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Factors Associated With Turnover Intention of Medical Laboratory Professionals During the COVID-19 Pandemic: A Mixed Methods Approach

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by

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Dedication

This dissertation is dedicated to the unsung heroes of healthcare and the COVID-19 pandemic, **MEDICAL LABORATORY PROFESSIONALS**! Thank you for all that you do to save lives!

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Abstract

The COVID-19 pandemic disrupted and strained healthcare systems worldwide. Frontline healthcare workers have experienced increased rates of psychological distress and burnout during the COVID-19 pandemic, which have led to high turnover intention and workforce shortages. Medical Laboratory Professionals have endured similar experiences during the COVID-19 pandemic; however, there has been limited research exploring these factors for this group of professionals. This study utilized a convergent mixed methods approach to investigate the impact of psychological distress and burnout on the turnover intentions of Medical Laboratory Professionals in the United States during the COVID-19 pandemic, as well as to explore motivational factors associated with turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic. The results showed that overall, Medical Laboratory Professionals levels of psychological distress (stress, anxiety, and depression) and burnout during the COVID-19 pandemic deviated from the "normal" reference ranges. Results also found that more than half of Medical Laboratory Professionals had a desire to leave their position during the COVID-19 pandemic. Psychological distress (stress, anxiety, and depression) and burnout (emotional exhaustion and depersonalization) were found to be significant predictors of turnover. Several themes emerged relating to coping with psychological distress, laboratory morale, and factors for turnover intention. These themes include, but are not limited to, recognition/appreciation, healthy/unhealthy coping strategies, importance of work life balance, dissatisfaction with salary, psychological distress, and burnout. Results from this study suggest there is a significant need to develop and implement well-being programs within medical laboratories to recruit and retain Medical Laboratory Professionals. These interventional

programs can aid the Medical Laboratory rapid response to crisis and help to retain Medical Laboratory Professionals during the next pandemic.

Chapter I: Introduction

Background

Comprising one of the largest sectors in the United States, healthcare systems employ approximately 59 million people worldwide and approximately 18 million people in the United States (Centers for Disease Control and Prevention [CDC], 2017; Joseph & Joseph, 2016). The healthcare workforce consists of physicians, nurses, allied health professions (medical laboratory scientists, occupational therapists, physical therapists, etc.), nurse aides, technicians, etc. Healthcare professionals (HLPs) provide care for those who are ill and/or injured, either directly by hands-on patient care, or indirectly, aiding in diagnosis but no patient contact (Joseph & Joseph, 2016). While providing care for others, are healthcare professionals taking care of themselves?

HLPs face hazardous and challenging working conditions daily. Healthcare professionals are also at risk of hazardous exposures, physical injury, and workplace violence (CDC, 2017). HLPs are often exposed to emotional and stressful situations while caring for patients. Due to the challenging nature of healthcare, HLPs may experience adverse reactions, as a response to their environment. HLPs have reported feelings of psychological, physical, and emotional distress due to work environments and conditions (Koinis, et al., 2015). The risk of exposure to hazardous working conditions and threats to HLP mental and physical well-being greatly increased during the COVID-19 pandemic (CDC, 2023).

The COVID-19 pandemic disrupted and strained healthcare systems worldwide. As of December 2022, there have been over 639 million confirmed COVID-19 cases and over 6.6 million COVID-19-related deaths reported (World Health Organization, 2022). In the United

States alone, there has been over 4.8 million COVID-19 hospitalizations at the time of writing this paper (Centers for Disease Control and Prevention [CDC], 2022). The COVID-19 pandemic overwhelmed healthcare systems and crippled its resources. Due to the surge in COVID-19 cases and hospitalizations, healthcare systems have been forced to deal with shortages of space, supplies, and healthcare workers (Myers & Liu, 2022).

The lack of resources due to the COVID-19 pandemic has negatively impacted HLPs and led to consequences for healthcare systems. COVID-19 has caused an increase in workload for HLPs, fear of the COVID-19 virus itself, and fear for the health and safety of themselves, family, and patients (Zhou et al., 2022). HLPs have experienced increased rates of psychological distress, such as stress, anxiety, and depression during the COVID-19 pandemic. These professionals have also exhibited increased rates of burnout due to staffing shortages and increased workload caused by COVID-19 (Franklin & Gkiouleka, 2021).

The healthcare field has experienced a critical shortage of workers prior to the pandemic; however, the COVID-19 pandemic has worsened the staffing shortage issue (Assistant Secretary for Planning and Evaluation, 2022). Since the beginning of the COVID-19 pandemic, hospitals have reported a decline of approximately 105,000 employees (Hughes, 2022). The American Hospital Association (2022) reports that by 2026 there will be a shortage of up to 3.2 million healthcare professionals. Healthcare facilities have been pushed to hire travel workers to combat the staffing crisis during the COVID-19 pandemic. A study conducted by AMN Healthcare found that, 96% of healthcare facilities in the United States are utilizing contract allied health professionals, with Medical Laboratory Professionals being the second most in-demand allied health profession (AMN Healthcare, 2021). Insufficient staffing can lead to poor patient

outcomes, healthcare system strain, and negative impacts on HLPs. Shortages of HLPs are due to high turnover rates and is expected to worsen over the years.

Problem Statement

The COVID-19 pandemic has impacted healthcare professionals in various ways. The pandemic has depleted resources, dwindled workforces, impacted mental health, decreased job satisfaction, and contributed to high rates of turnover in healthcare (Chatzittofis et al., 2021; Jalili et al., 2021; Leskovic et al., 2020; Teo et al., 2021). The impact of the COVID-19 pandemic on frontline healthcare professionals, such as nurses and physicians, has been greatly studied throughout the pandemic. It has been well documented that frontline healthcare professionals have experienced increased psychological distress, burnout, and high turnover rates during the COVID-19 pandemic (Akova et al., 2022; Al-Mansour, 2021; Alizadeh et al., 2020; Alrawashded et al., 2021; Chatzittofis et al., 2021; Firew et al, 2020; Jalili et al., 2021; Morgantini et al., 2020). Although not on the frontlines, Medical Laboratory Professionals have also endured similar experiences to the frontline health professionals during the COVID-19 pandemic; however, there has been limited published research exploring these factors for this group of professionals. To date there has been one study analyzing psychological distress of Medical Laboratory Professionals, and that study was conducted on Medical Laboratory Professionals in Ghana (Swaray et al., 2021). There has also only been one study exploring factors relating to burnout of Medical Laboratory Professionals in Ontario, Canada (Nowrouzi-Kia et al., 2022). To date, there have been no studies investigating the impact of the COVID-19 pandemic on Medical Laboratory Professionals in the United States.

Because Medical Laboratory Professionals perform diagnostic testing that aids in the diagnosis of patient illness, it is essential to the healthcare industry that these individuals are

recruited and retained for positions. According to the U.S. Bureau of Labor and Statistics (2022), there are an estimated 329,000 jobs for Medical Laboratory Professionals, and this is projected to grow by 7% from 2021 to 2031, indicating an increase in demand. The American Society for Clinical Pathology conducted their annual wage survey in 2021 and surveyed 9,819 Medical Laboratory Professionals across the United States. It was found that 37.1% of Medical Laboratory Professionals were considering leaving their current position, and 30.5% were considering leaving the profession (Garcia et al., 2022). As the demand for Medical Laboratory Professionals continues to grow, it is important to explore why employees intend to leave or have left their job during the COVID-19 pandemic. Identifying reasons for turnover during the current COVID-19 pandemic could mitigate turnover during the next pandemic and allow the Medical Laboratory workforce to retain employees and keep up with demand.

Study Purpose

The purpose of this convergent mixed methods study was to explore the impact of psychological distress and burnout on the turnover intentions of Medical Laboratory Professionals in the United States during the COVID-19 pandemic. For the sake of this study, *during the COVID-19 pandemic* is defined as mid-February 2020 – June 2022. This study also investigated if self-reported psychological distress, burnout, and turnover intention were influenced by Medical Laboratory Professionals demographics during the COVID-19 pandemic. This study also sought to explore motivational factors associated with turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic. The intent of this study is to serve as a baseline for the development of workplace intervention programs targeting Medical Laboratory Profession well-being. These interventional programs can aid the Medical Laboratory

rapid response to crisis and help to retain Medical Laboratory Professionals during the next pandemic.

Conceptual Framework Overview

The theoretical framework used to guide this research study was the *Stimulus Organism Response* (S-O-R) model. The S-O-R model consists of three constructs, stimulus, organism, and response, and can be used to explain human behaviors (Zhang et al., 2021). The S-O-R assumes that internal behavioral changes within an organism can be influenced by an external stimulus (Mehrabian & Russell, 1974). The S-O-R model has been heavily rooted in environmental psychology and can be used to explain the behavioral response of an individual, due to internal psychological changes caused by an environmental stimulus (Lin et al., 2020).

The current study will adapt the S-O-R model to investigate the presence of psychological distress, burnout, and turnover intentions of Medical Laboratory Professionals during the COVID-19 pandemic. Using the COVID-19 pandemic as the stimulus, the S-O-R model will allow researchers to investigate the impact of the pandemic on psychological and behavioral responses of Medical Laboratory Professionals.

Research Questions

This study set out to investigate the following *quantitative* research questions and associated hypotheses:

Research Question 1: What was the prevalence of self-reported psychological distress, burnout, and turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic?

$H1_a$: Medical Laboratory Professionals will report higher than normal levels of self-reported stress during the COVID-19 pandemic.

$H1_b$: Medical Laboratory Professionals will report higher than normal levels of self-reported anxiety during the COVID-19 pandemic.

$H1_c$: Medical Laboratory Professionals will report higher than normal levels of self-reported depression during the COVID-19 pandemic.

$H1_d$: Medical Laboratory Professionals will report higher than normal levels of emotional exhaustion during the COVID-19 pandemic.

$H1_e$: Medical Laboratory Professionals will report higher than normal levels of depersonalization during the COVID-19 pandemic.

$H1_f$: Medical Laboratory Professionals will report lower levels of personal accomplishment during the COVID-19 pandemic.

$H1_g$: Medical Laboratory Professionals will report a desire to contribute to turnover during the COVID-19 pandemic.

Research Question 2: Did self-reported psychological distress, burnout, and turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic differ based on demographic variables?

$H2_a$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and self-reported stress.

$H2_b$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and self-reported anxiety.

