards Chair for ASCLS State Chapter	2005 – present
Elected Board Member for ASCLS State Chapter	2008 – 2010
Faculty Advisor, Weber State Chapter of the Health Occupation Students of America Club	2006 - 2010
Faculty Advisor, Weber State Chapter of the American Red Cross Student Organization	2008 – 2011
Faculty Advisor, Many Hands Club,	2010 – 2012

International Professional Experience

Teaching Methodologies Workshop, Pre-service Curriculum Review
Freetown, Sierra Leone
January 13 – 18, 2013

Preservice Curriculum Review
Hanoi, Vietnam
April 18 – 22, 2011

Preservice Teaching Methodologies Workshop
Maputo, Mozambique
January 24 – 28, 2011

Scope of Practice Site Assessment, Lab Partners' Meeting
Maputo, Mozambique
August 11 – 18, 2010

Preservice Assessment and Curriculum Review

Maputo, Mozambique
March 22 – 26, 2010

National Laboratory Quality Assurance Program Planning Meeting
Maputo, Mozambique
December 1 – 3, 2009