Medical laboratory testing personnel: Perception of professional status and engagement in professional development and career advocacy.

by

Joan O'Connell-Spalla

Submitted in Partial Fulfillment of the Requirements

for the degree of
Doctor of Education
in the
Educational Leadership Program

YOUNGSTOWN STATE UNIVERSITY

August 2021

I hereby release this dissertation to the public. I understand that this d issertation will be made available from the Ohio LINK ETD Center and the Maag Library Circulation Desk for public access. I also authorize the University or other individuals to make copies of this thesis as needed for scholarly research.

Signature:

_____

Joan O'Connell-Spalla, Student Date

Approvals:

_____

Dr. Karen Larwin, Dissertation Advisor Date

_____

Dr. Kelly Colwell, Committee Member Date

_____

Dr. Maria Delost, Committee Member Date

_____

Dr. Patrick Spearman, Committee Member Date

_____

Dr. Salvatore A. Sanders, Dean of Graduate Studies

Acknowledgements

Some say it takes a village to raise a child, but the same can be said for completion of this dissertation. My success is the direct result of the support and knowledge of many people for whom I am forever thankful.

I am deeply indebted to my committee chairperson Dr. Karen Larwin. I would not be writing this acknowledgement if not for your constant support, patience, and guidance. The road to completion was fraught with several obstacles and when I felt like giving up it was your unrelenting belief in my ability and your selfless dedication to my success that inspired me and kept me moving forward, for that I am forever grateful.

My sincere appreciation is extended to the members of my committee: Dr. Kelly Colwell, thank you for your encouragement and reminding me of the importance of perseverance. Dr. Maria Delost, thank you for checking on me frequently, offering to help with anything I needed, and always encouraging me. Dr. Patrick Spearman, thank you for providing a unique perspective and direction; your insight provided a relevant and interesting direction for this study. I am grateful to all of you for sharing your time, experience and knowledge. It is with your guidance and support that I was able to focus and complete the process.

Thank you to the department of education faculty who have taught me so much along the way and my colleagues in the department of health professions who consistently provided words of wisdom and encouragement. Thank you to the many different cohorts of doctoral students I joined as I worked my convoluted way through the program; I consider myself lucky to have met so many extraordinary people.

Special thanks to my editor Leslie; it was a pleasure working with you; your expertise has been invaluable throughout the process.

I would also like to express my gratitude to the laboratory professionals who took the time to participate in this study; without your valuable feedback this would not be possible.

There are many family members and friends who share in this accomplishment all of whom provided advice, encouragement, food, and laughter, when needed most.

To my husband Jeff, and my children Hayley and Matthew, words cannot express how grateful I am to have you all in my life. Thank you for supporting my goal to complete this project, for the breaks I needed to keep things in perspective, and for bearing the brunt of the distractions, papers, books, and fast food. You are the reason I succeed, love you. To my sisters, Joyce, Carol, and Susan, you have been a constant source of support in my life, there are so many obstacles I could not have overcome without your help. I am blessed to have all of you in my life.

Last but not least, I dedicate this work to my mother who, although no longer with us, continues to inspire me to be strong, resilient, and kind.

Abstract

The shortage of Medical Laboratory Professionals (MLP) has been an ongoing problem for over a decade, primarily due to areas of discontent of MLP. Initiatives to improve these problematic areas of discontent have been and continue to be important to the field of medical laboratory science in regard to recruiting and retaining these essential professionals. Previous research has uncovered significant factors associated with discontent including; salary levels, lack of advancement, public awareness and esteem. This study explores the issues of awareness, respect, and recognition of the MLP within the context of the healthcare community, the impact on professional status among other healthcare professionals and the association with career satisfaction and professional engagement. This longitudinal survey presents data from samples of laboratory professionals collected both prior to the COVID-19 pandemic (n= 371) and during the COVID-19 pandemic (n=380). Results of the current study indicate that more than half of respondents do not feel respected by other healthcare professionals and more than 90% indicated that other healthcare professionals do not understand the educational requirements and level of responsibility of the MLP. Additional analysis reveals that perceived lack of respect and understanding by members of other healthcare professions have a statistically significant impact on the career satisfaction of MLP. The current study highlights the need to address awareness, respect, and understanding of the valuable contribution of the MLP, specifically, among other healthcare professionals. The implication of creating change related to respect, recognition, and awareness within the healthcare community is discussed as a means of developing positive professional identity and status and improving recruitment and retention of vital medical laboratory professionals.

Keywords: Medical Laboratory Professional, COVID-19, Coronavirus, healthcare professionals

Table of Contents

List of Tables

List of Figures

Chapter 1

Medical Laboratory Personnel: Perception of Professional Status

Medical laboratory tests are critical for the diagnosis, management, and prevention of disease. The accuracy of the more than 13 billion tests performed in the United States each year is an essential aspect of providing objective evidence necessary for the treatment of health conditions (American Association of Clinical Chemistry [AACC], 2015). Medical laboratory professionals (MLP) who perform, interpret, and report these tests train extensively in both didactic and clinical methods to ensure accurate and precise results. Medical laboratories are generally isolated from other areas within a healthcare facility. Sophisticated technology and instrumentation within the laboratory often require controlled environments for optimum operation, as well. The volume of samples processed and tested throughout the laboratory require meticulous procedures for handling biohazardous samples and reagents. The nature of the work and the required environment lead to physical isolation from other healthcare areas and other healthcare professionals. Within the confines of the medical laboratory, there exists a diverse range of professionals with varied educational background, responsibilities, and titles, most of which are unbeknownst to those outside the laboratory walls. Laboratory tests are performed and reported by certified or licensed medical laboratory technicians (MLT) who hold an associate degree or medical laboratory scientists (MLS) who have earned a bachelor's degree or higher. Those who conduct, interpret, and report test results complete an educational program that requires extensive knowledge of disease pathology, theoretical background of methodologies, and application of analytical problem solving across several disciplines. Extensive theoretical knowledge and clinical application are b

required in several disciplines including, molecular diagnostics, microbiology, hematology, and chemistry. The background of those who perform the required tests has been shown by previous studies to correlate positively with the required educational training (American Society for Clinical Laboratory Science [ASCLS], 2020; Delost et al., 2009). Although the physical separation of the laboratory environment is a necessity, what is observed by those outside the laboratory is not representative of the complex processes and divergent levels of staff who work behind the scenes. A consequence of physical isolation is the tendency for those outside the laboratory to reference professionals as "lab" or "lab techs"; this type of inadvertent, stereotypical misnomer lacks acknowledgement of the professional qualification required of laboratory professionals. Merriam Webster describes a hierarchy as a classification of groups based on economic, social or professional standing, from this perspective the myriad of different healthcare professionals within a facility can be seen as a hierarchy with respect to education and scope of practice (Merriam-Webster, 2021). Within the healthcare hierarchy, there is greater understanding and acknowledgement regarding the educational background and professional standing of those who hold more visible roles. Rarely is there confusion regarding the status and professional qualifications of physicians, physician assistants, registered nurses, nurse assistants, or pharmacists, and pharmacy technicians; all of these professionals have clearly defined roles and recognizable status among colleagues and the general public. The hierarchy that exists within the laboratory and the professional roles and background of those behind the scenes is less understood and more readily stereotyped. Lack of awareness contributes to lack of recognition and acknowledgement of the important role of MLP, which in turn leads to issues with both

recruitment and retention. The current and ongoing shortage of testing professionals at both the MLT and MLS levels is not new in the field of laboratory medicine. Personnel shortages began to emerge in the late 1990s and early 2000s as a result of financial cost-cutting measures, the closing of educational programs, and concurrent retirements compounded the problem (Bennett et al., 2014). Recent data indicate the shortage of laboratory professionals will continue to be a significant problem. In 2016, there were approximately 335,000 laboratory professionals in the United States with an expected retirement rate of 19.4% between the years 2017 to 2021 (Caldwell, 2019; Garcia et al., 2019). The combined figures related to increased job growth, high vacancy rates, and expected retirements continue to be alarming with respect to overall staffing levels of qualified laboratory professionals in the future (Rothenberg, 2017). Previous research has uncovered several factors that contribute to the multifaceted problem of laboratory staffing. The combination of increased test complexity and an aging population with greater access to healthcare contribute to both greater utilization and the need for qualified professionals to provide accurate results that contribute to evidence-based care (Caldwell, 2019).

The total number of MLT and MLS graduates in 2016 was 6,818; at first glance, this represents an increase compared to previous years, however, the misrepresentation lies in the fact that 14% of the total graduates consisted of currently employed MLTs advancing to the MLS level through continued education (Caldwell, 2019). The reality of those entering the field and contributing as new laboratory professionals in the workforce is much lower. Recruitment rates have been and continue to be low and the number of students entering programs continues to remain insufficient. Prospective students entering

the field consider the career a steppingstone to what they perceive as more attractive professions (McClure, 2016). Recent surveys of current professionals indicate that 85% of laboratory professionals have experienced or currently experience burnout, and 44% of those surveyed were considering a complete career change, factors associated with burnout included high stress, high workload, and lack of adequate staffing (Garcia et al., 2020). The Coronavirus pandemic has placed an unprecedented strain on an already lean workforce and brought to the forefront the importance of adequate laboratory staffing . The respect for and understanding of the educational skills and support from administrative leadership and other healthcare professionals must be evaluated in order to change the perception of the medical laboratory profession.

Dynamics Associated with Retention and Recruitment

Despite years of research and effort to uncover the dynamics associated with the retention and recruitment issues that plague the medical laboratory profession, a critical shortage of qualified professionals remains. There is little awareness among the general public and members of other healthcare professions regarding the educational background and skill required of laboratory professionals. Within the hospital setting, high-level administrators generally lack knowledge of the required qualifications and valued contribution of highly trained laboratory professionals (Kaplan & Burgess, 2011; Swails, 2017). The invisibility of the professionals who work behind the scenes contributes to a generalized stereotypical perception of laboratory professionals and the generalization of all laboratory workers. This perception significantly dismisses the diversity in background and scope of practice that exists among laboratory professionals (Rohde et al., 2015). The combined lack of awareness, stereotypical perceptions, and lack

of recognition within the workplace create a significant barrier with respect to implementation of successful retention and recruitment efforts and impacts the general well-being and job satisfaction of current professionals in the laboratory.

The review of literature highlights retention and recruitment factors identified as salient over many years including salary, advancement opportunities, recognition, and appreciation. More recent research on well-being and burnout focuses on the aspects of workload and salary as most significant; however, recognition and career advancement remain important facets of discontent (Garcia et al., 2020). Professional organizations have joined forces over the past decade in an attempt to address continued issues with retention and recruitment of qualified laboratory professionals. The ASCLS and the American Society for Clinical Pathology (ASCP) have worked collaboratively to promote the profession and raise awareness of the significant contribution of those who work behind the scenes (Bennet et al., 2014; ASCLS, 2020). Despite efforts, over the years, to provide insight and solutions, the same concerns remain. Salary has repeatedly been revealed as a negative factor in job satisfaction and although wages for MLPs have shown slight increases over the years, they fail to remain equitable with those seen among other healthcare professions (Doig & Beck, 2005; McClure, 2016; Lewin, 2016). The lack of advancement opportunity has repeatedly been identified as a detriment to career satisfaction. The one positive is the recent establishment of the doctorate degree in clinical laboratory science, which provides an emerging and more integrated role for the medical laboratory professional. The new advanced practice degree provides an opportunity for the medical laboratory scientist to work closely with physicians and nurses to provide expertise in areas of test utilization and interpretation, a role that may

help to bridge the gap of invisibility and create greater understanding and collaboration between laboratory professionals and other members of the healthcare team (Singh & Gunsolus, 2020). The advanced practice role is a new concept that will require time to determine efficacy and acceptance of integration. Overcoming the physical barrier of the laboratory and integrating with other healthcare professionals establishes a more positive perception of the role of the laboratory professional. In spite of the research and increased effort to bolster the field as a career choice, the critical shortage, low recruitment and retention, and discontent remain significant issues for the profession (Garcia et al.).

Purpose of the Present Study

Respect is cited as one of the most highly valued aspects of the work environment and yet often overlooked as an important issue (Rogers & Ashforth, 2017). This study will focus on the prevalence of perceived lack of respect and value for the profession and the impact on development of professional identity, commitment and engagement of laboratory professionals. Theoretical concepts of equity and social identity will be examined with regard to how laboratory professionals perceive themselves and how they believe other healthcare professionals perceive them. Strategies over the past decade or more have not significantly changed how those in the profession are perceived among healthcare professionals or explored the impact on career satisfaction. This study will examine the role of recognition, respect and value within the workplace particularly the need to increase understanding among colleagues and administrators. The effect of recognition and acknowledgement within the healthcare hierarchy is explored as a psychological barrier to career satisfaction.

A survey will be utilized to collect data from a sample of medical laboratory professionals who are members of the Medical Laboratory Scientists Facebook group. Total membership in the closed group is 36,000. The study was approved through the Institutional Review Board (IRB) committee at Youngstown State University (YSU). Survey questions were developed by the researcher and piloted by current laboratory professionals for review and revision. The survey will be posted on the Facebook page in an attempt to gain responses and perspective of non-managerial professionals. To provide a more diverse sample, snowball sampling will be utilized and the survey provided to current laboratory professionals employed in local hospitals will be asked to share the link with interested colleagues.

This study will attempt to uncover the current status of self- perception and how the perception of others influences the professional identity, overall career satisfaction, and professional engagement of those in the field. Recent research conducted by the ASCP provides data on factors salient to career satisfaction among laboratory professionals., an interesting finding is that most of those surveyed indicate they enjoy the work but do not feel that others have an adequate understanding or appreciation for what they do (Garcia et al., 2020). The goal of this study is to address the impact of perception, particularly the issue of respect and appreciation of the value of the work from the framework of social identity within the healthcare hierarchy and examination of how those perceptions impact career satisfaction and professional engagement. The review of literature is grounded in the theory of self-concept and the construct of self-worth as a consequence of social interactions (Dutton et al., 2016). The role of social interactions, both verbal and non-verbal, is explored in relationship to development of

self-concept and perceived occupational respect (Thomas, 2016). Efforts to increase salary, raise awareness, and provide advancement opportunities for medical laboratory professionals may not be sufficient if there remains an underlying perceived level of disregard for the value of the contribution and the profession in general. This study attempts to uncover the prevalence of perceived lack of respect and value as well as the impact on establishment of positive professional identity and career engagement. The following research questions will be addressed:

RQ1: Do medical laboratory professionals perceive they are respected by other members of the healthcare community?