$H2_c$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and self-reported depression.

$H2_d$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and emotional exhaustion.

$H2_e$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and depersonalization.

$H2_f$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and personal accomplishment.

$H2_g$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and turnover intention.

Research Question 3: Were self-reported psychological distress and burnout predictors of turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic?

$H3_a$: There is a predictive relationship between self-reported stress and turnover intention.

$H3_b$: There is a predictive relationship between self-reported anxiety and turnover intention.

$H3_c$: There is a predictive relationship between self-reported depression and turnover intention.

$H3_d$: There is a predictive relationship between emotional exhaustion and turnover intention.

$H3_e$: There is a predictive relationship between depersonalization and turnover intention.

$H3_f$: There is a predictive relationship between personal accomplishment and turnover intention.

This study also set out to investigate the following *qualitative* research question:

Research Question 4: What were Medical Laboratory Professionals perceptions of ways to cope with psychological distress, laboratory morale, and turnover intention during the COVID-19 pandemic?

$QUAL_1$: What services were available for coping with psychological distress at your organization?

$QUAL_2$: What methods did you utilize to cope with psychological distress?

$QUAL_3$: What interventions have been implemented within your organization to increase morale in your laboratory?

QUAL$_4$: What interventions have been successful or unsuccessful with increasing morale in your laboratory?

QUAL$_5$: What factors contributed to you leaving your organization?

QUAL$_6$: What factors contributed to you leaving the profession?

QUAL$_7$: If you left the profession, what field are you working in now?

Study Significance

Medical Laboratory Science has historically been a hidden and understudied profession; however, the profession has gained more attention during the COVID-19 pandemic. Research targeting the well-being of medical laboratory professionals is limited, especially in the United States. There have been minimal studies exploring psychological distress and investigating the impact of the COVID-19 pandemic on the profession of medical laboratory sciences. Nowrouzi-Kia et al. (2021) found that demographic variables, age and education, and job demands were associated with burnout during the COVID-19 pandemic. Swaray et al. (2021) found a high level of psychological distress amongst Medical Laboratory Professionals involved in COVID-19-related duties in Ghana.

The COVID-19 pandemic has impacted all healthcare professionals, including Medical Laboratory Professionals. There is a significant need to include Medical Laboratory Professionals in studies regarding healthcare professionals' personal well-being and the impact that it has had on the profession during the COVID-19 pandemic. To date, there has been no research on medical laboratory professional turnover during the COVID-19 pandemic.

This study was the first of its kind exploring factors related to mental well-being, burnout, and turnover intention of medical laboratory professionals during the COVID-19 pandemic, using a mixed methods approach.

Delimitations

This study utilized an electronic survey to collect information from Medical Laboratory Professionals regarding their self-perceived experiences of psychological distress, burnout, turnover intention, socio-demographic variables, and methods that organizations have taken to address these phenomena during the COVID-19 pandemic. The survey was distributed to Medical Laboratory Professionals via professional membership groups on social media outlets (i.e., Facebook and LinkedIn). Medical Laboratory Professionals who did not work during the COVID-19 pandemic and who are not practicing in the United States were excluded from the study.

Assumptions

This study had the assumption that all Medical Laboratory Professionals who participated in the study will have worked during the COVID-19 pandemic. There was also an assumption that Medical Laboratory Professionals in the United States were members of the professional groups on Facebook and LinkedIn. Lastly, there was the assumption that participants would answer all quantitative and qualitative questions completely and honestly.

Definitions

Burnout: Prolonged response to chronic stressful situations and consists of emotional exhaustion, depersonalization, and a lack of sense of personal accomplishment (Agency for Healthcare Research and Quality [AHRQ], 2017).

COVID-19: An infectious respiratory disease discovered in 2019, caused by SARS-CoV-2. (Also known as Coronavirus disease). (Centers for Disease Control and Prevention [CDC], 2021).

Medical Laboratory Professionals: Individuals who perform laboratory testing on patient specimens to assist physicians in the diagnosis and treatment of patients.

Medical Laboratory Scientist: Individuals who have completed an accredited Medical Laboratory Science program and have obtained a bachelor's degree or higher and passed the national certification examination. (Also known as Clinical Laboratory Scientist or Medical Technologist).

Medical Laboratory Technician: Individuals who have completed an accredited Medical Laboratory Technician program and have obtained an associate degree. (Also known as Clinical Laboratory Technicians).

Psychological Distress: A set of painful mental and physical symptoms associated with the fluctuation of moods in most people (American Psychological Association, n.d.).

Turnover Intention: An employee's plan to leave their current place of employment.

Chapter Summary and Research Study Organization

Chapter I introduced and provided background on the problems that healthcare professionals have faced and are currently facing during the COVID-19 pandemic. Chapter I highlighted the gap in research regarding the well-being of Medical Laboratory Professionals during the COVID-19 pandemic. Chapter II will provide a comprehensive literature review pertaining to COVID-19, psychological distress, burnout, and turnover intention amongst healthcare professionals. Chapter II will also give insight into the theoretical framework that is

used to guide this research study. Chapter III will cover the research design and methodology for the study. Chapter IV will present the data analysis and results of the research study. Chapter V will serve as a discussion of the results provided by the research study. This chapter will also include study limitations, as well as recommendations for findings from the research study.

Chapter II: Literature Review

Chapter Overview

Chapter II provides a review of the literature which serves as the background for this study. The chapter opens with a brief background regarding the COVID-19 virus and pandemic. The chapter then transitions into psychological distress and previous studies on psychological distress in healthcare workers. Next, the chapter analyzes burnout and burnout amongst healthcare workers and medical laboratory professionals. Next, this chapter analyzes employee turnover and turnover intention amongst healthcare workers. Lastly, the chapter provides information on the theoretical framework that is used to guide this research study.

COVID-19

Novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the etiologic agent responsible for causing the COVID-19 pandemic (Lv et al., 2020). COVID-19 emerged in Wuhan, China in 2019 and spread worldwide within a few months (Labrague & de los Santos, 2020). On March 11, 2020, the World Health Organization declared COVID-19 a global pandemic (Cucinotta & Vanelli, 2020). COVID-19 has infected over 542 million people worldwide (World Health Organization, 2022). Those infected with COVID-19 have a wide range of symptoms including, but not limited to, fever, cough, body aches, loss of smell or taste, shortness of breath, and diarrhea (CDC, 2021). In addition to worldwide sickness, COVID-19 also caused a significant economic impact. It is estimated that by the conclusion of the pandemic, COVID-19 will have cost the United States 16 trillion dollars (Cutler & Summers, 2020). COVID-19 has also made a significant negative impact on mental health of people worldwide (Kuriala, 2021).

Psychological Distress

The American Psychological Association has defined psychological distress as a set of painful mental and physical symptoms associated with the fluctuation of moods in most people (American Psychological Association, n.d.). Psychological distress can be characterized as non-specific symptoms of stress, anxiety, and depression collectively (Viertiö et al., 2021). Psychological distress is emotional suffering that can be caused by a real or perceived physical psychological threat (Alizadeh et al., 2020). Psychological distress can be caused by stressors and demands and lead to the inability to cope with daily life (Arvidsdotter, 2016). Some stressors that can trigger psychological distress could be traumatic experiences or life events. Psychological distress could cause severe mental health problems that could lead to serious impairment and require treatment (CDC, 2015).

Infectious disease outbreaks have been known to have negative psychological impacts on healthcare workers as well as the general population, as seen with the Severe Acute Respiratory Syndrome (SARS) outbreak that occurred in 2003 (Chew et al., 2020). Healthcare workers are one of the occupational groups most prone to psychological distress due to the COVID-19 pandemic (Akova, 2022). The increase in psychological distress of healthcare workers during the COVID-19 pandemic can be attributed to having a greater risk of exposure to the virus, significant increases in workload, shortages of personal protective equipment, fear of infecting their loved ones, perceived stigma, and lack of knowledge and experiencing in managing the virus (Kafle et al., 2021). Healthcare workers have reported negative mental health effects during the COVID-19 pandemic including depression, anxiety, loneliness, and other psychological concerns (Vizheh et al., 2020).

Psychological Distress in Healthcare Workers

The psychological impact of the COVID-19 pandemic on healthcare workers has been extensively studied in healthcare professions other than Medical Laboratory Professionals. A study conducted by Que et al. (2020) aimed to investigate the prevalence of psychological problems and factors associated with psychological problems amongst healthcare workers in China during the COVID-19 pandemic. A cross-sectional research study design was utilized, and a web-based survey was administered to 2285 healthcare workers via the social media platform WeChat. The healthcare workers surveyed included physicians, nurses, medical residents, technicians, and public health professionals (Que et al., 2020). Researchers did not specify whether laboratory personnel were included amongst the healthcare workers surveyed.

Que et al. (2020) measured psychological problems amongst healthcare workers by utilizing the Chinese versions of the Generalized Anxiety Disorder Scale (GAD-7), Patient Health Questionnaire (PHQ-9), and Insomnia Severity Index (ISI). The GAD-7 is a 7-item, self-rated scale used to identify and classify severity of generalized anxiety disorder. Cutoff points of 5,10, and 15 were used to classify anxiety as mild, moderate, and severe, respectively (Que et al., 2020). A GAD-7 score of ≥10 indicates anxiety. The PHQ-9 is a 9-item, self-reporting tool used for screening, monitoring, and measuring the severity of depression. Cutoff points of 5, 10, and 15 were used to classify depression as mild, moderate, or severe, respectively (Que et al., 2020). A PHQ-9 score of ≥10 indicates depression. The ISI is a 7-item, self-reporting questionnaire used to measure the nature and severity of both daytime and nighttime insomnia. Cutoff scores of 8, 15, and 22 were used to classify insomnia as subthreshold, moderate, and severe, respectively (Que et al., 2020). An ISI score of ≥15 indicates clinical insomnia.

Que et al. (2020) utilized descriptive statistics logistic regression for the data analyses. Results from the study indicated that the prevalence of anxiety, depression, insomnia, and the overall psychological problems was 46.04%, 44.37%, 28.75%, and 56.59%, respectively amongst healthcare workers in China during the COVID-19 pandemic (Que et al., 2020). Que et al. (2020) also discovered that front-line healthcare workers were at a higher risk of anxiety, insomnia, and overall psychological problems as compared to those healthcare workers who were not on the front-line. The three major factors that were found to contribute to psychological problems amongst healthcare workers were: negative information regarding the pandemic, unwillingness to join front-line work if given the choice, and negative feedback from family and friends who joined front-line work during the COVID-19 pandemic (Que et al., 2020).

Similar to the previous study conducted by Que et al. (2020), Chatzittofis et al. (2021) assessed the mental distress of health care workers during the COVID-19 pandemic in the Republic of Cyprus. Researchers utilized a descriptive, correlational, and cross-sectional study design to collect data via an online questionnaire sampling 424 health care workers. Chatzittofis et al. (2021) specifically assessed the presence of post-traumatic stress, depressive, and anxiety symptoms amongst healthcare workers including physicians, nurses, physiotherapists, and "other" (occupational therapists, pharmacists, and clinical psychologists), notably laboratory professionals were not included in this study. The survey also collected demographic variables related to health care workers including sex, age, and work sector.

Chatzittofis et al. (2021) utilized the PHQ-9, the Impact of Events Scale Revised (IES-R), and the Perceived Stress Scale (PSS-10) to measure mental distress amongst healthcare workers. The PHQ-9, which has been previously described, was used to measure depressive symptoms. The IES-R is a 22-item, self-reported scale used to measure post-traumatic stress symptoms

caused by traumatic events along three subscales: Intrusion, Avoidance, and Hyperarousal. Items are summed to give a total score for each subscale, as well as a total overall score the IES-R. Cutoff values ≥ 33 indicate clinically relevant symptoms of post-traumatic stress (Chatzittofis et al., 2021). The PSS-10 is a 10-item, self-reported scale used for the measurement of self-perceived stress intensity. A total score is summed to assess levels of self-perceived stress intensity. Higher scores reflect high levels of stress; however, there is no consensus regarding cutoff values for this scale. Chatzittofis et al. (2021) denoted clinically meaningful levels of stress by considering the distribution of PSS-10 scores in the upper quartile.

Chatzittofis et al. (2021) utilized both descriptive and inferential statistics in this study. Descriptive statistics included mean, standard deviation, or frequencies. Kruskal-Wallis was used to analyze group differences in continuous variables. Logistic regression was also utilized to assess the mental distress in healthcare workers. In total, 79 of the participants screened positive for clinical depressive symptoms while 62 screened positive for post-traumatic stress symptoms. Researchers found 106 health care workers were classified as experiencing high stress and 24 participants were found to be experiencing suicidality (Chatzittofis et al., 2021). Participants who demographically identified as female, younger, and a nurse were found to significant predictors of depressive and post-traumatic stress symptoms.

Job stressors related to the COVID-19 pandemic have also been found to influence psychological distress in health care workers. Hamama et al. (2021) investigated the association between COVID-19 related job stressors and psychological distress amongst physicians and nurses, using the job demands resources (JD-R) model as a theoretical basis. The job stressors that were utilized in this study were organizational attentiveness to increase workload, information on how to work safely during the pandemic, and the availability of appropriate

personal protective equipment (Hamama et al., 2021). The study also analyzed the contribution of demographic variables (sex, age, profession, and seniority) to perceived psychological distress. Psychological distress was measured using the Kessler psychological distress inventory (K-6), which is a 6-item questionnaire that measures non-specific psychological distress. K-6 scores are computed by summing total scores. Cutoff values ≥ 13 indicate serious mental illness.

Hamama et al. (2021) found that COVID-19 related job stressors were positively linked to reported psychological distress. Researchers also found that nurses and physicians with high seniority were associated with greater psychological distress (Hamama et al., 2021). The findings from this study are consistent with similar studies that utilized the jobs demand resource model to relate job stressors to psychological distress amongst healthcare workers.

Most of the studies evaluating psychological distress amongst healthcare workers during the COVID-19 pandemic have been limited to front-line healthcare workers; however, Firew et al. (2020) sought to investigate the factors contributing to infection and psychological distress amongst a broad group of healthcare workers. Firew et al. (2020) utilized a cross-sectional research design survey and was administered to 2,040 physicians, nurses, emergency medical technicians, and non-clinical staff across the United States. Participants were enrolled by using a convenience sampling method, and the survey was disbursed via various social media platforms. Most of the healthcare workers who participated in the survey were female (70.26%), Caucasian (67.89%), and from the Northeast region (47.12%) (Firew et al., 2020). Researchers found that healthcare workers who contracted COVID-19 were at higher risk for depression, anxiety, and burnout. To date, this study was one of the largest samples investigating psychological distress amongst healthcare workers in the United States.

Similar to Firew et al. (2020), Teo et al. (2021) examined the psychological distress and burnout of a large sample size (N = 2744) of diverse healthcare workers (doctors, nurses, allied health professionals, administrative, and operational staff) during the COVID-19 pandemic in Singapore. Notably, researchers did not explicitly state whether laboratory professionals were included with allied health professionals in this study. Researchers examined the changes of psychological distress amongst the healthcare workers prospectively over a six-month period. Self-reported data was collected monthly via an online survey on the Qualtrics platform.

The outcome variables that were analyzed in this study were stress, anxiety, and burnout measured by the Perceived Stress Scale, Generalized Anxiety Disorder scale, and the Physician Work Life Scale, respectively. The Physician Work Life Scale is a 150-item mail survey that measures practice characteristics, as well as job satisfaction of physicians; however, Teo et al. (2021) only utilized one question from the Physician Work Life Scale to measure burnout. The Perceived Stress Scale and the Generalized Anxiety Disorder Scale have been previously described.

Consistent with Firew et al. (2020), most of the healthcare participants in the research study conducted by Teo et al. (2021) were female (81%) and 60% were nurses. Only 15% of the participants fell under the "Allied Health Professionals" category. Allied Health Professionals reported levels of stress (29%), anxiety (12%), and burnout (22%) at baseline. Overall, elevated perceived stress, anxiety, and burnout was reported by 33%, 13%, and 24% of the entire sample respectively at baseline (Teo et al., 2021). Over the six-month period, it was found that perceived stress and burnout increased gradually, but anxiety did not increase significantly.

Like Teo et al. (2021), Akova et al. (2022) aimed to assess the prevalence of stress, anxiety, depression, burnout, and hopelessness amongst a diverse group of healthcare workers in

Turkey during the COVID-19 pandemic. This cross-sectional study design was carried out via a Google survey and administered through the social media platform WhatsApp to 1015 healthcare workers. Healthcare workers in this study included physicians, nurses, health officers, emergency medical technicians, physiotherapists, paramedics, laboratory technicians, and other healthcare workers.

Stress, anxiety, and depression were measured using the Depression Anxiety Stress Scale-21 (DASS-21), burnout was measured using the Maslach Burnout Inventory (MBI), and hopelessness was rated with the Beck Hopelessness Scale (BHS). The DASS-21 is a 21-item, self-reported survey used to separately measure the emotional states of depression, anxiety, and stress. The MBI is a 22-item, self-reported survey that measures burnout levels across three dimensions, emotional exhaustion, depersonalization, and personal accomplishment. The BHS is a 20-item, self-reported survey intended to measure the three factors of hopelessness, feelings about the future, loss of motivation, and future expectations (Beck et al., 1974).

Akova et al. (2022) found that 56.7% of healthcare workers had moderate/high emotional exhaustion, 35.8% had moderate/high depersonalization, and 58.0% had low personal accomplishment. 34.9% of healthcare workers exhibited high depression, 31.9% had high anxiety, 15.4% had high stress, and 33.3% had moderate/severe hopelessness. Of the 1015 healthcare workers sampled for this study, only 29 were medical laboratory professionals. These medical laboratory professionals did not have specific variable data reported, instead they were lumped into the category of "other healthcare workers" in the results section of this study.

Most of the previously presented studies on psychological distress during the COVID-19 pandemic focused on healthcare workers other than Medical Laboratory Professionals; however, Swaray et al. (2021) conducted a study aimed to assess psychological distress solely amongst

Medical Laboratory Professionals involved in COVID-19-related duties in Ghana. This cross-sectional survey was administered online through the use of a Google Form. Medical Laboratory Professionals were recruited via social media platforms, WhatsApp and short message service. A total of 473 Medical Laboratory Professionals participated in this survey across the 16 regions of Ghana.

Similar to previously mentioned studies, Swaray et al. (2021) measured psychological distress (stress, anxiety, and depression) using the DASS-21. This study utilized both descriptive and inferential statistical analyses. Researchers used multiple forms of regression analyses (Negative Binomial, Poisson, Logistic, and Probit) to analyze psychological distress in Medical Laboratory Professionals.

Of the 473 participants, Swaray et al. (2021) found that 378 were male, 95 were female, and a mean age of participants was 33 years. Results from this study yielded a relatively high prevalence of psychological distress amongst Medical Laboratory Professionals. Results from this study also indicated that Medical Laboratory Professionals who were directly involved in COVID-19-related duties experienced elevated levels of psychological distress, as compared to those not involved in COVID-19-related duties (Swaray et al., 2021).

Burnout

Burnout was first introduced in the early 1970s by psychologist Herbert J. Freudenberger. Freudenberger did not officially define the term burnout; instead, he described the feeling of burnout based on his personal experience. Freudenberger (1974) characterized the feeling of burnout as both physical and behavioral symptoms. Physical symptoms include exhaustion,

fatigue, headaches, sleeplessness, and shortness of breath; while behavioral symptoms were anger, frustration, cynicism, and signs of depression (Freudenberg, 1974).

Building off the work of Freudenberger, Christina Maslach and her colleagues became pioneers in burnout research. Maslach focused on specific measures of burnout. Maslach classified burnout into three dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach & Jackson, 1981). Emotional exhaustion refers to feelings of being overextended and emotionally depleted by other people (Vercambre et al., 2009). Depersonalization refers to the negative, cold, and cynical feeling towards others (Liu et al., 2020). Reduced personal accomplishment refers to a decline in one's feelings of success and competence in their work (Leiter & Maslach, 1988). To measure burnout on the three dimensions, Maslach developed the Maslach Burnout Inventory (MBI) in 1981, which is still widely used today.