RQ2: How do medical laboratory professionals feel about the value of their work being understood?

RQ3: How does perceived lack of respect profession impact career satisfaction and engagement?

RQ4: How does perceived lack of understanding regarding the medical laboratory profession impact career satisfaction and engagement?

RQ5: How has the Coronavirus (COVID19) pandemic impacted the professional experience of medical laboratory professionals?

Limitations

A researcher's background and experience influence the chosen topic for investigation as well as the interpretation of data. The researcher's understanding of personal assumptions and preconceptions is essential in providing objective data. As a former MLS, this researcher's experience with the problem of perception is derived from first-hand experiences: i.e., the need to explain to others the scope of the profession along with consistently being misidentified as a nurse or phlebotomist were common issues. The absence of acknowledgement and understanding regarding the skills and educational training among other healthcare professionals combined with the invisibility of those tucked away in the "lab" created a negative atmosphere and feelings of low status within the context of the organization. This research focuses on the psychological well-being of the profession and the impact of recognition and value. Identification and understanding of the underlying feelings of low worth and perceived lack of respect are essential to evaluating the well-being of laboratory professionals. Recognition and value enhance well-being; thus, it is worthwhile to evaluate well-being from the psychological perspective of social value in the workplace as a critical component of successful retention and recruitment interventions (Basford et al., 2012). The survey questions will be presented to members of the MLS/MLT Facebook group. The decision to survey via the Facebook platform versus utilization of a professional database was based on the researcher's background knowledge of membership in professional organizations. Membership in ASCLS and ASCP is generally higher among administrators and educators and much lower for those in non-administrative roles. Utilizing the Facebook format would reach a greater and more diverse group of professionals; however, the

qualifications of the respondents cannot be verified creating a significant limitation. A study requirement was to reach laboratory professionals who may or may not be members of professional organizations. Therefore, the use of Facebook to distribute the questionnaire was a deliberate attempt to reach a larger and more diverse population of laboratory professionals.

Definition of Terms

American Society of Clinical Laboratory Science (ASCLS) – Professional organization for medical laboratory professionals (MLP), educators and students (ascls.org)

American Society of Clinical Pathology (ASCP) – Founded in 1922, professional association for pathologists and medical laboratory professionals (ascp.org)

American Society of Clinical Pathology Board of Certification (BOC) - established in 1928 creates and administers medical laboratory certification exams (ascp.org)

Board of Regents (BOR) - established in 1928 to provide official registration of the first laboratory technicians. The Board of Regents and the National Certification Agency (NCA) formed a single certification agency, the Board of Certification (BOC) in 2009 (ascp.org)

Center for Medicare and Medicaid Services (CMS) - is a division of the Department of Health and Human Services. CMS oversee the major healthcare programs including Medicare and Medicaid and manage laboratory certification and compliance with CLIA regulations (cms.gov)

College of American Pathologists (CAP) - professional group for board certified pathologists (cap.org)

Clinical Laboratory Improvement Amendments (CLIA) - are federal regulations that apply to all facilities that test human specimens (CDC.gov)

Clinical Laboratory Improvement Advisory Committee (CLIAC) – professional group that provides scientific and technical advice to the department of Health and Human Services. (cdc.gov)

Coronavirus- Large family of viruses that infect both animals and humans and can result in a wide range of illnesses from the common cold to severe respiratory illness. (Webmd.com)

Coronavirus disease (COVID19) – Infectious disease caused by a new strain of Coronavirus resulting in mild to severe respiratory illness (WHO.gov)

Healthcare Professionals – trained or licensed professionals involved in the maintenance or restoration of health through conformity to the technical and ethical standard of a profession (Miriam Webster). This refers to nurses, physicians, respiratory therapists, radiology technicians, and others in the healthcare industry

Medical Laboratory Scientist (MLS) - an individual who has earned a bachelor's degree in Medical Laboratory Science from an accredited college or university or a bachelor's degree in life science followed by additional training in Medical Laboratory Science from an accredited training program. Previously referred to as Medical Technologist or Clinical Laboratory Scientist (ascls.org)

Medical Laboratory Technician (MLT) - An individual who has earned an associate degree from an accredited college or university. Previously referred to as Clinical Laboratory Technician (ascls.org)

National Certification Agency (NCA) - established in the 1970s by the American Society for Medical Technology (ASMT) (now the American Society for Clinical Laboratory Science (ASCLS) to provide certification for laboratory professionals. The organization merged with the ASCP Board of Regents in 2009 to form the current Board of Certification (Karni, n.d.)

SARS – Severe acute respiratory syndrome – viral respiratory illness caused by Coronavirus (cdc.gov)

SARS-CoV-2 – The name given to the new strain of Coronavirus causing Coronavirus disease (COVID-19) and resulting in a global pandemic

Chapter 2

Review of Literature

The ongoing issues related to recruitment and retention of qualified MLP are best understood through examination of the historical evolution of the profession and the environmental factors that impact laboratory operations. The literature review explores the history of the profession, factors identified by research as significantly impacting professional well-being and commitment, and initiatives designed to address the issues that continue to create critical staffing shortages.

Physicians began performing simple chemical analysis in the 1800s to provide clues to the origin of disease (Berger, 1999a). Increased knowledge of medical and biochemical processes resulted in an increased number of tests available to provide objective data. As the number of available tests expanded, the need for dedicated space and trained professionals to assist with the plethora of analytical procedures created the shift from bedside testing to establishment of the laboratory and laboratory professional (Berger,1999b). As hospitals evolved in the early 20th Century, a focus on quality also emerged. The American College of Surgeons (ACS) instituted standard-based inspections of hospitals as early as 1918 and added the requirement that each facility include a laboratory with adequate staff and equipment (Kotlarz, 1999). Physicians were reluctant to relinquish control of the testing aspect of the diagnostic process. The decision to hire and train professionals who would remain under their direct control was a mechanism for retaining their status in the hierarchy and ensuring that subordinates would not challenge their authority or expertise in the realm of laboratory testing (Berger,1999b; Kotlarz, 1998).

Pathologists are physicians who have specialized in laboratory analysis and interpretation. Throughout history, pathologists have engaged in their own struggle to maintain professional status among other physicians. The establishment of the American Society of Clinical Pathology (ASCP) in 1922 provided a professional organization to promote the status and recognition of the group (Berger, 1999b). Members of the newly established ASCP controlled the first formal training of Medical Technologists (MT) in the laboratory and developed the Board of Registry to govern certification requirements (Berger,1999b). Pathologist control of the governing board and the requirements and certification for MTs ensured that those hired would remain as subordinate and not upset the established hierarchy (Berger, 1999b). Approximately 80% of the initial applicants were females, who, in the early 20th Century, were unlikely to dispute the authority of the physician, and hence ideal for ancillary subordinate positions (Berger, 1999b).

As pathologists continued their quest for status among physician groups, MTs began their pursuit for autonomy, recognition, and respect. Formation of the American Medical Technologists (AMT) professional organization was an attempt to find governance that would focus primarily on their best interests and strive for control of their profession (Kotlarz, 1998). The AMT eventually established the National Certification Agency (NCA) as a mechanism for developing a certification process independent from that prescribed by the pathologists (Berger, 1999b). The pathologists' desire to remain in control and the medical technologists' desire to obtain professional autonomy created a polarizing rift between the two groups of professionals and a general consensus among medical technologists that pathologists cared little about their advancement and professional growth (Berger, 1999b). Eventually, the AMT, now known as the ASCLS

and the ASCP began to work collaboratively forming a combined certification agency and inclusive approaches to staffing shortages. Today, the ASCLS and the ASCP work closely on initiatives designed to enhance the career of MLPs (Campbell, n.d.). The history and the contentious relationship between MTs and the ASCP, along with continued changes in professional organizations and titles, has contributed to the tumultuous and confusing evolution of the profession and professional identity. The internal struggles for autonomy and recognition combined with the external lack of awareness and recognition impact career discontent. There remain laboratory professionals who are skeptical of the motives and effectiveness of the ASCP and ASCLS and believe there is little support for the needs of laboratory professionals (ASCLS, 2018)

Medicare Impact on Educational Programs

The implementation of Medicare changed healthcare delivery and reimbursement and significantly impacted laboratory operations and the laboratory workforce. Medicare originated as a taxpayer-funded program designed to provide healthcare for the elderly. Under the original plan, the reimbursement for provided care and services was based on an established fee (Blumenthal et al., 2015). Increased fees and the resultant increased reimbursements led to an alarming increase in the cost to administer the program. Between 1966 and 1980, the cost of Medicare increased by more than $200 billion per year (Takemura & Beck, 2001). The skyrocketing financial burden of the program and the inability to sustain services under the "pay by fee" structure prompted government intervention in the form of regulations and reforms (Blumenthal et al.). A new reimbursement framework was introduced: the Medicare Prospective Payment System

(PPS); under this structure, subsidy for services was accompanied by an allowable cap based on patient diagnosis (Blumenthal et al.). Often referred to as DRGs or diagnostic related groups, the new framework placed a maximum allowable amount of reimbursement for care based on the patient's diagnosis. The reimbursement was expected to cover all services provided, including laboratory related costs (Blumenthal et al.). Managed care organizations (MCOs) were established to control cost and services that fell within the allowable reimbursement; the organization agreed to provide healthcare benefits for Medicare recipients in exchange for a monthly fee paid by the government (National Council on Disability [NCD], 2013). Managed care organizations negotiate premiums, employ contracted providers, and manage utilizations, and the government reimburses the managed care corporation a flat fee. Thus, they are then charged with controlling cost and assuming the risk of providing care, similar in nature to an insurance company (NCD, 2013). Controlling cost meant discouraging hospital admissions, restricting provider access, and decreasing overuse of unnecessary services including laboratory tests (Takemura & Beck, 2001). Urgent care facilities and surgical centers owned by managed care organizations began to emerge and significantly decreased hospital admissions, and subsequently, the volume of in-house diagnostic laboratory tests. Hospital laboratories struggled to survive the negative impact and loss of financial stability created from the new business model; the resulting acquisitions, mergers, and consolidations led to subsequent reductions in staff (Takemura & Beck, 2001; Berger, 1999c; Berger, 1999d). Laboratories transitioned from revenue-generating entities to cost liabilities in the eyes of hospital administration. In fact, the closing of hospital-based MLS educational programs was a direct result of the financial instability

created by the new reimbursement structure. The reductions in staff and decreased financial assets meant that hospital laboratories could no longer support the resources necessary for educating medical laboratory students and a 43% decline in available programs occurred by the late 1990s (Freeman, 1998). The merging of healthcare facilities and consolidation of laboratory services buffered the impact of decreased programs and graduates. However, the loss of professionals was not an immediate concern as it was offset by the loss of test volume and concerns for f inancial stability. Rapid technological advances resulted in an increase in the number of tests available and the complexity of the procedures. The ability to keep pace with increased testing and complexity is impacted by the lack of qualified graduates, a metric that has steadily reached critical levels

Many of the hospital-based clinical programs that closed during the 1990s remain closed. Universities depend on the clinical programs to support student education; without adequate educational programs, a significant barrier exists in recruiting the next generation of laboratory scientists (Berger, 1999d; Kotlarz, 1998). Over the years, the circumstances surrounding finances and educational resources have created what is now a significant national shortage of qualified professionals, and as the COVID19 pandemic continues to impact the nation, the shortage of qualified laboratory professionals necessary to provide accurate testing has reached critical levels with no end in sight (Moore, 2020). The projected, increased demand for medical laboratory professionals between 2012 and 2025 is reported to be 22% with an average vacancy rate of 7.2%. Current data indicate a 7% growth in the profession between 2019 and 2029. (Bureau of Labor Statistics [BLS], 2021). The significant decrease in the number of available

programs, and hence, graduates, does not meet the current demand (ASCLS, 2018). The stress created by the current staffing shortage impacts the satisfaction and retention of those in the field and negatively impacts the attractiveness of the profession as a career choice (Garcia et al., 2020). The current state of the workforce and shortage of qualified laboratory professionals is the culmination of numerous factors both current and past. Solutions to the challenges must consider the multi-faceted issues surrounding the profession.

Coronavirus Impact on the Current Workforce

Coronavirus is a family of viruses that can result in illnesses ranging from a mild cold to serious and severe acute respiratory syndromes (SARS). SARS-CoVid-2 is the designation for the new strain of Coronavirus, identified in December 2019, and the causative agent of Coronavirus disease or COVID-19. The Coronavirus strain that emerged in late 2019 had not been previously identified and although it was not the first strain to result in SARS, it was unique in its ability to spread easily from person to person resulting in exponential increases in infections and the declaration of a global pandemic in March 2020 (Fang & Meng, 2020).

The initial measures to decrease the spread of Coronavirus infections included cancelling elective or routine healthcare procedures which resulted in a decrease in testing volumes for many labs (Durant et al, 2020). Early response and preliminary testing for Coronavirus had little impact on laboratory volumes due to established criteria that limited those eligible for testing. Laboratories that were not yet involved with Coronavirus testing responded to decreased test volumes by implementing cost-cutting measures including professional furloughs or reassignments. The change in the criteria

for testing and the announcement of testing for anyone who wanted a test quickly changed laboratory operations; some facilities went from performing a dozen tests per day to performing thousands per day (Wu, 2020). The demand for testing continued to increase sharply as shown in Figure 1. Along with the increased test demand, laboratory professionals faced shortages of chemicals, testing supplies, and personal protective equipment. By December of 2020, more than 200 million Coronavirus tests had been performed by the 338,700 practicing MLPs in the United States (Rhode, 2020).

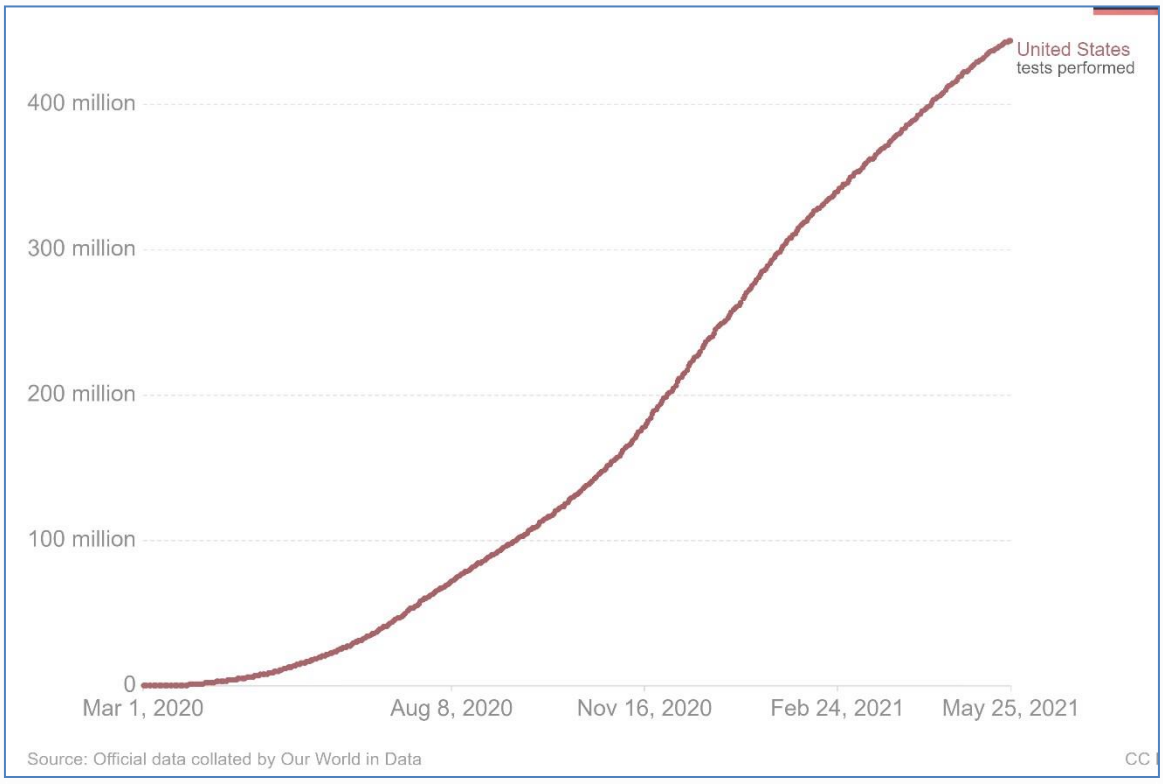
Many people associate the collection process with testing. The nasal specimens collected at numerous locations are transported to laboratories, processed, and analyzed. Behind the scenes, a qualified medical laboratory professional performs a complex procedure for identifying the genetic material, SARS-CoV-2, in the sample. Laboratory professionals have worked around the clock, shifting resources including professionals to implement and validate new methodologies and provide accurate timely data to ensure public safety (Rhode, 2020). As variant forms of the Coronavirus emerge and questions surrounding the longevity of vaccine immunity arise, the work performed by qualified laboratory professionals remains critical for adequate response and control. The ability to produce millions of accurate and timely results will depend on not only material resources, but also on human capital that is the laboratory professional (Wu, 2020).

Figure 1 illustrates the total Coronavirus tests conducted in the United States between March 1, 2020 and May 25, 2021 and the continued increase in demand. A recent study conducted by the ASCP and University of Washington Center for Health workforce reports concern among laboratory professionals with the ability to keep pace

with COVID-19 test demands as routine workload returns to normal levels (Garcia et al., 2021)

Figure 1

Total Coronavirus Tests in the United States



Motivation

Motivation is an internal process that drives behavior, and it is the desire for something that creates action, whether it is a physiological need such as thirst, or a psychological need such as recognition. Physiological needs are easy to appreciate and typically associated with survival; thirst, for example, precedes the motivation to seek water (Cherry, 2020). Psychological needs by contrast are much more complex, less apparent, and uniquely human (Souder, 2019). The desire to be recognized for the value of our work is a normal psychological need and, in the case of MLPs, the need for recognition should be considered as a significant factor in motivating behaviors, including seeking positions or career changes that will fill the void.

Motivational Theories

Several significant theories attempt to describe the origin of motivation. Abraham Maslow's theory of motivation describes the process in terms of the satisfaction of needs as they exist within a hierarchy, although this ranking of needs has drawn criticism, but there is merit in the basic premise that dissatisfaction or desire drive behavior and action (Souder, 2019). Psychologist Frederick Herzberg's Motivation – Hygiene Theory or Two Factor Theory presented motivating factors as two unique entities which are motivating factors that contribute to satisfaction and those that contribute to dissatisfaction (Souder, 2019). Herzberg's theory deviated from the theories presented by Maslow in that the factors that contribute to motivation do not exist as a hierarchy or continuum, but rather as independent entities that influence one's sense of satisfaction or dissatisfaction (Souder, 2019). Herzberg's theory suggested that true motivational needs such as achievement and recognition directly influence levels of satisfaction, while other needs

such as salary, which he deems hygiene factors, only contribute to levels of dissatisfaction when absent or inadequate (Souder, 2019). Research regarding the well-being of MLPs has shown that low salaries, lack of recognition, and the absence of opportunities for advancement have a significant negative impact on career satisfaction. Wage surveys are conducted every two years by the American Society of Clinical Pathology and includes response to laboratory professionals' feelings regarding compensation, 40% or respondents in 2017 and 45% of respondents in 2019 expressed inequity in pay and appreciation when compared to nursing and other healthcare professions (Garcia et al., 2019). The application of Herzberg's theory would indicate that the absence of recognition would directly decrease levels of career satisfaction. Additionally, the absence of adequate compensation would lead to increased levels of career dissatisfaction. The double negative impact of the motivational factors from a theoretical perspective may be an important factor in understanding the effectiveness of strategies designed to increase recruitment and retention in the field of MLS (Souder, 2019).

An important distinction must be made between rewards and recognition when considering programs to increase recruitment and retention, particularly the need to address each independently. Rewards, in the form of compensation, are transactional in nature: one does something and receives something in return. Recognition, by contrast, is a relational reward that satisfies emotional and psychological needs resulting in an increased sense of value and meaning (Hansen et al., 2002). This distinction is an important concept that must be taken into consideration when developing programs meant to increase both extrinsic and intrinsic motivation. Effective interventions will

incorporate both rewards and recognition as means to increase well-being and sense of value (Hansen et al.)

The financial burden of high turnover cannot be ignored when considering factors that impact motivation. Research has shown that a 1% turnover in professionals corresponds to a 40% decrease in productivity and a significant financial burden (Madhani, 2020). Effective recruitment and retention programs must be grounded in knowledge of the expectations, culture, education, and skill of the target population you wish to effectively motivate (Madhani, 2020). In healthcare settings, such as hospitals, the uniqueness of each profession must be considered, particularly the specific culture, needs, and expectations that exist among the different groups. Effective programs can make the difference between satisfaction, which is simply defined as contentment, and true engagement and commitment (Madhani, 2020)

Adam's Equity Theory of Motivation. Adam's Equity Theory of Motivation is based on social exchange theory and proposes that motivation is dependent on the perception of equitable treatment when compared with others of similar skill and responsibility (Souders, 2020). In the workplace, it is difficult to achieve motivation and engagement if there is a perceived inequity in the value of one's contribution (Souder, 2019; Webb et al., 2015). The healthcare setting is unique in that the common goal of patient care is shared by each of the distinct professions although from differing perspectives. The social hierarchy within the healthcare environment lends itself to stereotypical behaviors and attitudes in the workplace. It is important to note that research conducted by Braithwaite et al. (2016) revealed that although stereotypical behaviors based on position and status were common within the structure of the healthcare

environment, they were not exhibited as inherent personality traits outside of the healthcare organization (Braithwaite et al.). Significant to the field of MLS is the limited opportunity for interaction with other healthcare professionals. The laboratory is often isolated from other areas of the hospital, often tucked away, typically in the basement, with little through traffic. The professionals who work within the confines of the laboratory are typically unseen by other healthcare professionals and often unrecognized. This disconnect and lack of social exchange perpetuates perceived stereotypes and, in turn, fuels the perception of inequity (Braithwaite et al.) According to Dr. Brandy Gunsolus, the first graduate of the new doctorate degree in clinical laboratory science, the dire consequences of the shortfall of medical laboratory scientists and the impact on coronavirus response capability are results of shortages the field has faced for years (Moore, 2020). A review of responses from members of the MLT/ MLS professionals' Facebook page indicates that perceived inequity remains a significant problem for laboratory professionals. In the workplace, perceived organizational support and appropriate rewards and recognition are key elements to establishing a sense of respect and value. Organizational reinforcement and respect are imperative to avoid feelings of ostracism and negativity (Sarfraz et al., 2019).

Workforce Shortage and Recruitment

The current Coronavirus pandemic highlights the same concerns related to workforce shortages and recruitment that have plagued laboratories for years, 58% of laboratories indicate they lack adequate, qualified staff to perform the required large volume of tests needed to ensure public health during the COVID-19 pandemic (AACC, 2020). The workforce reduction of MTs in the 1990s and combined closure of education

programs led to the beginning of the shortage that continues today (Schill, 2017). The challenge to recruit and retain qualified professionals is an ongoing global issue (Lewin, 2016). Educational programs have decreased significantly since the late 1990s and the resultant output of graduates is insufficient to fill reported vacancies (Bennett et al., 2014; Strain & Sullivan, 2019). The consequences of the continued shortage of qualified professionals create a risk to quality healthcare and to the laboratory professionals who are subjected to continued physical and psychological stress. In 2009, the Swine Flu outbreak elevated concerns regarding laboratory staffing as hospitals struggled to perform large volumes of tests, a problem that has arisen again with the current Coronavirus pandemic (Landro, 2009). Previous solutions to the ongoing shortage did little to support and acknowledge the profession, but instead, conveyed messages that devalued the education required of MLPs. In 2016, the Center for Medicare and Medicaid Services (CMS) issued a memorandum to the Clinical Laboratory Improvement Act of 1988 (CLIA 88) stating that a degree in nursing would be considered equivalent to a degree in MLS. This would allow those with nursing degrees to perform both moderate and high-complexity testing as well as to act in supervisory roles within the laboratory even though they lack the required scientific background and specific laboratory training (AACC, 2020). Laboratories are subjected to strict inspection protocols including documentation of professionals' qualifications. The CLIA 88 is a federal law that requires participation in proficiency testing. The program provides laboratories with specimens and requires compliance with strict performance and reporting protocols. Proficiency testing is an external, quality control measure designed to ensure the competency of professionals and accuracy of test results. Repeatedly reporting inaccurate results, or failure to comply with

protocol regulations can lead to serious sanctions, including laboratories' loss of the ability to perform testing. A retrospective study of proficiency test results conducted in 2009 highlighted the importance of the educational training and qualifications of MLPs. Study results showed that professionals who lacked the background and certification in MLS were more likely to produce inaccurate results, which place both the patient's health and laboratory operation at risk (Delost et al., 2009). MLPs comprehend the significance of pre-analytical variables such as specimen collection, transport, and storage, and the impact on results. They are educated to think critically regarding clinical significance, chemical methodology, and interfering substances for thousands of tests performed in the laboratory. Each time a medical laboratory scientist reports a result, unbeknownst to most, an educated thought process accompanies the result. It is this background information that is never visible to those outside of the laboratory, one cannot see the critical analysis that ensures each result is precise and accurate.

Recruitment Issues

Recruitment is an ongoing struggle. Although the number of MLPs is reported to have increased by 42% between 2000 and 2016, the supply of qualified professionals is inadequate to meet the demand created by current vacancies and expected retirements (Strain & Sullivan, 2019). Lack of awareness has been consistently documented in the research as a significant factor in recruitment (Butina & Schell, 2011; Bennett et al., 2014). Misconceptions, negative stereotypes, and the perception of the profession as a low-pay technical vocation negatively impact the selection of MLS as a career choice among young people (Doby, 2016). The educational requirements and skill level of laboratory professionals are often not evident to those outside of the profession and the

perception of laboratory careers as low skill continues to be an inaccurate generalization (Kaplan & Burgess, 2011). Although salaries have reportedly increased slightly in response to critical shortages, the increases are not equitable to those of other allied health professions (MLO Staff, 2019).

The combined lack of awareness that has plagued the field for decades, the persistent stereotype, and the decreased availability of educational programs all contribute to the current shortage. A recent position statement proposed by the American Association for Clinical Chemistry (AACC) appealed to Congress to provide funding for educational programs as well as the implementation of loan forgiveness programs to enhance recruitment (AACC, 2020).

Retention and Career Satisfaction

Increased technological advancements and complexity of laboratory testing requires a depth of knowledge gained from both education and experience (Marinucci et al., 2013). Employee turnover creates difficulty with consistency and implementation of new procedures while attempting to train new professionals (Marinucci et al.). High workload and low salary have consistently been expressed as elements of discontent among current professionals as has the perception of low status, neglect, and lack of regard for the value of their work (Alrawahi et al., 2018). The retention of qualified professionals is a global issue with similar underlying cause. Recent responses from expatriate laboratory professionals employed at Omani Hospital in the Arabian Peninsula revealed that low levels of satisfaction are accompanied by significant feelings of demoralization (Alrawahi et al.).