Burnout in Healthcare Workers

Jalili et al. (2021) sampled a group of 615 physicians and nurses who cared for COVID-19 patients to assess the levels of burnout amongst this population and factors associated with its development. This cross-sectional study took place across six university-affiliated hospitals in Iran and the self-administered survey was taken online by healthcare workers who were recruited using a convenience sampling method. The survey collected socio-demographic and work-related characteristics such as: age, sex, marital status, number of children, job title, place of work, years of experience, shifts per month, and number of hours worked per shift. Jalili et al. (2021) then used a translated version of the MBI to study levels of burnout due to the COVID-19 pandemic. Respondents experienced 8.9%, 41.9%, and 50.1% of low, moderate, and high levels of burnout respectively on the emotional exhaustion dimension scale. On the depersonalization

dimension, respondents experienced 0.8%, 86.0%, and 13.2% of low, moderate, and high levels of burnout, respectively. Subjects were also scored on the personal accomplishment dimension and exhibited 0.8%, 14.3%, and 85.5% of low, moderate, and high levels of burnout, respectively. Overall, 53.0% of respondents experienced high levels of burnout during the COVID-19 pandemic. Gender was found to be the only variable associated with high levels of burnout in all three dimensions.

Liu et al. (2020) utilized a cross-sectional survey to investigate the impact the COVID-19 pandemic had on burnout amongst healthcare professionals in China. Liu et al. (2020) sampled 880 healthcare workers via an online survey. Healthcare workers were divided into three occupational categories, physician, nurse, or other. The level of healthcare worker burnout was assessed by the Chinese version of the MBI which assessed burnout in three dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment. Liu et al. (2020), divided respondents assessment results into four levels: no burnout, mild burnout, moderate burnout, and severe burnout. The overall positive rate for the three dimensions of burnout were 9.09% for emotional exhaustion, 50.57% for depersonalization, and 56.59% for reduced personal accomplishment, with the overall burnout rate being 73.98% amongst the healthcare professionals surveyed. Liu et al. (2020) concluded that the rate of moderate and severe burnout had increased due to the COVID-19 pandemic.

A mixed-methods study conducted by Roslan et al. (2021) aimed to examine the prevalence of burnout amongst a diverse occupation of healthcare workers, including Medical Laboratory Professionals, in Malaysia during the COVID-19 pandemic and explore factors associated with burnout. A cross-sectional study was used to assess the prevalence of burnout amongst health care workers and the survey was administered online. Burnout was measured

using the Copenhagen Burnout Inventory (CBI), a 19-item, self-reported survey that measures burnout across three sub-scales: personal burnout, work-related burnout, and client-related burnout (Roslan et al., 2021). Healthcare workers were also asked open-ended questions to better gather information on their experience with burnout during the COVID-19 pandemic.

Roslan et al. (2021) utilized a snowball sampling method and a total of 893 healthcare workers completed the survey, including 99 Medical Laboratory Technologists. The overall prevalence of burnout from all healthcare workers on the dimensions of personal-related, work-related, and patient-related burnout was 53.8%, 39.1%, and 17.4%, respectively. The 99 healthcare workers classified as Medical Laboratory Technologists sampled in this study exhibited 65.7%, 53.5%, and 15.2% of personal-related, work-related, and patient-related burnout, respectively. The key demographics that were associated with all three dimensions of burnout were: psychosocial support at work, medical conditions, younger age, inadequate childcare at home, long hours, direct involvement with COVID-19, having no children, and irregular spirituality routines (Roslan et al., 2021). By administering the qualitative portion of the survey, Roslan et al. (2021) found that the most described source of burnout was workload. Some healthcare workers also cited uncertainties caused by the COVID-19 pandemic, challenging work-family balance, and stretched workplace relations as sources of burnout.

A global cross-sectional study was conducted by Morgantini et al. (2020) to explore the factors associated with burnout amongst healthcare professionals during the COVID-19 pandemic. This study was the first intercontinental survey obtaining perceptions of healthcare workers during the COVID-19 pandemic. A total of 2,707 healthcare workers from 60 different countries participated in the survey via social media platforms, Facebook, WhatsApp, and Twitter as well as e-mail. Healthcare workers that participated in this study were classified as

physician, nurse, or other. Of note, it was unclear whether Medical Laboratory Professionals were included in the “other” category. Burnout rate was measured on the dimension of emotional exhaustion, using a self-developed questionnaire.

Morgantini et al. (2020) found that 51.4% of healthcare workers from 33 countries reported emotional exhaustion burnout during the COVID-19 pandemic. The country with healthcare workers reporting the highest burnout rate was the United States at 62.8%. Factors that increased the likelihood of burnout amongst the healthcare workers surveyed included high workload, high job stress, high time pressure, and limited organizational support (Morgantini, 2020). The findings from this study were consistent with other studies exploring factors associated with burnout amongst healthcare workers during the COVID-19 pandemic.

One of the few studies investigating the impact of the COVID-19 pandemic exclusively on Medical Laboratory Professionals was conducted by Nowrouzi-Kia et al. (2022). Nowrouzi-Kia et al. (2022) set out to examine factors associated with burnout amongst Medical Laboratory Technologists in Ontario, Canada during the second wave of COVID-19 pandemic. A cross-sectional study design was implemented, and a questionnaire was distributed to Medical Laboratory Technologists by the Medical Laboratory Professionals Association of Ontario. The outcome variable, burnout, was measured by using the middle version of the Copenhagen Psychosocial Questionnaire, third edition (COPSOQ-III). The COPSOQ-III also assessed the mental health of Medical Laboratory Technologists, specifically stress. The COPSOQ-III middle version is a self-reported survey consisting of 60-items across 26 dimensions; however, Nowrouzi-Kia et al. (2022) only utilized 48 questions from the survey to measure mental health participation and engagement of Medical Laboratory Technologists. In addition to the COPSOQ-III, Nowrouzi-Kia et al. (2022) also collected demographics variables on Medical Laboratory

Technologists such as gender, age group, marital status, education, ethnicity, number of children living at home, employment status, and work accommodation due to disability.

A total of 952 Medical Laboratory Technologists were included in the study. Nowrouzi-Kia et al. (2022) found that most of the respondents were female (89.9%), and the burnout prevalence was 72.3% amongst Medical Laboratory Technologists during the COVID-19 pandemic. Researchers also found that those respondents who held a university degree were less likely to experience burnout compared to those with a high school degree. High quantitative demands, high work pace, high job insecurity, high work-life conflict, high self-rated health, and high job satisfaction are occupational factors significantly associated with burnout amongst Medical Laboratory Technologists (Nowrouzi-Kia et al., 2022). Overall, this study sheds light on factors associated with burnout amongst Medical Laboratory Technologists in Ontario, Canada.

Turnover and Turnover Intention

Employee turnover is a concept that has been widely explored by scholars across all professions, not just healthcare and has been a research concept targeted by organizations. Employee turnover can be defined as an employee's exit from an employer/organization (Hom & Griffeth, 1995). Turnover has been classified as voluntary or involuntary. Voluntary turnover refers to an employee's decision to leave an organization and involuntary turnover refers to an organization's decision to terminate an employee (Shaw et al., 1998). There are many factors that contribute to voluntary turnover including but not limited to job stress, lack of job satisfaction, lack of career advancement opportunities, poor compensation, and lack of organizational commitment (Lee & Mowday, 1987).

Employee turnover intention is different from actual employee turnover, in that it includes employee attitude and behavior towards an organization (Ngo-Henha, 2017). According to Lacity et al. (2008) turnover intention can be defined as the extent to which an employee plans to leave their organization. Turnover intention has been found to be a better measurement of resignation intention than actual turnover rate, because turnover intention has better predictive ability (Zhang & Feng, 2011). Carmeli and Weisberg refers turnover intention to three different elements in the withdrawal cognition process: thoughts of quitting, the intention to search for another job elsewhere, and the intention to quit (Carmeli & Weisberg, 2006).

One of the most notable foundational models regarding employee turnover was created by William Mobley. Mobley (1977) proposed that there is a definitive linkage between job satisfaction and employee turnover, and that the intention to leave a job happens in several steps. Mobley suggested that employee turnover happens in ten steps: evaluation of existing job, experience job satisfaction/dissatisfaction, thinking of quitting, evaluation of expected utility of search and cost of quitting, intention to search for alternative, search for alternatives, evaluation of alternatives, comparison of alternative vs. present job, intention to quit, quit (Mobley, 1977).

Turnover Intention in Healthcare Workers

In a cross-sectional research study in China, Wen et al. (2018) investigated turnover intention and the factors influencing turnover intention among primary care doctors. A multi-stage stratified random sampling method was used to enroll 440 primary care doctors into the study. A self-administered questionnaire consisting of four parts was used to collect data for the variables. Part one consisted of socio-demographic characteristics: age, gender, education, medical practice type, job title, and location. Part two collected work-related characteristics. Part three measured job satisfaction using a 16-item questionnaire produced by Warr et al. (1979).

Part four of the questionnaire collected information about reasons for resigning and turnover intention. Turnover intention was measured by a six-item turnover intention scale, which was revised for the Chinese population. Wen et al. (2018) found that 42.3% of respondents intended to resign, and location, age, job title, doctor's position level, work pressure, and job satisfaction were associated with turnover intention amongst primary care physicians.

Raso et al. (2021) performed a cross-sectional study to investigate nurses' intent to leave their positions during the COVID-19 pandemic and explore background factors that may influence turnover intention. A snowball sampling method was used, and 5,088 registered nurses were obtained for the study from the DAISY foundation database of US hospitals (Raso et al., 2021). Nurses who were not full-time or who held executive roles were excluded from the study. Demographic variables were collected on the nurses and included age, gender, education, role, practice setting, and years of experience. The self-developed questionnaire consisted of three questions, targeting intent to leave current position, intent to leave profession, and rating the COVID-19 pandemic impact on their practice (Raso et al., 2021). 82.1% of the respondents were direct care nurses, 89% were females with an average age of 41.1, and 14.5 years of experience. 11% of the nurses' sample indicated that they intended to leave their current position, while 20% remained undecided. Only 1.8% of nurses intended to leave their professions, and 7.6% remained undecided. The COVID-19 pandemic impact on nursing practice was rated on a scale from 0-10, with 0 being no impact and 10 being a major impact. Nurses rated the pandemic impact with an average of 7.77. Nurses who rated the pandemic having a high impact on their practice, were more likely to leave their position (Raso et al., 2021). This study concludes that nurses who intend to leave their position and those who are undecided could cause instability in the nursing workforce.