Career satisfaction has not improved over the past two decades. Evaluation of respondent satisfaction on surveys from 2004 compared with recent satisfaction and burnout results revealed that in almost two decades the outcome is similar. Survey results from 2004 concluded that 50% of respondents felt devalued and considered changing careers, and survey results published in 2020 reflected those same sentiments, concluding again that approximately 50% of respondents considered a career change (Garcia et al., 2020). Laboratory managers often report high turnover rates, difficulty filling vacancies, and significant problems retaining new professionals beyond the five-year mark (McClure, 2016; Moon et al., 2014). Many new professionals utilize the medical laboratory as a steppingstone to careers with increased salary and greater advancement opportunities. For those who remain beyond the five-year mark, many describe the profession as a dead end and indicate they would not recommend it to younger people (McClure, 2016). Hospital administrators may not fully comprehend the requirements for laboratory professionals in terms of the diversity of education and skill. Therefore, development of adequate retention strategies is limited when addressing staffing issues (Swails, 2017). Salary, advancement opportunities, and recognition efforts are often overlooked which further contribute to a sense of devaluing and decreased commitment on the part of the laboratory professionals, as evidenced by recent research that indicates less than half of respondents believe that their work is valued by healthcare professionals outside of the laboratory (Garcia et al.). Inclusion and value within the hospital hierarchy is an important factor in job satisfaction and it is essential that hospital administrations begin to purposefully target and include laboratory professionals if retention and recruitment are to be effective (Kenwright, 2018).

Professional Identity

Self-concept is a broad term for our assessment of who we are; self-esteem, self-image, and self-worth are components of self-concept and although they are often thought to be synonymous, each has unique and distinct characteristics (McLeod, 2008). Theories related to self-concept are based on foundational principles including the belief that development is an overall intellectual and emotional perception of who we are, which in turn is influenced by our environment and interactions (Ackerman, 2020).

The development of a clear identity within the context of the profession has been a struggle for MLTs and MLSs. The historical evolution of the profession and subsequent title changes over the years have created difficulty in the establishment of strong professional identity. The lack of clarity regarding who's who in the laboratory compounds the problem of generalization particularly among other healthcare professionals (Neary 2014). Poor professional identity is the consequence of invisibility, lack of knowledge, and continued misrepresentations. Inaccurate misconceptions and stereotypical assumptions are substantiated through misrepresentations in media and television (Rohde et al., 2015). Exposure to the inaccurate and, at times, unprofessional portrayal of laboratory professionals contributes to the stereotypical assumptions of those unfamiliar with the required education and skills.

A hierarchy exists within the confines of the clinical laboratory based on education, skills, and responsibilities. Clerks, laboratory assistants, phlebotomists, medical technicians, medical laboratory scientists, and pathologists are all members of the laboratory team. Each holds unique education and skills required to perform assigned tasks. The lack of awareness among other healthcare professionals and administrators

regarding the diversity of occupations and scope of practice within the laboratory contributes to continued generalizations such as “lab” or “lab people” when referring to members of the profession, which further impedes the development of positive professional identity (Braithwaite et al., 2016). There is little confusion regarding the titles and responsibility associated with other healthcare occupations. Administrators, healthcare professionals, and community members are aware of the differences in responsibility with respect to physicians or physician assistants, nurses or nursing assistants, however, the continued lack of awareness and inaccurate stereotypes associated with the laboratory are detrimental to the future of the profession and impede the retention and recruitment of qualified professionals (Caza & Creary, 2016).

The professional organizations associated with the laboratory have overcome a contentious history and worked together for the benefit of MLPs. In November 2020, the ASCP and the ASCLS released a position statement regarding the confusing history of the titles used for laboratory professionals. Understanding the need for clarity, a rationale was established for use of the current designations which are MLT and MLS. The consistent use of titles to promote the scope of the profession and to provide a greater sense of clarity was a significant step toward unification and professional identity. However, and significantly disappointing, is the slow adoption among the professionals in the laboratory, some of whom continue to utilize antiquated titles in both the educational and professional arenas. The continued use of numerous titles adds to the confusion for those unfamiliar with the inner structure of the laboratory (ASCLS, 2020).

A clear job title reflects the position held within an organization and represents to others the responsibilities associated with the role. The evolution of the medical

laboratory profession has been accompanied by several confusing title changes at both the MLT and MLS level (Neill, 2005). The first laboratory professionals to perform testing were referred to as Medical Technologists. In an effort to clarify the role of those who hold a Baccalaureate degree in laboratory science, the designation was changed to Clinical Laboratory Scientist, and changed again to the current title of Medical Laboratory Scientists. Compounding the problem are the additional titles and changes for those who hold the associate degree. At this level, the initial designation was Medical Technician, which was later altered to Clinical Laboratory Technician, and changed again to the current assigned title of Medical Laboratory Technician. The latest designations of Medical Laboratory Scientist and Medical Laboratory Technician were introduced and supported through collaboration of both the ASCP and the ASCLS to establish clarity, continuity, and unification within the profession (LeClair, 2011). Despite the effort to establish a job title that is reflective of the responsibility level and the desire of those in the field to be recognized, there are still discrepancies in the use of titles among professionals (LeClair, 2011). The ambiguity in job titles over the years combined with the lack of consistent acceptance of those in the profession to utilize consistent designations contributes to a confusing representation for those outside of the profession.

Organization Culture and Commitment

Positive interaction between members of different occupations enhances pride and respect. Expressions of value and understanding the worth of the contribution of others in the workplace increases and nurtures a sense of organizational commitment (Behan et al., 2017). Employees with higher levels of commitment are less likely to leave (Bamberg et al., 2008). The bi-annual wage surveys conducted by the ASCP indicate the need for

organizational incentives to promote professional engagement and value the commitment of MLPs. Data collected in 2017 and in 2019 revealed that less than 40% of respondents receive reimbursement for tuition or required continuing education (Garcia 2019, Garcia, 2021). Affective commitment or the desire to remain with an organization has been reported as low among MLPs indicating that those remaining in the profession do so out of obligation or need rather than choice (Meyer & Maltin, 2010; Behan et al.). The dissatisfaction and negativity expressed by mid-career professionals in the laboratory impacts the ability to recruit and retain new professionals (Schill, 2017).

Personnel Qualifications

Diminishing the required education and training of those producing laboratory data used to guide the treatment of patients is risky for both the public and the profession. The CLIA of the late 60s was passed by Congress to provide improved public health through regulation of laboratories, and additional amendments proposed in 1988 were designed to expand the scope of the legislation to ensure accurate and reliable patient results (Center for Disease Control [CDC], 2018). All laboratories that perform testing on human specimens must abide by CLIA regulations which are published and enforced by the CMS (CDC, 2018).

The 1988 CLIA amendments originally proposed strict qualifications for laboratory professionals, however, a great deal of controversy was generated by special interest groups who would be adversely affected by having to adhere to the proposed regulations (Laboratory Medicine, 1990). Physician groups that had a financial stake in office laboratories were particularly vocal against the proposed requirements. Following several years of lobbying and compromises, the final legislation that emerged included

professional requirements based on test complexity and minimal qualifications were established at all levels (Berger, 1999c; Laboratory Medicine, 1990). The Federal Drug Administration (FDA) was tasked with determining test complexity and assigning each test to the appropriate designated level, which are waived, moderate, or highly complex (American Association of Pathology Assistants [AAPA], n.d.) The final qualifications required for profesionals performing laboratory tests published in the CLIA document are minimal and do little to improve public health (Laboratory Medicine, 1990). Formal education and certification by AMT or ASCP are considered the gold standard for determining competence of laboratory professionals, however, neither is required by CLIA legislation.

A retrospective study conducted in 2009 showed that both experience and formal education positively impacted the production of accurate results (Delost et al., 2009). A survey of laboratory managers in 2018 concluded that professionals who lacked formal education and training were much more likely to make technical errors (Lawson & Ledesma, 2018). Despite research on increased errors associated with undereducated professionals, greater than 50% of managers surveyed indicated that although certification is typically required, due to the shortage, they would be likely hire non-certified professionals to fill vacancies (Lawson & Ledesma, 2018).

The requirement of certification is the standard for competence; it is a decision of the facility and not a CLIA requirement. Puerto Rico and 12 other states have implemented licensure requirements for laboratory-testing professionals. In most cases, completion of formal education and certification are the basis for license eligibility (Rohde et al., 2015) Facilities located in states that do not require licensure are permitted by law to hire non-

certified testing professionals who meet only the minimum requirements established by CLIA regulations. Professions that require licensure are protected by law and those engaged in the tasks of the position must hold the license. By contrast, certification is a less restrictive private means of establishing competency.

The growing shortage of qualified laboratory professionals and the lack of strict professional regulations allow laboratories to bypass requirements for formal education and certification when attempting to fill vacancies. The influx of undereducated professionals further devalues the field of laboratory science and discourages those who might otherwise choose the career path.

In 2016, the CMS added language to the CLIA Amendments indicating that a bachelor's degree in nursing would be considered equivalent to a bachelor's degree in MLS, physical science, biological science, or chemistry (ASCLS, 2020). When questioned regarding the rationale behind the action, CMS indicated the language was a direct response to shortages in rural physician office laboratories who found it difficult to attract qualified professionals to perform moderate to high complex testing procedures (ASCLS, 2020). The ASCP, ASCLS, and several other laboratory-related organizations opposed the CMS decision submitting a petition including a unified response indicating that laboratory professionals engage in educational coursework that includes three to four times the amount of science-related content compared to the nursing degree, which is necessary to provide competence in the performance, interpretation, and troubleshooting of patient test data. The initial policy memo introduced by the CMS in 2016 sparked a great deal of opposition. A petition with 35,000 signatures opposing the change was submitted and supported by several laboratory organizations, but despite the obvious

opposition and concern, CMS moved forward with formalization of the ruling (ASCP, 2019). In January 2018, CMS published a request for information, a required step in the process of formalizing federal regulations; the result included over 8,000 opposing comments to the intended ruling (Harrington, 2018). In a statement to CLIAC in 2018, Dr. Susan Harrington, Chair of the Board of Certification for ASCP, reiterated the unique but different focus with respect to degrees in nursing and MLS. The proposed regulations decrease the professional standards and will impact quality and patient care; Harrington described this "degree creep" (Harrington, 2018, p. 2) as a significantly dangerous avenue that will impact the ability to staff laboratories with qualified professionals (Harrington, 2018). The recommendations of the ASCP as presented to CLIAC include the need for adequate education and training requirements and recognition of certification in the CLIA regulations in order to maintain quality patient care (Harrington, 2018). The issue related to CLIA professional requirements is an ongoing fight to maintain the integrity of the profession.

Chapter 3

Methodology

The purpose of this chapter was to introduce the methods used in this longitudinal quantitative survey designed to identify the level of professional engagement, career satisfaction, and the perception of respect for and understanding of the medical laboratory profession. The study also examined trends that may exist between responses collected prior to the Coronavirus pandemic and those obtained during the pandemic. The research design, sampling methods, and survey development will be discussed, followed by statistical analysis of data utilizing SPSS software.

The research questions in this study were designed to explore how medical laboratory professionals perceive themselves in regard to their professional status among colleagues and how they believe other healthcare professionals understand and regard the value of their contributions. A study conducted in 2001 collected data from MLS graduates over eight decades. The results showed that positive self-perception consistently correlated with career progression (Francis et al., 2001).

This quantitative longitudinal trend survey is designed to explore the perception of MLP with respect to professional status and the impact on professional engagement and career satisfaction prior to and during the COVID19 pandemic and attempts to answer the following research questions:

RQ1: Do medical laboratory professionals perceive they are respected by other members of the healthcare community?

RQ2: How do medical laboratory professionals feel about the value of their work being understood?

RQ3: How does perceived lack of respect and understanding for the profession impact career satisfaction and engagement?

RQ4: How does perceived lack of understanding of the medical laboratory profession impact career satisfaction and engagement?

RQ5: How has the COVID19 pandemic impacted the professional experience of medical laboratory professionals?

Sample

The sample for this research study included members of the MLT/MLS Facebook page, a closed private group consisting of over 30,000 members. The Facebook page was selected in an attempt to reach a broad range of MLPs who may otherwise be difficult to access. A sample size of 371 responses were obtained from administration of the pre-COVID survey in June 2018, a sample size of 380 was utilized from the administration of the COVID-19 survey conducted in April 2021.

Demographic information included respondents' age, gender, role in the laboratory, and years of experience

Instrument

An electronic survey was utilized to collect quantitative and qualitative responses from a sample of MLPs who are members of the Medical Laboratory Scientists' Facebook group. Total membership in the closed group is 36,000. The study was approved through the IRB at YSU. An electronic survey was chosen to reduce the time and cost and increase the probability of reaching an otherwise difficult population to access. The survey was administered prior to the COVID-19 pandemic and again during the COVID-19 pandemic. The survey items were developed by the researcher to assess

respondent participation in professional activities and career satisfaction and piloted to current laboratory professionals for identification of problems with interpretation, wording, or question bias; revisions were made based on pilot feedback. The survey questions were developed to determine the level of engagement in professional activities, how MLPs feel about their career choice, and how they feel they are viewed by other healthcare professionals. Additional open-ended questions were added to the survey administered during the COVID-19 pandemic and designed to reflect the impact of the pandemic on the professional experience.

After receiving IRB approval, a survey link was posted to the Facebook page with a brief description. The link was posted on the Facebook page in an attempt to obtain responses from a large audience of laboratory professionals who otherwise may be difficult to reach. Snowball sampling was also utilized and the survey was provided to current laboratory professionals employed in local hospitals who were asked to share the link with interested colleagues. The pre-COVID survey and the COVID survey were administered in the same manner.

Basic descriptive statistics were utilized as the data analysis tool in regard to the proposed investigation followed by examination of quantitative items using preliminary analyses. For example, Pearson's Zero-Order Correlation, Homogeneity of Variance and independent samples t-tests are computed using IBM SPSS Statistics software. More definitive information regarding data analysis is provided in Chapter 4.

Table 1 provides a list of 28 questions; the first 25 questions were included in the pre-COVID-19 survey administered in June 2018. The additional questions (26 through 28) were added to the survey conducted during the COVID-19 pandemic in April 2021.

The survey modifications developed for administration during the pandemic were approved by the YSU IRB committee. Questions included scaled answers, yes/no responses, multiple choice responses, and open-ended response.

Table 1

Survey Questions

1. Please indicate your role in the lab
2. Please indicate your gender
3. How many years of experience do you have as a medical laboratory professional?
4. What is your age group?
5. Do you currently hold a license as a medical laboratory professional from any state?
6. Are you currently certified as a medical laboratory professional?
7. Which of the following best describes the educational institution you attended to become a laboratory professional?
8. Do you currently have a paid membership in any of the following professional organizations?
9. Which of the following are reasons that you might not purchase membership in a professional organization? Please select all that apply.
10. How often do you access professional publications for information about your profession?
11. Which of the following best describes your reasons for accessing professional publications? Please check all that apply.
12. Which of the following sources do you access to learn about current issues facing the profession? Please check all that apply.
13. When was the last time you participated in a conference or workshop sponsored by a professional organization such as ASCP or ASCLS?
14. My employer encourages attendance at professional meetings and conferences.
15. I am proud to be a medical laboratory professional
16. I believe my profession is respected by other members of the healthcare community?
17. My level of education and responsibility as a medical laboratory professional is understood by other healthcare professions.
18. I would choose this career again
19. If there were no barriers to consider, I would pursue another career
20. I am satisfied with future career opportunities within my field
21. I am aware of the current issues facing my profession
22. I am aware of the difference between licensure and certification
23. I am familiar with personnel requirements described by the Clinical Laboratory Improvement Act (CLIA)
24. I am aware of the recent proposed change to federal regulations that would make a degree in nursing acceptable and equivalent to the degree requirement for a medical laboratory professional
25. What aspect of the profession would you like to see change? (open-ended)
26. What do you believe is preventing recruitment into the profession? (open-ended)
27. How has COVID-19 changed your profession?
28. Describe your facility (for example, large rural hospital or small urban clinic)

Procedure: Data Collection and Management

The data analysis plan for this investigation included initial collection of background information for both the pre-COVID and COVID survey respondents. Demographic data provides the reader with an overview of participating respondents in both the pre-COVID and COVID samples. Comparison of pre-COVID-19 and COVID responses is utilized to determine if significant differences exist in response to the current pandemic. Factor analysis is used to determine correlation of variables related to career satisfaction and professional engagement. Finally, open-ended responses are reviewed and summarized for common themes.

Chapter Four

Results

The current investigation sought to explore the factors associated with career satisfaction and professional engagement and the impact on recruitment and retention in the field. The goal of this study was to survey current professionals to determine how they perceive their professional status and how they believe the field of medical laboratory science is perceived by other members of the healthcare community. The impact of those perceptions on the level of satisfaction and engagement in the profession is also explored, Additionally, the current investigation examines if the MLPs' experiences have changed as a result of the Coronavirus pandemic. Specifically, the research questions are:

Research question 1:

Do medical laboratory professionals perceive they are respected by other members of the healthcare community?

Research question 2:

How do medical laboratory professionals feel about the value of their work being understood?

Research question 3:

How does perceived lack of respect impact career satisfaction and engagement?

Research question 4:

How does perceived lack of understanding regarding the medical laboratory profession impact career satisfaction and engagement?

Research question 5:

How has the COVID19 pandemic impacted the professional experience of medical laboratory professionals?

Descriptive Statistics

Two surveys were conducted. The first survey was conducted in June 2018 prior to the COVID-19 pandemic and is referred to as the pre-COVID sample, data collected consisted of 371 responses. The second survey was conducted in April of 2021 during the COVID-19 pandemic and is referred to as the COVID sample consisting of 380 responses. The data files were split to present pre-COVID responses from those obtained during the COVID pandemic. Table 2 provides a breakdown of participants' role in the laboratory both from the pre-COVID and COVID surveys.

Table 2 provides a breakdown of participants' role in the laboratory both from the pre-COVID and COVID surveys.

Table 2

Breakdown by Role, Pre-Coronavirus Pandemic and During Coronavirus Pandemic

	Pre-COVID Frequency	Pre-COVID Percent	COVID Frequency	COVID Percent
MLT Associate degree	82	22.1	72	18.9
MLS/MT Bachelors Non-management	221	59.6	217	57.1
MLS/MT Bachelors – Management	46	12.4	64	16.8
MLS/MT Masters	21	5.7	25	6.6
Other	1	0.3	1	0.3

As indicated above, reported role remained consistent across the pre-COVID and COVID samples.

Table 3 provides a breakdown of the gender of the respondents in both the pre-COVID and COVID survey.

Table 3

Breakdown of Gender Pre-COVID-19 and During COVID-19

	Pre-COVID Frequency	Pre-COVID Percent	COVID Frequency	COVID Percent
Female	342	92.2	351	92.4
Male	29	7.8	29	7.6

As indicated in Table 3, the distribution of gender is consistent across both samples with the majority of respondents reporting as female.

Table 4 provides the breakdown of years of experience in the laboratory for both the pre-COVID and COVID survey respondents.

Table 4

Years of Experience Pre-COVID-19 and During COVID-19

	Pre-COVID Frequency	Pre-COVID Percent	COVID Frequency	COVID Percent
0-5 years	102	27.5	55	14.5
6-10 years	61	16.4	74	19.5
11-20 years	65	17.5	90	23.7
Greater than 20 years	143	38.5	161	42.4

As indicated in Table 4, the majority of respondents in both the pre-COVID and COVID survey indicated they had 20 or more years of experience. A greater number of participants with 0-5 years of experience responded to the pre-COVID survey compared to administration during COVID-19. The distribution among other age ranges remained consistent.

Table 5 provides the breakdown by age of respondents for both the pre-COVID and COVID survey results.

Table 5

Age Distribution Pre-COVID-19 and During COVID-19

Age in years	Pre-COVID Frequency	Pre-COVID Percent	COVID Frequency	COVID Percent
20-29	66	17.8	47	12.4
30-39	102	27.5	86	22.6
40-49	84	22.6	100	26.3
50-59	71	19.1	82	21.6
60 and over	48	12.9	64	16.8

As indicated in Table 5, a greater number of responses from participants in the 20-29 and 30-39 age groups was received on the pre-COVID survey in comparison to the COVID survey. The number of respondents in the age groups 40-49, 50-59, and 60 and over were greater in the COVID survey when compared to pre-COVID responses

Table 6 provides the breakdown of respondents who indicated they hold licensure as an MLP in any state, both pre-COVID and COVID.

Table 6

Licensure Pre-COVID-19 and During COVID-19

	Pre-COVID Frequency	Pre-COVID Percent	COVID Frequency	COVID Percent
Yes	127	34.2	141	37.1
No	239	64.4	234	61.6
Don't Know	5	1.3	5	1.3

As indicated in Table 6, Licensure remained consistent across the two groups with the majority of respondents indicating they do not hold licensure in the field of medical laboratory science.

Table 7 provides pre-COVID and COVID breakdown of those who indicated they are certified as an MLP.

Table 7

Certification Pre-COVID-19 and During COVID-19

	Pre-COVID Frequency	Pre-COVID Percent	COVID Frequency	COVID Percent
Yes	350	94.3	363	95.5
No	19	5.1	15	3.9
Don't know	2	0.5	2	0.5

Table 7 displays over 90% of respondents in both the pre-COVID and COVID survey indicate they hold professional certification.

Table 8 presents the breakdown of the educational institution attended by respondents.

Table 8

Educational Institution Attended Pre-COVID-19 and During COVID-19

	Pre-COVID Frequency	Pre-COVID Percent	COVID Frequency	COVID Percent
Community College	84	22.7	69	18.2
State University/College	208	56.2	223	58.8
Private University/College	52	14.1	63	16.6
Other	26	7.0	24	6.3

According to Table 8 the type of institution attended remained consistent across the two groups of respondents.

Table 9 provides the breakdown of respondents both pre-COVID and COVID who indicated they currently hold a professional membership

Table 9

Professional Membership Pre-COVID-19 and During COVID-19

	Pre-COVID Frequency	Pre-COVID Percent	COVID Frequency	COVID Percent
Yes	122	33.0	126	33.3
No	200	54.1	196	51.9
Other	48	13.0	56	14.8
System	1		2	

As indicated in Table 9, professional membership remained consistent across the two groups.

Research Question 1: *Do medical laboratory professionals perceive they are respected by other members of the healthcare community?*

Combined participation in both the pre-COVID and COVID survey was n = 750. Participants responded to the following question: *I believe my profession is respected by other members of the healthcare community*. A total of 396 (52.8%) respondents did not believe they were respected, 353 (47.1%) believed that the profession is respected by other healthcare professionals. Slightly more than half of MLP surveyed expressed a lack of respect by other healthcare professionals. Analysis of open-ended responses to Question 25, *What aspect of the profession would you like to see change?* provided additional insight and reveals repeated themes related to recognition, lack of understanding, salary, and respect. Participants expressed specific concern related to a

lack of respect from other healthcare professionals and administrators outside the laboratory.

Research Question 2: *How do medical laboratory professionals feel about the value of their work being understood?*

A total of 750 participants responded to the question "My level of education and responsibility as a medical laboratory professional is understood by other healthcare professions." Analysis indicates that 698 (93.1%) of participants do not believe that other healthcare professionals understand the level of responsibility and education required by the profession. A total of 50 (6.7%) participants did believe their responsibilities and education were understood. Narrative responses to Question 25, *What aspect of the profession would you like to see change?* communicated desire for greater knowledge and understanding of the work performed and the level of education required. This same sentiment was expressed as a barrier to recruitment in response to the open-ended question, *What do you believe is preventing recruitment into the profession?*

A Principal Component Analysis was initially carried out on the data set to try and establish the number of factors that needed to be extracted. Based on the Principal Component Analyses, using an Oblimin rotation with a Kaiser Normalization, three factors were identified. Items 15, 18, 19, and 20 all fell into Factor 1, Career Satisfaction, while items 21, 22, 23, and 24 fell into Factor 2. Professional Engagement, Items 14, 16, and 17 were all perception factor items.

The results of the factor loadings are presented in Table 10.

Table 10

Factor Matrix

	Career Satisfaction	Professional Engagement	Perception
Q14			0.902
Q15	0.549		
Q16			0.916
Q17			0.304
Q18	0.824		
Q19	0.747		
Q20	0.668		
Q21		0.484	
Q22		0.653	
Q23		0.69	
Q24		0.595	

Once the Factor 1 and Factor 2 items were established, the factor items were summed to compute the two factors: Career Satisfaction and Professional Engagement. These factors were used to answer the third and fourth research questions.

Research Question 3: *How does perceived lack of respect impact career satisfaction and engagement?*

An independent samples *t*-test was conducted to investigate if respect impacts career satisfaction. Participants indicated feeling respected with a "yes" or "no" response. This served as the independent variable. Career satisfaction was computed by aggregating the responses the following items:

Question 15: I am proud to be a medical laboratory professional

Question 18: I would choose this career again

Question 19: If there were no barriers to consider, I would pursue another career

Question 20: I am satisfied with the future career opportunities within my field

The basic descriptive statistics for career satisfaction and respect are provided in Table 11.

Table 11

Basic Descriptive Statistics for Career Satisfaction/Respect

	N	Mean	SD
Yes	353	5.06	1.06
No	396	5.81	1.30

The results of the Levene's test for Equality of Variance indicates that homogeneity of variance is not tenable, $F = 26.582$, $p < .001$; therefore an adjustment has been made to the degrees of freedom for this analysis.

The results of the *t*-test indicate reported feelings of respect significantly impact career satisfaction. $t\,(742.190) = 8.74$, $p = <.001$, $CI_{95}[.92,.58]$. An independent sample *t*-test was conducted to determine if perceived respect impacts professional engagement. Professional engagement was computed by aggregating the responses to the following items:

Question 21: I am aware of the current issues facing my profession

Question 22: I am aware of the difference between licensure and certification

Question 23: I am familiar with personnel requirements described by the CLIA

Question 24: I am aware of the recent proposed change to federal regulations that would make a degree in nursing acceptable and equivalent to the degree requirement for a medical laboratory professional.

The basic descriptive statistics for professional engagement and perception of respect are provided in Table 12

Table 12

Basic Descriptive Statistics for Professional Engagement/Respect

	N	Mean	Std. Deviation
Yes	353	4.43	.78
No	396	4.41	.71

The results of the Levene's test for Equality of Variance indicates that homogeneity of variance is tenable, $F = 1.259$, $p = .262$, therefore, equal variance is assumed. The results of the *t*-test indicate that professional engagement is not significantly impacted by reported feelings of respect. $t = .398$, $p = .691$, CI_{95} [.09,.13]

Research Question 4: *How does perceived lack of understanding of the medical laboratory profession impact career satisfaction and engagement?*

An independent samples *t*-test was conducted to investigate if understanding of the educational requirements and responsibility of medical laboratory professionals within the healthcare community impacts career satisfaction.

The basic descriptive statistics for career satisfaction and perceived understanding are presented in Table 13.

Table 13

Basic Descriptive Statistics for Career Satisfaction/Perceived Understanding

	n	Mean	SD
Yes	50	4.92	1.104
No	698	5.50	1.25

The results of the Levene's test for Equality of Variance indicates that homogeneity of variance is tenable, $F = 3.951$, $p = .047$; therefore, equal variance is assumed.

The results of the *t*-test indicate that career satisfaction is significantly impacted by lack of understanding among other healthcare professionals regarding the level of education and responsibility required of MLP:

$t = 3.193$, $p = .001$, CI_{95} [.94, .22]

An independent samples *t*-test was conducted to determine if understanding of the level of education and responsibility of MLP within the healthcare community impacts professional engagement. Basic descriptive statistics for professional engagement are provided in Table 14.

Table 14

Basic Descriptive Statistics for Professional Engagement

	N	Mean	SD
Yes	50	4.44	.81
No	698	4.42	.74

The results of the Levene's test for Equality of Variance indicate that homogeneity of variance is tenable, $F = .442$, $p = .506$. The results of the *t*-test indicate that professional engagement is not significantly impacted by lack of understanding regarding the level of education and responsibility of MLPs within the healthcare community: $t = .135$, p .893, CI_{95} [.22, .25]

Question 5: *How has the Corona Virus pandemic impacted the professional experience of medical laboratory professionals?*

An independent *t*-test was conducted to determine the impact of the COVID-19 Pandemic on career satisfaction. Descriptive statistics for career satisfaction are provided in Table 15.