Similar to Raso et al., (2021), Sinsky et al. (2021) assessed the work intentions of a diverse group of healthcare workers in the United States and explore factors associated with reduced turnover intentions. 20,665 healthcare workers across 124 institutions in the United States were sampled via snowballing and included physicians, nurses, other clinical roles, clerical workers, housekeepers, and administrators. Data was collected using the Coping with COVID survey, which collected demographic information and measured burnout fear of infection and transmission, perceived anxiety or depress, work overload, sense of meaning and purpose, and feeling values by one's organization (Sinsky et al., 2021). Amongst the sampled healthcare workers, 69.8% were Caucasian, 60.4% were female, and 44.84% were physicians. The likelihood of healthcare workers leaving their current practice within the next 24 months was the highest amongst nurses (40.0%), while other clinical staff was at 29.4%. Predictors of intention to leave current practice were found to be burnout, fear of exposure, COVID-19-related anxiety and depression, and workload. Sinsky et al. (2021) also found that turnover intention was lowered by healthcare workers feeling values by one's organization. This study concludes that for healthcare organizations to maintain their workforce, they should target interventions that improve healthcare workers sense of feeling valued (Sinsky et al., 2021).

Theoretical Framework

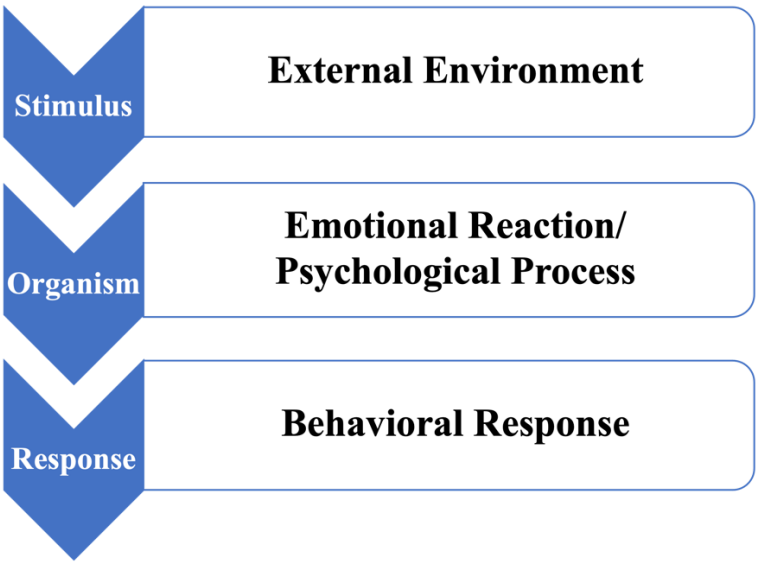
Stimulus-organism-response (S-O-R) model is a cognitive theory that was suggested by Woodworth (1929), as an extension to the original stimulus-response model proposed by Pavlov in 1927. Woodworth (1929) S-O-R model posits that there is a stimulus that triggers a response based on internal feelings or behaviors of an organism. Building on the work of Woodworth, in 1974 Albert Mehrabian and James A. Russell further developed the S-O-R model and adapted it to study consumer behavior in environmental psychology. The S-O-R model proposed by

Mehrabian and Russell posits environmental stimuli has the potential to influence an individual's emotional state, and that emotional state can cause approach or avoidant behavioral responses (Mehrabian & Russell, 1974).

S-O-R model consists of three constructs that determine the behavioral outcomes of an event: stimulus, organism, and response (Figure 1). "Stimulus" is the external factor that can influence the mental state of an individual (Fu et al., 2021). Mehrabian and Russell (1974) described the environment as being a stimulus in the S-O-R model. Eroglu et al. (2021) described stimulus as environmental factors that affect cognitive reactions of an individual and the influence that arouses the individual. "Organism" is the emotional reaction and psychological process that occurs after encountering the stimulus (Pandita et al., 2021). Organism captures the cognitive and affective states that intervene between stimuli and the behavioral response of an individual (Yang et al., 2021). Organism can influence an individual's behavioral response (Mehrabian & Russell, 1974). The "response" construct represents the final actions manifested by the individual (Fu et al., 2021). The behavioral responses exhibited by the individual can be described as approach or avoidant behaviors, where approach behaviors include positive responses and a desire to stay, and avoidant behaviors include negative responses or a desire to leave (Donovan & Rossiter, 1982; Eroglu et al., 2001).

Figure 1

S-O-R Model



Application of Theoretical Framework

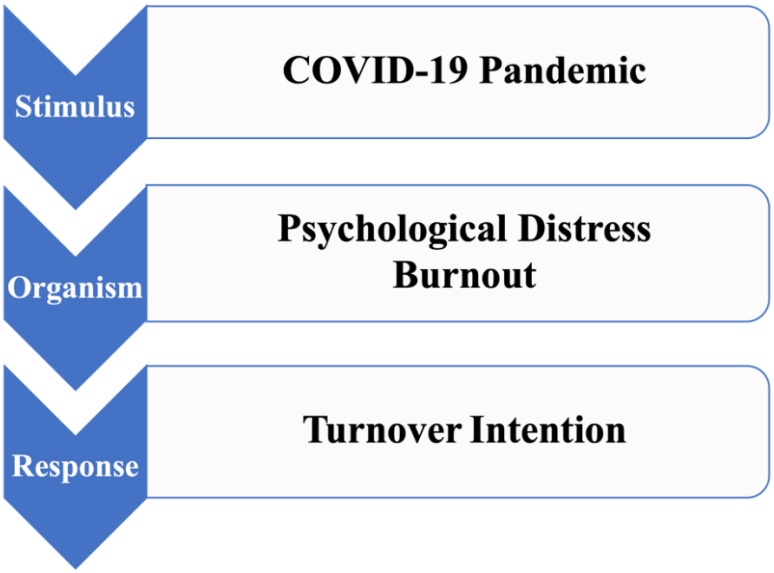
The S-O-R model has been widely applied to understand consumer behavior of humans; however as of late the S-O-R model has been utilized to examine human behaviors during the COVID-19 pandemic. Soroya et al. (2021) set out to investigate the factors leading to information avoidance during the COVID-19 pandemic. Researchers applied the S-O-R model by having information seeking and information overload serving as the stimuli, information anxiety served as the organism, and the response was information avoidance (Soroya et al., 2021). Zheng et al. (2020) applied the S-O-R conceptual framework to investigate how COVID-19 lockdown and psychological distance influenced social anxiety in China. In this study, the stimuli consisted of pandemic severity and lockdown measures during the pandemic, organism consisted of psychological distance, while the response was social anxiety (Zheng et al., 2020). A study conducted by Pandita et al. (2021) set out to investigate the psychological impact of the COVID-19 pandemic on students using the S-O-R model as a theoretical framework.

Researchers outlined the stimulus as the characteristics of the COVID-19 pandemic, the organism as the student's emotional response towards the COVID-19 pandemic, and the response reflected the behavioral outcomes of students as a result of the emotional response caused by the COVID-19 pandemic (Pandita et al., 2021).

The S-O-R model explains how the environment can serve as a stimulus and in turn promote feelings and psychological states that can influence an individual's behavior. The present study will apply the S-O-R model to assess the presence of psychological distress, burnout, and turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic. For this study, stimulus is the COVID-19 pandemic, organism refers to psychological distress and burnout, and response is the turnover intention of Medical Laboratory Professionals. Figure 2 summarizes the application of the S-O-R model to the present study.

Figure 2

Application of the S-O-R Model



Chapter Summary

This chapter provided a summary of previous research regarding psychological distress, burnout, and turnover intention of healthcare workers during the COVID-19 pandemic. This chapter also gave insight into the theoretical framework used to guide this study. The literature publicized that healthcare workers have been greatly impacted by the COVID-19 pandemic. The research studies revealed that stress, anxiety, and depression are high amongst healthcare workers during the COVID-19 pandemic, as well as burnout. Turnover and turnover intention varies amongst professions, and there is a need to study this outcome variable for organizations to retain staff. This review of the literature has shown that healthcare workers such as nurses and physicians have been extensively studied during the COVID-19 pandemic, and there is a need to study other professions as well, such as Medical Laboratory Professionals.

The literature review revealed a lack of research on the effect of the COVID-19 pandemic on Medical Laboratory Professionals regarding psychological distress, burnout, and turnover intention. Though there have been studies that have taken place in other countries on Medical Laboratory Professionals, none have taken place in the United States. This literature review highlights the significant need to study Medical Laboratory Professionals in the United States and explore the impact that the COVID-19 pandemic has had on the profession.

Chapter III will provide details on the methodology of this research study and include research questions, target population, sampling methods, variable descriptions, survey information, data collection method, and statistical methods for data analysis.

Chapter III: Research Methodology

Chapter Overview

Chapter I provided an introduction and background of the study problem, while chapter II provided a detailed review of the literature. Chapter III will detail the research plan for the present study and includes details on the research design, population and sample, study variables and instrumentation, data collection, data analysis, and study validity.

The purpose of this convergent mixed methods study was to explore the impact of psychological distress and burnout on turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic. This study also investigated if psychological distress, burnout, and turnover intention differed based on demographic variables of Medical Laboratory Professionals during the COVID-19 pandemic. Additionally, this study sought to explore motivational factors associated with turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic.

Research Design

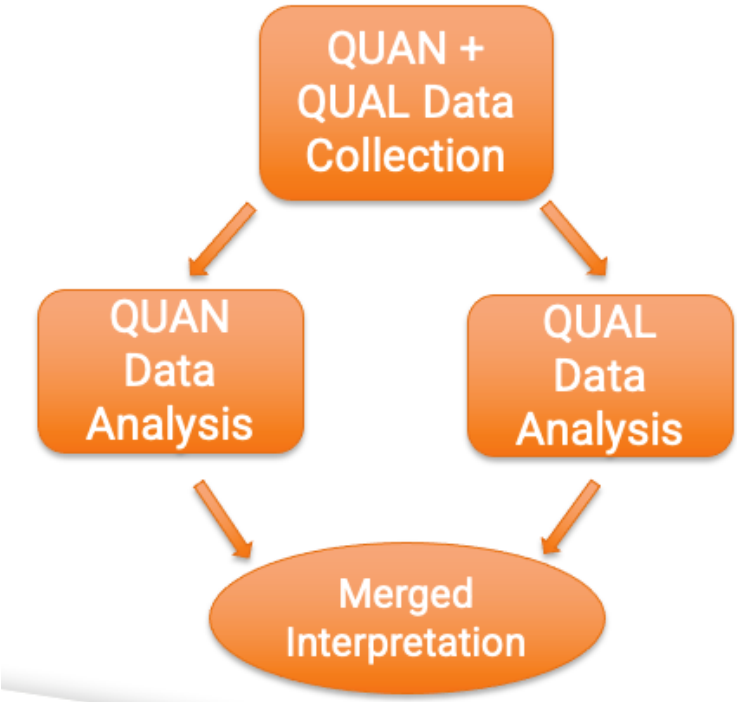
Mixed methods research studies involve the collection of quantitative and qualitative data and the integration of both during the research process (Polit & Beck, 2017). The purpose of mixed methods research is to provide a better understanding of research problems and phenomena by integrating both quantitative and qualitative data (Creswell & Plano Clark, 2017). The goal for mixed methods research is to draw from the strengths and minimize the weaknesses of single quantitative and qualitative research studies (Johnson & Onwuegbuzie, 2004).