Table 15

Descriptive Statistics for Career Satisfaction Pre-COVID and COVID

	N	Mean	Std. Deviation
Pre-COVID	370	5.4568	1.27707
COVID	380	5.4605	1.22895

Results of the Levene's test for Equality of Variance indicates that homogeneity of variance is tenable, $F = .321$, $p = .571$

The results of the *t*-test indicate the COVID-19 pandemic did not significantly impact reported career satisfaction: $t = .041$, $p = .967$, CI_{95} [-.18, .18]

An independent Samples *t*-test was conducted to determine the impact of the COVID-19 pandemic on professional engagement. Descriptive statistics for professional engagement are provided in Table 16.

Table 16

Descriptive Statistics for Professional Engagement Pre-COVID and COVID

	N	Mean	SD
Pre- COVID	370	4.35	0.71
COVID	380	4.50	0.77

Results of the Levene's test for Equality of Variance indicates that homogeneity of variance is not tenable: $F = 8.812$, $p = .003$. Therefore, an adjustment has been made to the degrees of freedom for this analysis.

The results of the *t*-test indicate there is a significant difference in professional engagement across the Pre-COVID and COVID responses: $t\ (746.164) = 2.74$, $p = .006$, $CI_{95\ [-}.26, .04]$

The majority of participant responses to the open-ended question, *How has COVID-19 changed your profession?* reveal increased workload, stress levels, and inadequate staffing as a consequence of the current pandemic. "We are short staffed and overworked to the extreme." Some respondents indicated they experienced increased shortages as colleagues chose to leave the field: "I have seen a lot of people leave the field"; others indicated the desire to leave the profession themselves: "I want to leave the clinical lab." Awareness and recognition of the role of laboratory professionals during the pandemic elicited both positive and negative response from participants, and while some believed that the pandemic had a positive impact on awareness of the role of laboratorians, others expressed the recognition for their effort was short-lived. *"Brief*

moment of recognition but then asked to do more with less." Several responses revealed continued feelings of inequity when compared with other healthcare professions and emphasized the continued lack of understanding of the profession. "*Nurses and doctors are getting all the glory"* and, "*We are not paid with hazard pay like the others being exposed"*; *"For now we are recognized as the people who run the tests but understanding our career, no!"*

Two electronic surveys were conducted; the first was conducted prior to the COVID-19 pandemic, N= 371, and the second survey was distributed during the COVID-19 pandemic, N=380. Data from both groups were analyzed. A greater number of participants in the age group 20-29 and those who reported 0-5 years of experience responded to the pre-COVID survey. Additional demographic information collected remained consistent between the two groups. Slightly over half of respondents in the combined pre-COVID and COVID sample indicated they d id not feel the profession is respected and over 90% did not believe the level of education or responsibility of laboratory professionals was understood by other healthcare professionals. Response to open-ended questions indicates that respect, recognition, and lack of understanding continue to be significant issues among current professionals in both the pre-COVID and COVID groups. Career Satisfaction among laboratory professionals is significantly impacted by perceived levels of respect and understanding of the profession from other healthcare professionals, however, the Coronavirus pandemic has not been found to significantly altered levels of career satisfaction. Professional engagement of MLP is not found to be significantly impacted by feelings of respect or understanding, however, the

Coronavirus pandemic has significantly altered professional engagement of medical laboratory professionals.

Summary

The majority of respondents in the current study are female, hold a bachelor of science degree and certification as a medical laboratory scientist, and have greater than 10 years of experience. Data analysis included comparison of responses collected from surveys conducted prior to the COVID-19 pandemic and during the COVID-19 pandemic. Demographics remained consistent across both samples. Slightly more than half of respondents indicated they do not believe that the profession is respected by other healthcare professionals, and greater than 90% do not believe the required level of education and responsibilities of the career are understood within the healthcare community. These results were consistent across both the pre-COVID and COVID survey responses.

Participant response to the impact of respect and understanding within the healthcare community on career satisfaction and professional engagement was found to be consistent across the pre-COVID and COVID samples.

Career satisfaction of MLP was found to be significantly affected by how respondents perceived respect and understanding from other healthcare professionals. Evaluation of professional engagement based on participant awareness of current issues and regulations pertaining to the field of medical laboratory science was not found to be affected by perceived respect or understanding in this study.

Chapter 5

Discussion

The shortage of MLP has been an ongoing issue for two decades. Previous research has focused on the need to increase salaries, create awareness among young people and the public, establish advancement pathways, and develop unity within the profession in an effort to enhance recruitment and retention in the field. Despite all of the data and suggested initiatives, there remain significant problems with the perception and awareness of the profession that impact career satisfaction, particularly within the healthcare community. The current investigation explores the perception of respect and understanding of the required education and responsibility of medical laboratory professionals within the healthcare community as a significant component of career satisfaction. Those who work in the lab are often unnoticed or stereotyped as there is little understanding of the diversity of skill and education required to perform laboratory analysis. The need for recognition and respect identified in this study are grounded in theories that reveal the impact of equity and professional identity in the career setting. Lack of acknowledgement of the valuable contribution of laboratory professionals by healthcare professionals and administrators outside of the laboratory has not been evaluated to a great extent with respect to the impact on recruitment, retention, and overall career satisfaction and engagement.

The current investigation focuses on the impact perceived respect and value have on the career satisfaction and engagement of current laboratory professionals within the healthcare system. The investigation includes quantitative results from an electronic survey distributed to medical laboratory professionals who are members of a private

Facebook page. The survey was distributed prior to the COVID-19 pandemic and repeated during the COVID-19 pandemic. Participants were asked to respond to questions related to demographics, career satisfaction, and professional engagement. Additional questions regarding the impact of the COVID-19 pandemic were added to the second survey. The intent of the research is to inform retention and recruitment efforts through greater understanding of the professional status of MLP within the context of the healthcare community and the impact on career satisfaction and engagement.

The research question central to this investigation is: *Do medical laboratory professionals believe their work is valued and respected within the healthcare community and what is the impact on career satisfaction and engagement?*

More specifically, the research questions for this study are:

- Do medical laboratory professionals perceive they are respected by other members of the healthcare community?
- How do medical laboratory professionals feel about the value of their work being understood?
- How does perceived lack of respect impact career satisfaction and engagement?
- How does perceived lack of understanding of the medical laboratory profession impact career satisfaction and engagement?
    - How has the Corona Virus pandemic impacted the professional experience of medical laboratory professionals?

Research Question 1: *Do medical laboratory professionals perceive they are respected by other members of the healthcare community?*

Participants were asked to respond yes or no to the question: *I believe my profession is respected by other members of the healthcare community*. Of the 750 responses, 396 or 52.8% did not believe that the profession held a place of respect in the healthcare community. Additional comments indicate that lack of respect in the workplace from administrators and members of other healthcare professions is a significant issue they would like to see change.

Interpretation of Findings - Research Question 1

Slightly more than half of respondents reported they do not believe they are respected by members of other healthcare occupations. Additional information is provided through review of participant response to the open-ended question: *What aspect of the profession would you like to see change?* Replies reveal that lack of respect is salient for many participants and sentiments expressed included; "More respect from other hospital employees" and more specifically "Respect and knowledge of our profession from hospital administration." The manner in which each participant interprets the concept of respect may vary depending on the unique circumstances of each individual and the environment and culture of the workplace.

Context – Research Question 1

Respect has been identified as one of the most important factors affecting commitment and satisfaction (Rogers, 2017). One's perceived level of respect is often communicated through indirect and direct interactions that reflect the level of worth and value one believes their profession occupies in their unique workplace (Dutton, 2016). This perceived sense of respect or felt worth can be communicated through both verbal and non-verbal cues and impacts the satisfaction and sense of value one associates with their vocation (Dutton, 2016). Medical laboratory professionals' perceptions of respect within the healthcare setting may vary dependent on differences in the type and frequency of interaction with members of other healthcare professions. Respondents personal expectations, experiences, and the culture of the workplace may influence how respect is perceived and reported for this study.

Implications: Research Question 1

Professional respect is often directly related to one's perceived level of social standing in the workplace; those who are afforded higher levels of respect often hold what are considered more prestigious positions (Thomas, 2016; Smith & Tyler, 1997; Kemper, 1972). An examination of perceived respect and the impact of the social standing and value of MLP among other healthcare professionals is an important gap in the research; this may also be a significant influencing factor with regard to retaining highly qualified professionals.

The lack of frequent interaction between medical laboratory scientists and other healthcare professionals provides little opportunity to engage in meaningful collaboration; additionally, negative interactions reinforce stereotypes and assumptions

and inhibit development of respect. The isolation of laboratory professionals should be considered a barrier to developing mutual respect within the healthcare setting.

Administrative approaches to recruitment and retention of qualified laboratory professionals should include evaluation of the perceptions of the laboratory and existing interactions within the facility. Concentrated efforts to increase respect for those in the medical laboratory could be a catalyst for reducing misconceptions and the resultant negative perceptions. Those professionals who feel their profession is respected within an organization are likely to exhibit greater commitment which reduces costly turnover (Behan, 2017). Increasing the level of respect afforded to MLPs within the healthcare hierarchy may not only increase career satisfaction and improve retention, but it may also change the perception of the career as a more attractive choice for young people.

Research Question 2: *How do medical laboratory professionals feel about the value of their work being understood?*

Participants were asked if they believed that the work they do and the educational level required was understood by other healthcare professionals. The current investigation revealed that 93.1% of respondents do not believe the educational background and responsibilities of laboratory professionals are understood by colleagues in other healthcare occupations.

Interpretation – Research Question 2

An overwhelming majority of participants indicate that few healthcare professionals outside the laboratory understand the nature of the job and the education required of those who work in the laboratory.

Context – Research Question 2

Lack of knowledge and understanding from other groups of professionals and organizational administrators are explored as a contributory factor to feelings of low value or worth. How one is classified within a group impacts status and occurs in three stages which are: categorization among the groups, identification within the social structure, and comparison with other groups (Tajfel & Turner, 1979). Shared common interest and professional categorization can provide a sense of pride, self-esteem, and positive social identity (McLeod, 2019). Administrators and human resource professionals who lack adequate knowledge of the medical laboratory profession may fail to recognize and understand the laboratory contribution to patient care or acknowledge the educational level and complex responsibilities of laboratory professionals. Administrative initiatives designed to recognize and reward healthcare workers often exclude laboratory professionals. These types of decisions made without adequate understanding of the importance of the laboratories role in patient care communicate negative messages and lead to increased feelings of inequity. Laboratory professionals who do not believe the organization values the profession may develop decreased levels of commitment and motivation (Kaplan & Burgess, 2011).

Healthcare organizations are comprised of a variety of different occupational groups whose members share similar backgrounds and responsibilities; doctors, nurses, pharmacists, physical therapists, respiratory therapists, medical laboratory scientists, and other healthcare professionals each possess unique educational backgrounds and levels of responsibility associated with their chosen career. As a collective group or community, those in healthcare share the common interest of patient care regardless of their unique role. Each profession derives a sense of pride and self-esteem from their place within the organization; the level of respect afforded to healthcare professionals is often a result of categorization and comparison within the healthcare facility (McLeod, 2019). Interaction among professional groups in the workplace contributes to broader understanding and appreciation for each individual's unique skills and may also provide the foundation for positive social identity and status among peers. Laboratories are typically isolated from other areas, a necessary arrangement due to the nature of the work, however, the consequence is a workforce that tends to be out of sight and out of mind. The invisibility of the laboratory professional in the workplace prevents interactions that can bridge the gap in understanding their role and responsibilities in the healthcare community. The high percentage of respondents in this study who expressed a lack of understanding regarding the profession is indicative of a significant problem related to the categorization of their professional status and comparison of responsibility among the community of healthcare professionals in the workplace.

Implications – Research Question 2

How one views their profession is in part a reflection of the verbal and non-verbal messages regarding the established worth and value in the workplace. The isolation of laboratory professionals and the tendency to categorize those who work in the lab as simply "lab workers" insinuates indifference for the professionals as individuals thus influencing development of professional identity and insinuates low status in the workplace. Additionally, the misconception of "lab techs" as requiring little education or skill has been a persistent problem that has contributed to entrenched negative stereotypes (Doby, 2016). Lack of knowledge within healthcare systems regarding the training and scope of responsibility of laboratory professionals perpetuates the generalizations and stereotypical assumptions, and creates barriers to formation of positive social and professional identity. The perceived lack of respect and understanding of the value of the medical laboratory professionals within the hierarchy of healthcare has not been adequately explored or addressed with respect to the impact on career satisfaction, retention, and recruitment of qualified laboratory professionals.

High turn-over, difficulty filling vacancies, and problems retaining professionals beyond five years have all been expressed as important concerns by medical laboratory managers (McClure, 2016). Exploration of the connection between disappointment with professional status and the interactions that occur in the workplace should be a component of understanding retention issues particularly among those new to the profession. Improvement in understanding the scope of responsibility and level of education of laboratory professionals specifically in the workplace is a starting point for

developing a sense of professional worth and greater organizational commitment within the laboratory (Behan et al., 2017)

Results obtained in the current study support previous findings indicating laboratory professionals' feelings of being undervalued, unrecognized, and neglected in comparison to other healthcare professionals (Alrawaha, 2018). This study focuses primarily on the workplace and addressing issues of low worth, misconceptions, and lack of awareness as significant component of career satisfaction among medical laboratory professionals.

Research Question 3: *How does perceived lack of respect impact career satisfaction and engagement?*

Summary of Findings

The current investigation evaluated the impact of respect on career satisfaction and professional engagement. Reported levels of respect were found to significantly impact career satisfaction but did not influence professional engagement.

Research Question 4: *How does perceived lack of understanding of the medical laboratory profession impact career satisfaction and engagement?*

Summary of Findings

The current investigation revealed that the understanding of the medical laboratory profession within the healthcare community significantly impacts levels of career satisfaction. Professional engagement was not significantly impacted by understanding of the profession within the healthcare community.

Interpretation of Research Question 3 and Research Question 4

The interpretation, context, and implications of research questions three and four are simultaneously analyzed. The perceptions of respect and understanding include many applicable intersecting concepts when considering the impact on career satisfaction and professional engagement. The current study found that career satisfaction of medical laboratory professionals is significantly impacted by both respect and understanding of their educational level and responsibility by members of other healthcare professions. The professional engagement as defined by awareness of current issues and regulations related to the medical laboratory profession was not influenced by laboratory professionals' perceptions of respect or understanding by other healthcare professionals.

Context -Research Question 3 and Research Question 4

Career satisfaction in the current survey was analyzed based on participant response to a series of questions including whether they exhibit a sense of pride in the profession, whether they would choose the career again, whether they would explore a different career if the opportunity arose, and their optimism with respect to the future of their career. Analysis of responses in the current investigation reveal that career satisfaction is significantly impacted by both perceived respect and understanding of the roles and responsibilities by other healthcare professionals. The results of the current study are similar in nature to those reported in the well-being and burn-out survey conducted by the ASCP; in that study 46% of respondents did not feel valued by professionals outside the laboratory and 57.1% did not feel valued by the institution. Significant in the well-being survey is the finding that over 85% of respondents indicated they enjoyed the work, but also over 85% have at some point experienced burnout

(Garcia et al., 2020). Lack of understanding and respect for the profession results in a constant battle to prove the value and worth of the education and expertise required to provide accurate data for patient care.

Four major factors are thought to influence the sense of value or perceived worth we attribute to ourselves; they are: how others treat us, how we compare to others, our social status, and the roles through which we identify ourselves (Argyle, 2008). With respect to MLP, lack of understanding of the educational level required to perform the work results in misconceptions, negative comparisons, and inaccurate status in the workplace all of which contribute to feelings of low status and worth. The laboratory has always been a behind-the-scenes operation and this invisibility creates unique problems with respect to assumptions and stereotypes regarding the education and role of the professionals in the laboratory and thus the status within the healthcare community (Rohde et al., 2015). The importance of the unique education and skill level of laboratory professionals continues to be misunderstood and dismissed. Recent legislative initiatives undermine the required training and allow other healthcare professionals to not only perform but also to supervise laboratory testing (Harrington, 2018). Circumventing professional requirements under the premise of alleviating professional shortages is a precarious justification, one that would not likely be acceptable in other healthcare professions. Disregarding the value of the expertise established through formal education communicates that laboratory professionals are dispensable and contributes to feelings of low worth and status in the workplace (Harrington, 2018; Lawson & Ledesma, 2018). Understanding the role of laboratorians and promoting hiring practices that value the

extensive educational background and knowledge necessary for accurate patient care is detrimental to the future of the profession and the health of the public (Harrington, 2018).

Professional engagement in this investigation was assessed by response to questions related to participant awareness of current professional issues, legislative initiatives, and professional requirements and was not significantly impacted by reported levels of respect or understanding. It is not surprising that awareness of professional issues and requirements were not influenced by the opinion of other healthcare professionals in the workplace.

The value others afford a profession reflects their knowledge and appreciation of the unique education and skills required of the professional members and imparts a sense of worth and value for those engaged in the work. The invisibility of those in the laboratory and the subsequent misconception that laboratory work requires little education results in low levels of respect and diminishes the perception of medical laboratory science as an attractive long-term choice (Braithwaite et al., 2016). A sense of worth and value in the workplace is a necessary foundation for the development of commitment and career satisfaction.

The ASCP and the University of Washington Center for Healthcare workforce recently published a study on future challenges in recruitment and retention. As in previous studies, salary, advancement, workload, and visibility were considered significant factors and described the profession as "a workforce that is almost invisible to anyone who is not already working in healthcare" (Garcia et al., 2020, p. 52) Improving recognition and visibility among professional groups was briefly mentioned as a contributing solution (Garcia et al.) This investigation emphasizes the need to recognize

that the scope of the laboratory professional responsibility and education is also almost invisible within the healthcare community and there is a need to address the issue within the workplace. The old adage "Charity starts at home" comes to mind, in that it is necessary to examine the impact of lack of recognition and respect within the healthcare community as a viable starting point for development of a positive work culture for laboratory professionals.

Implications - Research Question 3 and Research Question 4

Highly educated laboratory professionals who are not afforded a sense of worth from hospital administrators and members of other healthcare professions are not likely to remain in or advocate for the profession. Most professionals who complete formal education and enter the workforce are afforded a sense of value and pride in their occupation and accomplishments. Laboratory professionals must not only complete a rigorous educational program, but they are also thrust into an atmosphere of high stress due to the continued shortages and increasing test volumes, and amid this atmosphere, they still must fight to prove the value of their education and expertise (Harrington, 2018, Garcia et al., 2020).

How professionals feel about their career choice is influenced by the perceived feedback of others (Ackerman, 2020). Changing the sense of low status and worth of medical laboratory professionals will mean changing the feedback narrative and correcting misconception throughout the workplace. Hospital administrator recognition and understanding of the profession and implementation of programs designed to raise awareness facility wide could be the essential key to improving retention and recruitment of qualified professionals.

Career satisfaction among MLPs is not solely linked to salary or workload; the impact of respect and value in the workplace must be considered as a significant contributing factor. Response to the shortage of qualified laboratory professionals, then, should seek to elevate the status of laboratory professionals within the healthcare community through efforts toward recognition and appreciation. It is also necessary to address established deep-seated attitudes and perceptions of laboratory professionals in order to change the narrative in the workplace and the career satisfaction of laboratory professionals within the healthcare hierarchy (Doby, 2016).

The current study provides a good starting point for recognizing the significant impact on career satisfaction related to respect and value of the profession within the healthcare community. Informed administrators and targeted programs within healthcare facilities designed to increase the social status and level of respect of medical laboratory professionals should be explored further as a significant component for increasing retention and recruitment. Organizational initiatives that provide opportunities to highlight unique characteristics of each of the professions throughout the facility would facilitate greater interprofessional understanding and respect for not only laboratory professionals but also other professions experiencing the same levels of invisibility and neglect.

Response to the shortage in laboratory professionals should first focus on enhancing understanding and recognition within the healthcare community. Raising the felt worth of MLPs in the workplace through initiatives that present the profession as uniquely educated, indispensable members of the healthcare team would provide a

foundational basis for changing the cultural perception of the profession in the workplace and contribute to improved career satisfaction.

Research Question 5: *How has the Corona Virus pandemic impacted the professional experience of medical laboratory professionals?*

Summary of Findings

The majority of responses to the open-ended question: *How has the Coronavirus pandemic impacted your professional experience?* reference increased workload and higher stress levels. Participants also reported problems with retention particularly among new professionals and those near retirement. Responses varied with respect to the laboratory role with some participants indicating the positive effect of thrusting the laboratory into the limelight and creating greater awareness, while others described the recognition as short-lived or lacking in equity when compared with other healthcare professionals.

Interpretation – Research Question 5

The qualitative responses to the current investigation are similar to the findings in the pre-COVID job satisfaction survey conducted by the ASCP. Reported levels of high stress and burnout among laboratory professionals in the ASCP survey seem to be intensified by the strain the Coronavirus pandemic has placed on an already stressed workforce (Garcia et al., 2020). Responses in the current investigation describe the workload as "exhausting" and "overwhelming" and participants reported high levels of stress and desires to retire or leave the profession altogether.

Context - Research Question 5

The Coronavirus pandemic has created unprecedented challenges for the nation's laboratories. Increased testing, lack of necessary supplies, and a workforce already under the strain of high stress and burnout were tasked with performance of over 400 million additional tests. The qualitative responses allow participants to express unique concerns related to their particular situation. The level of added stress and workload is dependent on the facility and may also be a function of participants' interpretation and ability to effectively handle changes in workload; therefore, workload expressed as overwhelming or exhausting is dependent on each person's perception. While most respondents reported longer working hours and higher stress levels, some reported the pandemic had little to no effect on their experience. The number of respondents in the current investigation aged 20-29 with 0-5 years of experience decreased in the COVID survey. This may be a result of variance in the sample population, however, this could also be an indication of attrition in response to greater stress and should be explored further.

Implications -Research Question 5

Although survey responses indicate the pandemic has increased awareness of the importance of laboratory testing, there are also continued issues related to lack of recognition, lack of appreciation, and inequities in compensation in comparison to other healthcare professions. High stress combined with little recognition or perception of value may significantly impact career satisfaction and retention of qualified MLPs particularly in response to the COVID-19 pandemic. Loss of experienced professionals or younger professionals who reach a breaking point with regard to added stress and workload may critically impact laboratory staffing and patient care.

MLPs are in short supply; finding and retaining qualified professionals are difficult for many facilities. Desperate times sometimes call for desperate measures, however, resorting to minimal requirements in hiring practices or downgrading educational requirements in order to fill vacancies will only further degrade the educational value of the profession and exacerbate the problems with recruitment and retention. Initiatives to fill vacancies should focus on valuing professional requirements and maintaining high standards.

The shortage of qualified MLPs is not new or surprising; this has been an ongoing multifaceted problem that has reached critical status as retention and recruitment issues continue to plague the profession. Recent research indicates that the disruption of the laboratory workforce due to COVID-19 and the increased levels of stress may accelerate the shortage of qualified professionals (Garcia et al., 2021).

A limitation of this study is generalization. The study surveyed members of the Facebook group whose identity and background cannot be verified. The inability to verify respondent background poses a threat to the external validity and generalization of the study results. The study was also provided to professionals in local healthcare facilities who were asked to share the link. Replicating this study using participants whose background and response can be verified would increase external validity. However, the administration of the survey at two different times produced similarity in demographic responses. The purposive sampling and subsequent snowball sampling methods were employed in an attempt to reach non-managerial participants who may or may not be active members of professional organizations. Repeat studies conducted in healthcare settings could provide greater validity

Implications for Practice

The goal of this study was to examine how laboratory professionals feel about the respect for and value of their contribution, more specifically, how they believe they are regarded within the healthcare hierarchy and the impact on career satisfaction and engagement.

This study is a good starting point for highlighting the impact of understanding and respect for the profession in the workplace. The lack of understanding and respect expressed by participants should be considered a significant factor with regard to career satisfaction. Addressing stereotypical misconceptions among other healthcare professionals and administrators outside of the lab should be explored as a means of improving retention in facilities. The felt worth of the MLPs within the healthcare hierarchy should be considered a significant factor with relation to career satisfaction, and hence, recruitment and retention efforts within the healthcare Facility administrators need to be aware of the psychological impact of perceived lack of respect and value on career satisfaction and organizational commitment. Implementing effective facility recognition programs that highlight the education, responsibility and value of laboratory professionals can enhance occupational pride and thus retention (Bethan et al., 2017). How MLPs see themselves in the workplace results from the cumulative internalization of the perception and judgement of others, it is through this lens that we can correct misconceptions (Ackerman, 2020). Changing the status of laboratory professionals in the workplace requires transformational leadership at the administrative level in order to change the perception of value experienced within the healthcare hierarchy (Doby, 2016).

Conclusion

MLPs are often assumed to be low-skilled button pushers and this lack of knowledge, respect, and value for the educational background and responsibility of MLS and MLT professionals significantly impacts career satisfaction. The majority of respondents in this study indicate experiencing a lack of understanding of their level of responsibility and education by other healthcare professionals. Although most healthcare professionals do not choose their occupation for the rewards or recognition, professional identity does develop from the sense of being valued within the organization and is an essential component of motivation and commitment. In the case of laboratory professionals, what is not understood fully cannot be valued adequately in the workplace.

Laboratory data are an important element of patient care and inform treatment decisions; thus medical laboratory scientists are extensively trained to understand chemical processes, possible interferences, and correlations between data and disease states, all of which are necessary to ensure that what is received in a report is a valid and accurate representation of the patient status. What is observed by those outside the laboratory in the form of a number on a report is not reflective of the extensive background and educated thought process that accompanies each result.

Attempts to improve career satisfaction, retention, and recruitment of laboratory professionals must start with awareness, recognition, and respect within the healthcare community. Organizational administrators should make a concerted effort to increase understanding of who's who in the laboratory and provide recognition and appreciation for their role. Elevating the professional status of MLP within the context of the

healthcare community should be considered an essential foundation for transformational change of the perception of the career as an attractive choice.

References

Ackerman, C. (2020). What is self-concept theory? A psychologist explains. *Positive Psychology.* https://positivepsychology.com/self-concept/

Alrawahi, S., Sellgren, F. S., Alwahaibi, A., Altouby, S., & Brommels, M. (2018). Factors affecting job satisfaction among medical technologists in University Hospital, Oman: An exploratory study. *International Journal of Health Planning Management*, *34*(1), 763-775.

American Association of Clinical Chemistry. (2015). *Laboratory medicine- Advancing quality in patient care.* https://AACC.org/advocacy-and-outreach/aacc-policy-reports/2015/laboratory-medicine-advancing-quality-in-patient-care

American Association of Clinical Chemistry. (2020). *Modernization of CLIA: Moderate and high complexity testing*. https://www.aacc.org/advocacy-and-outreach/position-statements/2020/modernization-of-clia-moderate-and-high-complexity-testing

American Association of Pathology Assistants. (n.d.). *CMS facts*. https://cdn.ymaws.com/www.pathassist.org/resource/resmgr/docs/CMS_Fact_Summary

American Society for Clinical Laboratory Science. (2020). *Becoming clinical laboratory professional*. https://www.ascls.org/careers-ascls/how-do-i-become-a-laboratory-professional

Argyle, M. (2008). *Social encounters: Contributions to social interaction*. https://www.biblio.com/9780202362915

Bamberg, R., Akroyd, D., & Moore, T. M. (2008). Factors that impact clinical laboratory scientists; Commitment to their work organization. *Clinical Laboratory Science, 21*(3), 167-177.

Basford, T. E., Offermann, L. R., & Wirtz, P. W. (2012). Considering the source: The influence of leadership level on follower motivation and intent to stay. *Journal of Leadership & Organizational Studies, 19*(2), 202-214. https://

10.1177/1548051811436279

Behan, K., Coffey, K., Promo, M., Brooks, T., & Van Der Like, J. (2017). Interprofessional experience with CLS and nursing. *Clinical Laboratory Science*, *30*(4), 233-239.

Bennett, A., Garcia, E., Schulze, M., Bailey, M., Doyle, K., Finn, W., Glenn, D., Holladay, B. E., Jacobs, J., Kroft, S., Patterson, S., Petersen, J., Tanabe, P., & Zaleski, S. (2014). Building a laboratory workforce to meet the future. ASCP task force on the laboratory professional's workforce. *American Journal of Clinical Pathology, 141*(1), 154-167. https//doi.org/dmfd

Berger, D. (1999a). A brief history of medical diagnosis and the birth of the clinical laboratory. Part 1- ancient times through the 19th century. *Medical Laboratory Observer, 31*(7), 28-30, 32, 34-40.