The present study utilized a convergent mixed methods study design, giving equal emphasis on the quantitative and qualitative strands represented by QUAL + QUAN. The

purpose of convergent mixed methods studies is to obtain different, but complementary data about the research problem (Polit & Beck, 2017). Both quantitative and qualitative data were collected concurrently in a single phase, analyzed separately, and integrated by merging data to make comparisons (Fetters et al., 2013). Figure 3 summarizes the convergent mixed methods study.

Figure 3

Convergent Mixed Methods Design Summary



Convergent mixed methods study design can add insights and understanding on findings that might be missed if only a single research method is utilized (Johnson & Onwuegbuzie, 2004). The qualitative strand of this convergent mixed methods design enhanced the significance of the study by capturing unique experiences of Medical Laboratory Professionals, while the quantitative strand provided standardized data. The convergent mixed methods design also

allowed for the researcher to examine the unexplored phenomena relating to psychological distress, burnout, and turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic. Findings from this study can be used to serve as a baseline for the development of workplace intervention programs targeting the well-being of Medical Laboratory Professionals.

Data was collected from participants using a self-administered, web-based survey. Survey research is intended to obtain specific information from a population regarding the prevalence or distribution of phenomena (Polit & Beck, 2017). There are several methods that can be utilized to collect survey data, including personal interviews, telephone interviews, and questionnaires. For this research study, a questionnaire was administered via Research Electronic Data Capture (REDCap) software. There are several advantages to using survey research. Survey research offers flexibility and can be focused on a broad range of topics (Polit & Beck, 2017). Internet-based survey research is also relatively low cost and can be used to target a wide range of participants, yielding a large sample size (Ponto, 2015).

Population and Sample

Target Population. The target population for this study consisted of all certified Medical Laboratory Professionals in the United States who were credentialed through the American Society for Clinical Pathology (ASCP) or American Medical Technologists (AMT). The accessible population consisted of certified Medical Laboratory Professionals in the United States who had access to social media and can take the self-administered questionnaire. There is no way to collect data from all certified Medical Laboratory Professionals in the United States, so this served as a subset of individuals to obtain a representative sample.

Sampling Strategy. Given the nature of this study, both the quantitative and qualitative sample consisted of the same participants. This study utilized a nonprobability convenience

sampling method. Convenience sampling is one of the most widely used sampling methods amongst many disciplines (Polit & Beck, 2017). In convenience sampling, participants are selected based on their convenience accessibility and proximity to the researcher (Elfil & Negida, 2017). The advantages of convenience sampling are that it is efficient and simple to perform; however, this method may lack generalizability and give rise to selection bias (Jager et al., 2017).

To enhance sample size and generalizability amongst participants, the nonprobability snowball sampling method was also utilized. Snowball sampling is a type of convenience sampling where previous participants refer other subjects who meet eligibility criteria (Polit & Beck, 2017). The survey utilized in this study was disseminated via various Medical Laboratory Professional groups on Facebook and LinkedIn. Participants were asked to share the survey link with their colleagues who may not be part of the Medical Laboratory Professionals groups on Facebook and LinkedIn. These Medical Laboratory Professional groups on Facebook and LinkedIn consisted of Medical Laboratory Professionals across the United States; thus, creating a more representative sample of all Medical Laboratory Professionals.

Eligibility Criteria. Table 1 provides a summary of inclusion and exclusion criteria. Medical Laboratory Professionals were included in the study if they currently hold a certification by ASCP or AMT, are in the United States, and worked during the COVID-19 pandemic. This study focused on the effects of the COVID-19 pandemic on laboratory professionals; thus if Medical Laboratory Professionals did not work during the pandemic their input would not be relevant to the study goals. Due to staffing shortages, some medical laboratories were forced to hire non-certified laboratorians to work during the COVID-19 pandemic. These individuals did not attend an accredited Medical Laboratory Science/Medical Laboratory Technician program

and did not sit for a certification exam. Because these individuals do not have the appropriate background, they were not included in the study. Lastly, this study focused on Medical Laboratory Professionals in the United States, so individuals who are not located in the United States were excluded from the study.

Table 1

Inclusion and Exclusion Criteria

Inclusion Criteria:	**Exclusion Criteria:**
ASCP or AMT certified*	Not ASCP or AMT certified
Located in the United States	Not located in the United States
Worked during the COVID-19 pandemic	Did not work during the COVID-19 pandemic

*****Medical Laboratory Scientists, Medical Laboratory Technicians, Categorical Technologists: (Blood bank, Microbiology, Hematology, Chemistry, Cytogenetics, Molecular Biology, Molecular Diagnostics), Histotechnicians, Histotechnologists, Cytologists, Phlebotomy Technicians, and Medical Laboratory Assistants.

Power Analysis

To determine an appropriate sample size for this study, a power analysis was performed. A power analysis is used to reduce the risk of Type II errors and strengthen statistical conclusion validity (Polit & Beck, 2017). The power analysis was used to estimate the appropriate sample size needed to achieve significant statistical power. There are three components that must be known to perform a power analysis and they are the significance criterion, α, the effect size, and power $(1 - \beta)$ (Polit & Beck, 2017).

Based on previous literature, this study set the following parameters: $\alpha=0.05$, a medium effect size of 0.15, and statistical power = 0.80. An a priori power analysis was conducted using

G*Power software 3.1.9.6 to calculate the appropriate sample size *n* needed to achieve appropriate statistical power for this study. The minimum sample size required for this study was determined to be 526 participants.

Study Variables and Research Questions

The study variables were selected based on previous literature regarding healthcare workers and the COVID-19 pandemic. Table 2 summarizes the variables used for this study. The variables for this study are sociodemographic variables (age, sex, highest level of education, race, ethnicity, years of experience, job title, location (state), and work sector), burnout, psychological distress, and turnover intention. The variables are presented differently based on the associated research questions. The study variables along with their associated research questions are listed below.

Research Question 1: What was the prevalence of self-reported psychological distress, burnout, and turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic?

Exposure Variable: COVID-19 pandemic

Outcome Variable(s): Psychological Distress, Burnout, and Turnover Intention

Research Question 2: Did self-reported psychological distress, burnout, and turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic differ based on demographic variables?

Independent Variable(s): Demographic variables (age, sex, level of education, race, ethnicity, years of experience, job title, and work sector)

Dependent Variable: Psychological Distress, Burnout, and Turnover Intention

Research Question 3: Were self-reported psychological distress and burnout predictors of turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic?

Independent Variable(s): Psychological Distress and Burnout

Dependent Variable(s): Turnover Intention

Table 2

Study Variables

Variable	**Instrument/Scale**	**Level of Measurement**
Demographic Variables		
Age	In Years	Continuous
Sex	Male; Female; Other	Categorical
Location (State)	Alabama; Alaska; Arizona; Arkansas; California; Colorado; Connecticut; Delaware; Florida; Georgia; Hawaii; Idaho; Illinois; Indiana; Iowa; Kansas; Kentucky; Louisiana; Maine; Maryland; Massachusetts; Michigan; Minnesota; Mississippi; Missouri; Montana; Nebraska; Nevada; New Hampshire; New Jersey; New Mexico;	Categorical

Variable	Instrument/Scale	Level of Measurement
	New York; North Carolina; North Dakota; Ohio; Oklahoma; Oregon; Pennsylvania; Rhode Island; South Carolina; South Dakota; Tennessee; Texas; Utah; Vermont; Virginia; Washington; West Virginia; Wisconsin; Wyoming	
Highest Level of Education	Associate; Bachelor; Master; Doctorate; Other	Categorical
Race	American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander; Hispanic or Latino; White; More Than One Race	Categorical
Ethnicity	Hispanic or Latino; Not Hispanic or Latino	Categorical
Job Title	Medical Laboratory Scientist/Clinical Laboratory Scientist/Medical Technologist; Medical Laboratory Technician/Clinical Laboratory	Categorical

Variable	Instrument/Scale	Level of Measurement
	Technician; Supervisor/Manager; Director	
Laboratory Work Sector	Hospital; Public Health; Reference; Private Practice; Other	Categorical
Years of Experience	In Years	Continuous
Psychological Distress		
Stress, Anxiety, and Depression	DASS-21; 4-point Likert scale; 0 = *Did not apply to me at all*; 3 = *Applied to me very much or most of the time*	Continuous
Burnout		
Emotional Exhaustion, Depersonalization, and Personal Accomplishment	MBI-HSS (MP); 22-item scale; 7-point Likert scale; 0 = *never*; 6 = *Every day*	Continuous
Turnover Intention		
Turnover Intention	TIS-6; 6-item scale; 5-point Likert scale; 1 = *never*; 5 = *always*	Categorical

This study also utilized a qualitative arm to explore perceptions of coping with psychological distress and laboratory morale. This study also explored motivational factors related to turnover intention amongst Medical Laboratory Professionals. The qualitative research question and the open-ended questions that were used to guide the question are listed below.

Research Question 4: What were Medical Laboratory Professionals perceptions of ways to cope with psychological distress, laboratory morale, and turnover intention during the COVID-19 pandemic?

***QUAL*$_1$**: What services are available for coping with psychological distress at your organization?

***QUAL*$_2$**: What methods have you utilized to cope with psychological distress?

***QUAL*$_3$**: What interventions have been implemented within your organization to increase morale in your laboratory?

***QUAL*$_4$:** What interventions have been successful or unsuccessful with increasing morale in your laboratory?

***QUAL*$_5$:** What factors contributed to you leaving your organization?

***QUAL*$_6$**: What factors contributed to you leaving the profession?

***QUAL*$_7$:** If you left the profession, what field are you working in now?

Study Instruments

The survey was divided into five sections and administered through REDCap. Section one consisted of a self-developed survey to collect demographic data from Medical Laboratory Professionals. Section two was used to collect information pertaining to psychological distress

(stress, anxiety, and depression) using the Lovibond and Lovibond (1995) Depression Anxiety and Stress Scales (DASS-21). Section three collected information regarding burnout amongst Medical Laboratory Professionals using the Maslach Burnout Inventory Human Services Survey (MBI-HSS). Section four collected data related to turnover intention amongst Medical Laboratory Professionals and was measured using Bothma and Roodt (2013) Turnover Intention Scale (TIS-6). Section five consisted of open-ended qualitative questions exploring perceptions of coping with psychological distress, laboratory morale, and factors related to turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic.

Section 1: Demographic Information. A demographic survey was administered to collect background information on Medical Laboratory Professionals. The sociodemographic variables that were collected for this study were age, location (state), sex, race/ethnicity, job title, laboratory department, years of experience, level of education, and the work sector.

Section 2: Depression Anxiety and Stress Scales (DASS-21). The DASS-21 was used to measure stress, anxiety, and depression amongst Medical Laboratory Professionals. The DASS-21 was created by Lovibond and Lovibond (1995) and is the short version of the 42-item questionnaire. This self-reported questionnaire consists of three dimensions to measure the negative emotional states of depression, anxiety, and stress (Henry & Crawford, 2005). The form includes 7 items for each of the three subscales, for a total of 21 items (Lovibond & Lovibond, 1995). The 21-items are scored on a 4-point Likert scale format ranging from 0 to 3, with 0 being *Did not apply to me at all* and 3 being *Applied to me very much or most of the time* (Lovibond & Lovibond, 1995). There is no overall composite score for the DASS-21, instead scores are computed for each dimension by summing total scores separately and multiplying by 2. Scores are multiplied by 2, because the DASS-21 is the shortened form of the original DASS-42.

Participant scores are then characterized as normal, mild, moderate, severe, or extremely severe, as indicated by the DASS-21 cutoff scores.

The DASS-21 has demonstrated high internal consistency, across the scales of depression, anxiety, and stress as indicated by Cronbach's α = .94, .87, and .91, respectively (Antony et. Al, 1998). Nadeem et al. (2023) also found that the DASS-21 demonstrated high reliability as indicated by an overall Cronbach's α = .95, and .91, .88, .93 across the depression, anxiety, and stress scales, respectively. Similar studies have provided additional evidence of high reliability for the DASS-21 amongst healthcare workers (Ali et al., 2022; Hammond et al., 2021; Talaee et al., 2020).

Section 3: Maslach Burnout Inventory Human Services Survey (MBI-HSS). The MBI-HSS was used to measure burnout levels amongst Medical Laboratory Professionals. The MBI-HSS was developed in 1981 by Christina Maslach and Susan Jackson (Maslach & Jackson, 1981). The MBI-HSS is used to measure burnout amongst professionals in the field of human services, which include Medical Laboratory Professionals.

The MBI-HSS is a 22-item survey that is measured on a 7-point Likert scale ranging from 0-6, where 0 is *never* and 6 is *every day.* The MBI-HSS is measured along three dimensions: Emotional Exhaustion (9 items), Depersonalization (5 items), and Personal Accomplishment (8 items). The Emotional Exhaustion scale measures feelings of being exhausted by work and being emotionally overextended, the Depersonalization scale measures an impersonal feeling towards patients, and the Personal Accomplishment scale measures feelings of success at work (Maslach & Jackson, 1981). High risk for burnout is indicated by high scores on the subscales of Emotional Exhaustion and Depersonalization, while a high score on the Personal Accomplishment subscale indicates low risk of burnout (Shaikh et al., 2019).

There is no overall composite score for burnout, instead each dimension of burnout is scored separately for each participant. Burnout scores are computed by summing the total scores for each sub-scale and dividing the sum by the total number of items for each sub-scale. Participants are then classified as experiencing low, moderate, or high levels of burnout as indicated by cutoff scores, which vary by sub-scale.

The MBI-HSS has demonstrated excellent reliability ranging from 0.70-0.90, as measured by Cronbach's alpha (van der Colff & Rothmann, 2012). Mutair et al. (2020) reported high internal consistency (0.87) for the overall MBI-HSS, and for the subscales of emotional exhaustion (0.85), depersonalization (0.80), and personal accomplishment (0.75). Additional studies investigating burnout in healthcare workers using the MBI-HSS have also provided evidence for high internal consistency of the survey (Forné & Yuguero, 2022; Lwiza & Lugazia, 2023; Wang et al., 2020). Permission to use the MBI-HSS was secured, and a license was obtained from Mind Garden prior to use of this survey (Appendix A).

Section 4: Turnover Intention Scale (TIS-6). The TIS-6 was created from the original Roodt (2004) 15-item survey to measure turnover intention amongst employees. The TIS-6 measures an employee's desire to leave their work position (Bothma & Roodt, 2013). This 6-item survey is measured on a 5-point Likert scale, ranging from 1 to 5 with 1 being *never* and 5 being *always*. A composite score for the TIS-6 is computed by summing the scores for each participant. Individuals scoring greater than 18 indicate a desire to leave; whereas individuals scoring less than 18 indicate a desire to stay in their position.

Bothma and Roodt (2013) validated this 6-item survey and found it to have a Cronbach's alpha reliability score of 0.80, which indicates high reliability. Similar studies investigating turnover intention amongst healthcare workers provided further evidence of high reliability of

the TIS-6 (Labrague et al., 2018; Lee et al., 2011). Permission was secured prior to use of this survey (Appendix B).

Section 5: Qualitative Information. The survey included seven open-ended questions to gather information about coping mechanisms for psychological distress, laboratory morale, and motivation for turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic. The questions were free-response and are listed below.

1. What services are available for coping with psychological distress at your organization?
2. What methods have you utilized to cope with psychological distress?
3. What interventions have been implemented within your organization to increase morale in your laboratory?
4. What interventions have been successful or unsuccessful with increasing morale in your laboratory?
5. What factors contributed to you leaving your organization?
6. What factors contributed to you leaving the profession?
7. If you left the profession, what field are you working in now?

Data Collection

Primary survey data was collected through REDCap, which is an electronic web application for constructing and managing surveys. REDCap provided a unique survey URL, and the researcher disbursed the unique URL to Medical Laboratory professional groups on Facebook and LinkedIn. The Facebook and LinkedIn post provided users with a brief purpose for the survey and participants were asked to click the link to activate the survey. Based on

recommendations from the VCU IRB, the researcher also posted a researcher flyer to accompany the Facebook and LinkedIn post (Appendix C). Users were also asked to share the survey URL with colleagues who may not be a part of these professional groups on Facebook and LinkedIn. Upon clicking the link, participants were directed to the study surveys online information sheet that provided further details about the study and users were asked to provide informed consent to take the survey (Appendix D). Upon providing consent, participants acknowledged that they have read and understood accurate information concerning the research study and that participation in this study is completely voluntary.

The survey was divided into five sections: demographic information (9-items), DASS-21 (21-items), MBI-HSS (22-items), turnover intention (6-items), and qualitative open-ended questions (7-items). The survey consisted of a total of 65 questions, with an estimated time of completion of 10-15 minutes. The survey opened for data collection April 18, 2023, and the researcher reshared the original Facebook and LinkedIn post as a reminder on April 25, 2023, and May 2, 2023.

Prior to survey distribution, the study was submitted to the IRB at Virginia Commonwealth University. This study was submitted to the IRB as exempt research under Category two, indicating that the survey procedure will not collect any identifiable information from respondents, nor will responses put any of the participants at risk. The information sheet as well as the original Facebook and LinkedIn post informed participants that their responses would remain anonymous.

Pilot Survey. The survey was preliminarily piloted to 5 Medical Laboratory Professionals to receive feedback regarding the clarity of questions, time of completion, and structure of the survey. Respondents were asked to provide any suggestions on questions that should be added or

deleted and reasons for these suggestions (Appendix E). Feedback from pilot survey participants indicated that the survey took 10-15 minutes to complete, questions were clear, concise, and easy to understand, and the software worked well. Three of the five participants suggested that researchers should add an additional qualitative question, "*If you left the profession, where are you working now?"* The researcher reviewed the feedback from the pilot survey, and the survey was modified to add the additional qualitative question. Data collected from the pilot survey was not used in the final analysis.

Quantitative Data Analysis

Data was directly exported from REDCap into the Statistical Package for Social Sciences (SPSS) version 29 for data analysis. Data was cleaned prior to analysis based on Tabachnick and Fidell (2013) techniques. Data cleaning steps are summarized below.

1. Inspect descriptive statistics for accuracy,
2. Evaluate for the presence of missing data and make necessary corrections,
3. Check pairwise plots for nonlinearity and heteroscedasticity,
4. Identify nonnormal variables and outliers and take corrective action, if necessary,
5. Identify and deal with multivariate outliers,
6. Evaluate variables for multicollinearity and singularity (Tabachnick & Fidell, 2013).

Any participant with missing data was excluded from the data analysis. Missing data referred to any participant who did not complete sections 1 through 4 of the survey. Upon inspection of the data, it was found that 221 participants accessed the survey; however, 45 did not complete sections 1 through 4 in its entirety and thus were excluded from the survey. This data cleaning step yielded a sample size of 176 participants. Initial analysis of the data found that the data was nonlinear and not heteroscedastic. The data was also not normally distributed, and thus

nonparametric testing was used. There were no multivariate outliers and no multicollinearity found.

Both descriptive and inferential statistics were used to analyze data in this research study. Statistical techniques varied based on the proposed research questions. Research question 1 is exploratory in nature and examined the prevalence of psychological distress, burnout, and turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic. Due to the nature of this research question, descriptive statistics were used to analyze this research question. Descriptive statistics describes subjects in terms of variables (Tabachnick & Fidell, 2013). Research question 2 examined if there are differences in psychological distress, burnout, and turnover intention based on demographic variables. To answer this research question, a series of nonparametric testing (Kruskal Wallis, Mann Whitney U, and Spearman correlation) was used. Nonparametric tests are used when data is not normally distributed, which was the case with this study (Nahm, 2016). The appropriate nonparametric test was selected based on variable type. Research question 3 sought to answer whether psychological distress and burnout are predictors of turnover intention. This question was answered using binary logistic regression. Binary logistic regression is used when multiple independent variables predict membership of one dichotomous dependent variable (Tabachnick & Fidell, 2013). Research questions and associated statistical methods are summarized in Table 3.