Berger, D. (1999b). A brief history of medical diagnosis and the birth of the clinical laboratory. Part 2- laboratory science and professional certification in the 20th century. *Medical Laboratory Observer*, *31*(8), 32-34, 36, 38.

Berger, D. (1999c). A brief history of medical diagnosis and the birth of the clinical laboratory. Part 3- Medicare, government regulation and competency certification. *Medical Laboratory Observer, 31*(10), 40-42, 44.

Berger, D. (1999d). A brief history of medical diagnosis and the birth of the clinical laboratory. Part 4- fraud and abuse, managed care and lab consolidation. *Medical Laboratory Observer, 31*(12), 38-42.

Blau, G. (1999). Early career job factors influencing the professional commitment of medical technologists. *Academy of Management Journal*, *42(*6), 687-695.

Blumenthal, D., Davis, K., & Guterman, S. (2015). Medicare at 50 - Origins and evolution. *N Engl J Med, 372*(5), 479-486.

Braithwaite, J., Clay-Williams, R., Vecellio, E., Marks, D., Hooper, T., Westbrook, M., Westbrook, J., Blakely, B., & Ludlow, K. (2016). *The basis of clinical tribalism, hierarchy and stereotyping: A laboratory controlled teamwork experiment*. https://10.1136/bmjopen-206-012467

Bureau of Labor Statistics, U.S. Department of Labor. *Occupational outlook handbook*, *clinical laboratory technologists and technicians.* https://www.bls.gov/ooh/healthcare/clinical-laboratory-technologists-and-technicians.htm

Butina, M., & Schell, J. (2011). Does professional identity affect the shortage of hospital laboratory personnel? *Clinical Leadership & Management Review, 25*(2), 10-15.

Campbell, S. (n.d.). *Moving ASCLS forward- Priority pillar: Collaboration.* https://www.ascls.org/communication/ascls-today/319-ascls-today-volume-32-number-3/419-moving-ascls-forward-priority-pillar-collaboration

Caldwell, B. (2019). ASCP laboratory workforce report. *American Journal of Clinical Pathology.* https://www.ascls.org/images/Government_AffairsGAC/Symposium/Caldwell_ASCPStudies_2019.pdf

Caza, B., & Creary, S. J. (2016). *The construction of professional identity*. School of Hotel Administration, Cornell University. http://scholarship.sha.cornell.edu/articles/878

Center for Disease Control. (2018). *About CLIA.* https://www.cdc.gov/clia/about.html

Cherry, K. (2020). *Motivation: Psychological factors that guide behaviors*. https://www.verywellmind.com/what-is-motivation-2795378?print

Delost, M., Miller, G.,Chang, A., Korzum, W., & Nadder, T. (2009). Influence of credentials of clinical laboratory professionals on proficiency testing performance. *AMJ Clin Pathol, 132,*550-551. https://10.1309/AJCPWCBSYISV1ASI

Doby, C. F. (2016). *Awareness of clinical laboratory sciences and shortage of clinical laboratory scientists in the 21st century*. [Unpublished doctoral dissertation]. Walden University.

Doig, K., & Beck, S. (2005). Factors contributing to the retention of clinical laboratory personnel. *Clinical Laboratory Science, 18*(1), 16-27.

Dutton, J. E., Debebe, G., & Wrzesniewski, A. (2016). Being valued and devalued at work: A social valuing perspective. *Qualitative organizational research: Best papers from the Davis Conference on Qualitative Research, 3,* 9-52.

Durant, T. J., Peaper, D. R., Ferguson, D., & Schulz, W. L. (2020). Impact of COVID-19 pandemic on laboratory utilization. *The Journal of Applied Laboratory Medicine*, *5*(6), 1194-1205.

Fang, B., & Meng, Q. H. (2020). The laboratory's role in combating COVID-19. *Critical reviews in Clinical Laboratory Sciences*, *5*(6), 400-414. doi: 10.1080/10408363.2020.1776675

Francis, D. P., Hofherr, L. K., Peddecord, M. K., Karni, K. R., & Krolak, J. M. (2001). The influence of perceived professional status on the career progression of CLS graduates. *Clinical Laboratory Science, 14*(3), 160-166.

Garcia, E., Kundu, I., & Fong, K. (2019). The American Society for Clinical Pathology's 2017 wage survey of medical laboratories in the United States. *American Journal of Clinical Pathology, 151*(1), 29-52. http://doi.org/dmfp

Garcia, E., Kundu, I., & Fong, K. (2021). American Society for Clinical Pathology's 2019 wage survey of medical laboratories in the United States. *American Journal of Clinical Pathology*, *155*(5), 649–673. https://doi.org/10.1093/ajcp/aqaa197

Garcia, E., Kundu, I., Kelly, M., Soles, R., Mulder, L., & Talmon, G. (2020). The American Society for Clinical Pathology's job satisfaction, well-being, and burnout survey of laboratory professionals. *American Journal of Clinical Pathology*, *153*(4), 470–486. https://doi.org/10.1093/ajcp/aqaa008

Harrington, S. (2018). *Statement of the American Society of Clinical Pathology and the American Society of Clinical Pathology Board of Certification before the Clinical Laboratory Advisory Committee.* https://www.cdc.gov/cliac/dos/fall-2018/

Huitt, W. (2009). Self-concept and self-esteem. *Educational Psychology Interactive.* http://www.edpsycinteractive.org/topics/conation/self2.html

Kaplan, R. L., & Burgess, T. E. (2011). The impending crisis in the clinical laboratory workforce. *Microbe Magazine*, *6*(2), 52–53. https://10.1128/microbe.6.52.1

Karni, K. (2012). *History*. ascls.org https://ascls.org/about-us/history

Kenwright, K. (2018). Career satisfaction in the profession of medical laboratory science. *Journal of Allied Health*, *47*(3), 222-227.

Kotlarz, V. R. (1998). Tracing our roots: The first clinical laboratory scientist. *Clinical Laboratory Science: Journal of the American Society for Medical Technology*, *11*(2), 97–100.

Kotlarz V. R. (1999). Tracing our roots: Years of turmoil (1962-1977). *Clinical Laboratory Science: Journal of the American Society for Medical Technology*, *12*(6), 336–341.

Kotlarz V. R. (2000). Tracing our roots: The rocky road toward recognition of clinical laboratory science's professional status (1962-1977). *Clinical Laboratory Science: Journal of the American Society for Medical Technology*, *13*(2), 166–171.

Laboratory Medicine. (1990). *Final rule raises new controversies for lab professionals*. https://doi.org/10.1093/labmed/21.6.343

Landro, L. (2009, May 13). Staff shortages in labs may put patients at risk. *Wall Street Journal*. https://www.wsj.com/articles/SBl 242173 5 7954413095

Lawson, S., & Ledesma, C. (2018). The importance of traditional education in medical laboratory science. *AMJ Clin Pathol 149,* S132-S135. doi: 0.1093/AJCP/AQX125

Lewin, D. N. B. (2016). The future of the pathology workforce. *Critical Values, 9*(3), 6-8.

Madhani, P. M. (2020). Effective rewards and recognition strategy: Enhancing employee engagement, customer retention and company performance. *The Journal of Total Reward, 29*(2), 39-48. https://ssrn.com/abstract=3672972

Marinucci, F., Majigo, M., Wattleworth, M., Paterniti, A. D., Hossain, M. B., & Redfield, R. (2013). Factors affecting job satisfaction and retention of medical laboratory professionals in seven countries of Sub-Saharan Africa. *Human Resources for Health*, *11*(1). doi: 10.1186/1478-4491-11-38

McClure, K. (2016). Perceptions regarding the clinical laboratory profession and professionals. *Clinical Leadership & Management Review, 22*(3), 1-12.

McLeod, S. (2008). *Social identity theory*. https://www.simplypsychology.org/social-identity-theory.html

McNeil, K. A., Mitchell, R. J., & Parker, V. (2014). Interprofessional practice and professional identity threats. *Health Sociology Review, 22*(3), 291-307. http://doi.org/gft6n8

Meyer, J. P., & Maltin E. R. (2010). Employee commitment and well-being. A critical review, theoretical framework and research agenda. *Journal of Vocational Behaviour 77*, 323-337. doi: 10.1016/j.jvb.2010.04.007

Merriam-Webster. (n.d.). Hierarchy. *Merriam-Webster.com dictionary*. https://www.merriam-webster.com/dictionary/hierarchy

MLO Staff. (2019). *MLO's 2019 annual survey of laboratory professionals.* https://www.mlo-online.com/management/article/21076556/mlos-2019-annual-salary-survey-of-laboratory-professionals

Moon, T. C., Beck, S., & Laudicina, R. (2014). Retaining experts: Administrators' views on retention incentives and older employees. *Clinical Laboratory Science, 27*(3), 162-168.

Moore, J. (2020). *Nurse and lab tech shortages slowing medical professionals fight against COVID-19.* WSBTV.com/news/local/nurse-lab-tech-shortages-slowing-medical-professionals-fight-against-Covid-19

National Council on Disability. (2013). *Appendix B. A brief history of managed care.* http://www.ncd.gov/publications/2013/20130315/20130513_AppendixB

Neary, S. (2014). Professional identity: What I call myself defines who I am. *Career Matters*, *2*(3), 14-15.

Neill, J. (2005). *Definitions of various self-constructs: Self-esteem, self-efficacy, self-confidence & self-concept.* http://www.wilderdom.com/self//

Nuñez-Argote, L., Baker, D. P., & Jones, A. P. (2021). Initial clinical laboratory response to COVID-19: A survey of medical laboratory professionals. *Laboratory Medicine*. https://doi.org/10.1093/labmed/lmab021

Rohde, R. (2020). *Who is doing all those COVID-19 tests? Why you should care about medical laboratory professionals*. https://theconversation.com/who-is-doing-all-those-covid-19-tests-why-you-should-care-about-medical-laboratory-professionals-151725

Rohde, R., Falleur, D. M., & Ellis, J. (2015). *Almost anyone can perform your medical laboratory tests-Wait, what?* https://www.elsevier.com

Rogers, K. M., & Ashforth, B. E. (2017). Respect in organizations: Feeling valued as "we" and "me." *Journal of Management, 43*(5), 1578-1608. http://doi.org/gfzqz9

Sarfraz, M., Qun, W., Sarwar, A., Abdullah, M. I., Imran, M. K., & Shafique, I. (2019). Mitigating effect of perceived organizational support on stress in the presence of workplace ostracism in the Pakistani nursing sector. *Psychology Research and Behavior Management*, *12*, 839–849. https://doi.org/10.2147/PRBM.S210794

Schill, J. (2017). The professional socialization of early career medical laboratory scientists. *Clinical Laboratory Science*, *30*(1), 15-21.

Souders, B. (2020). *20 most popular theories of motivation in psychology*. https://positivepsychsoudersology.com/motivation-theories-psychology/

Strain, A. K., & Sullivan, M. M. (2019) Strengthening laboratory partnerships, enhancing recruitment, and improving retention through training and outreach activities: The Minnesota experience. *Public Health Reports*,*134,* Supplement 2. http://doi.org/dmfk

Swails, K. (2017). Career ladders and the laboratory: A roundtable discussion. *Critical Values, 10(*3), 28-31. http://doi.org/dmfk

Tajfel, H., & Turner, J. (1979). *Social identity theory*. https://www.learning-theories.com/social-identity-theory-tajfel-turner.html

Tatum, B. D. (2017). *Why are all the black* [*sic*] *kids sitting together in the cafeteria? And other conversations about race*. Basic Books.

The American Society for Clinical Laboratory Science. (2018, August 2). *Addressing the clinical laboratory workforce shortage.* [position paper]. https://www.ascls.org/images/publications/Clinical_Laboratory_Workforce_FINAL_20180824

Thomas, W. H. Ng. (2016). Embedding employees early on: The importance of workplace respect. *Personnel Psychology, 69,* 599-633. doi: 10.111/peps.12117

Webb, E., Perry, M., & Fennelly, L. J. (2015). Employee motivation theory and application. In S. Davies (Ed.), *Security, Supervision, and Management* (4th ed.) (pp. 231–239). Elsevier. doi: http://dx.doi.org/10.1016/B978-0-12-800113-4.00018-3

Wu, K. J. (2020). 'Nobody sees us': Testing-lab workers strain under demand. https://www.nytimes.com/2020/12/03/health/coronavirus-testing-labs -workers.html

Appendix A

Re: HSRC #178-18

Diana Fagan <dlfagan@ysu.edu>

Wed 6/6/2018 2:11 PM

To: Joan O'Connell-Spalla <joconnellspalla@ysu.edu>; Karen H Larwin <khlarwin@ysu.edu>
Cc: ckcoy@ysu.edu <ckcoy@ysu.edu>

Dear Investigators,

Your protocol "Medical Laboratory Testing Personnel..." has been reviewed and is deemed to meet the criteria of an exempt protocol, category#3. You will be surveying Medical Laboratory Scientists and Medical Laboratory Technologists. You will be using friend to friend emails todistribute the link to the survey. No identifying information will be gathered.

The research project is now approved, and you can begin the investigation immediately. Please note that it is the responsibility of the principal investigator to report immediately to the YSU IRB any deviations from the protocol and/or any adverse events that occur. Pleasereference protocol #178-18 in all correspondence about the research associated with this protocol.

Good luck.
Dr. Diana Fagan, Vice-Chair, YSU HSRC

Fwd: IRB Protocol Modification 178-18M1

From: Eugene Thomas <gthomas_ils@yahoo.com>
Sent: Friday, April 16, 2021 11:19 AM
To: ckcoy@ysu.edu
Subject: Re: IRB Protocol Modification 178-18M1

Hi Cheryl. These documents are fine. I read over the changes and one hundred percent agree that they are acceptable for the study beingproposed and poses no risk at all to any subjects.

Thank you and please let me know

if there's anything else you need.

Geno

Dr. Eugene M. Thomas