Table 3

Research Questions and Associated Statistical Methods

Research Question	**Statistical Procedure**
RQ1: What is the prevalence of self-reported psychological distress and burnout amongst	Descriptive Statistics

Research Question	Statistical Procedure
Medical Laboratory Professionals during the COVID-19 pandemic?	
RQ2: Does self-reported psychological distress, burnout, and turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic differ based on demographic variables?	Nonparametric Testing: Kruskal Wallis Mann Whitney U Spearman Correlation
RQ3: Are self-reported psychological distress and burnout predictors of turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic?	Binary Logistic Regression

Quantitative Study Validity

Study validity refers to the extent to which inferences made in a study are accurate and that instruments measure what they are intended to measure (Polit & Beck, 2017). Internal validity refers to whether the study design, conduct, and analysis can answer the research questions without bias; whereas external validity refers to whether the observed results can be generalized to other settings or samples (Andrade, 2018). Due to the nature of this study, there are several threats to validity that need to be addressed. Table 4 summarizes the threats to validity for the quantitative strand of this study and resolutions for those threats. If threats cannot be controlled, they will be added to the limitations of this study. Due to the use of reliable and validated testing instruments, threats to measurement validity are not a concern.

Table 4

Threats to Validity for Quantitative Strand

Threats to Validity	Design Aspect	Control
External Validity		
Representativeness	Convenience sampling may not allow for a representative population. Also, the survey will be limited to those who have access to the internet, and social media platforms, Facebook and LinkedIn.	The survey was disbursed to MLPs across the entire country via professional Facebook and LinkedIn groups. The study utilized a snowball sampling method, to increase representativeness and to target those who may not have access to Facebook and LinkedIn.
Self-selection bias	MLPs who participate in the study may be different from those who do not participate in the study.	Reported in study limitations.
Statistical Conclusion Validity		
Low Statistical Power	Inadequate survey responses.	Reported in study limitations.

Qualitative Data Analysis

The qualitative data analysis was conducted based on guidance from Creswell & Creswell (2018). There are six steps to follow when performing a qualitative analysis, and those steps are summarized below.

1. Organize and transcribe data for analysis,
2. Read through all data,
3. Begin coding process,
4. Generate a description of categories and themes,
5. Advance how the description and themes will be represented,
6. Interpret the meaning of the data (Creswell & Creswell, 2018).

There was no need to transcribe QUAL data prior to exporting from REDCap, because study participants typed their responses to the qualitative questions directly into the online survey. All QUAL data was extracted from the REDCap survey and entered verbatim into MaxQDA Plus for coding and data analysis. QUAL data was analyzed using inductive content analysis, which refers to producing a summary of the content received from the qualitative questions (Vears & Gillam, 2022). Data was coded, sorted, and analyzed as themes emerged from the content of the responses to the open-ended QUAL questions. The descriptions and themes that emerged from the data analysis were organized and illustrated in a conceptual map.

Trustworthiness

Trustworthiness in qualitative research is parallel to reliability and validity in quantitative research (Lincoln & Guba, 1985). Trustworthiness is necessary to instill confidence in the data and analyses of qualitative research (Polit & Beck, 2017). Lincoln and Guba (1985) utilize four

criteria when assessing trustworthiness of a study: credibility, dependability, confirmability, and transferability. Credibility is the confidence in the truth of the data and interpretations, dependability is the stability of data over time, confirmability refers to congruency between people about the accuracy of the data, and transferability is the extent to which findings can be applicable to other settings and/or groups (Lincoln & Guba, 1985; Polit & Beck, 2017).

One method to ensure credibility is through triangulation. Triangulation refers to using multiple methods or data sources to establish identifiable patterns (Patton, 1999; Carter et al., 2014). This study incorporated triangulation by using multiple data sets to establish findings and by using multiple methods for data collection (QUAL + QUAN); thus, establishing credibility. The concept of transferability was achieved by providing thick description of the participants and the research process (Korstjens & Moser, 2017). Dependability and confirmability can both be achieved by performing an audit trail. The audit trail describes in detail the steps taken from the start of the research project to the reporting of the research findings, providing transparency of the research process (Korstjens & Moser, 2017). This dissertation served as an audit trail of the research path for this study and established dependability and confirmability.

Another method to increase trustworthiness of a qualitative study is by enhancing intercoder reliability. Intercoder reliability refers to the extent to which different coders agree on how to code the same data (Cheung & Tai, 2021). Intercoder reliability can help convince diverse audiences of trustworthiness of a study (O'Connor & Joffe, 2020). Based on these recommendations, a second coder was used to increase intercoder reliability and further establish trustworthiness.

Mixed Method Integration

Data obtained from both the QUAN and QUAL databases were integrated using the side-by-side comparison approach. The side-by-side comparison allows researchers to first report the quantitative results, followed by the qualitative findings (or vice versa) that corroborate or contradict the statistical results (Creswell & Creswell, 2018). This approach was applied in the discussion section of this dissertation. The side-by-side comparison produced a more comprehensive view of how Medical Laboratory Professionals have experienced and coped with psychological distress, burnout, and morale issues within their facility and how these issues have impacted turnover intention in the Medical Laboratory.

Chapter Summary

Chapter III provided details on the overall research plan of this study. This chapter included details on the research design, population and sample, sample size, power analysis, eligibility criteria, study variables and measurements, plans for data collection and data analysis, and potential threats to study validity. Chapter IV will provide the results produced by the study.

Chapter IV: Results

Chapter Overview

Chapter IV provides the results from both the quantitative and qualitative arms of the study. The chapter opens with a brief review of data collection methods and data cleaning for the study. Descriptive statistics relating to the sample of participants are reported, followed by the presentation of results from the quantitative arm of the study. Lastly, results from the qualitative arm are presented and emerging themes are identified based on responses to the qualitative survey questions. The chapter ends with a summary of results found from the convergent mixed methods study.

Data Collection Review

Upon IRB approval, the online survey was disseminated to Medical Laboratory Professionals who were members of Medical Laboratory professional Facebook and LinkedIn groups. The initial post sharing the survey link was opened on April 18, 2023, with a reshare reminders occurring on April 25, 2023 and May 2, 2023. Data collection ended on May 7, 2023, and the survey was closed in REDCap. The survey was accessed by a total of 221 participants who met the eligibility criteria. Due to incomplete survey responses, only 176 were used in the data analysis.

Data Cleaning Review

Data was exported directly from REDCap into IBM SPSS 29 software. Participant responses were examined for missing values. Any participant with missing data was excluded from the data analysis. Missing data referred to any participant who did not complete sections 1 through 4 of the survey. A total of 221 respondents accessed the survey and 45 were found to

have closed the survey without completing sections 1-5 in their entirety; thus, they were omitted from the data analysis.

Quantitative Results

Descriptive Statistics

Tables 5, 6, and 7 summarize the sociodemographic and job-related characteristics of the Medical Laboratory Professionals who participated in this study.

Personal Characteristics. The total number of participants used for the data analysis was 176 Medical Laboratory Professionals. Notably, 84.7% (*n* =149) of Medical Laboratory Professionals in this study identified as female. Most of the participants, 78.4% (*n* =138) identified as White and 94.3% (*n* =166) not Hispanic or Latino. The age of participants ranged from 23 to 73 years, with the mean age of the sample being 45.10 (*SD* = 12.41). The state of residence demographic revealed that participants were distributed throughout the United States. Of note, 13.1% resided in Pennsylvania (*n* = 23), 13.1% in Virginia (*n* = 23), 6.8% in Florida (*n* = 12), 6.3% in New York (*n* = 11), 5.7% in Georgia (*n* = 10), and 5.7% resided in Texas (*n* = 10). The highest level of education completed by 53.4% (*n* = 94) participants in this study was a Bachelor's degree, while 31.3% (*n* = 55) reported having obtained a Master's degree.

Job Characteristics. Medical Laboratory participants were asked to provide information relating to job-related characteristics during the COVID-19 pandemic (Tables 6 and 7). Of note, 84.1% (*n* = 148) of the participants in this study reported working in a hospital, while 6.8% (*n* = 12) worked in a reference laboratory. Within this sample, 5.1% (*n* = 9) reported "Other" as their laboratory work sector. The participants in this study also provided their job titles during the COVID-19 pandemic, 96 (54.5%) reported holding a title of MLS/CLS/MT, 20 (11.4%) held a

title of MLT/CLT, 44 (25.0%) reported working as a Supervisor/Manager, 6 (3.4%) worked at the director level, and 10 (5.7%) described their job title as “Other”. The years of work experience for this sample ranged from 2 to 50, with the mean years of work experience being 19.23 (*SD* = 12.66).

Table 5

Personal Characteristics of Participants

Characteristics	N	Percent
Sex		
Female	149	84.7
Male	27	15.3
Highest Level of Education Completed		
Associate	19	10.8
Bachelor	94	53.4
Master	55	31.3
Doctorate	8	4.5
Race		
American Indian/Alaska Native	2	1.1
Asian	10	5.7
Black or African American	17	9.7
Native Hawaiian or Other Pacific Islander	2	1.1
White	138	78.4
More Than One Race	7	4.0
Ethnicity		
Hispanic or Latino	10	5.7
Not Hispanic or Latino	166	94.3
State		
Alabama	1	0.6
Alaska	2	1.1
Arizona	3	1.7
Arkansas	1	0.6
California	5	2.8
Colorado	1	0.6
Connecticut	0	0.0
Delaware	0	0.0
Florida	12	6.8
Georgia	10	5.7
Hawaii	1	0.6
Idaho	0	0.0
Illinois	2	1.1

Indiana	4	2.3
Iowa	1	0.6
Kansas	0	0.0
Kentucky	2	1.1
Louisiana	1	0.6
Maine	0	0.0
Maryland	5	2.8
Massachusetts	3	1.7
Michigan	1	0.6
Minnesota	5	2.8
Mississippi	1	0.6
Missouri	3	1.7
Montana	0	0.0
Nebraska	3	1.7
Nevada	1	0.6
New Hampshire	0	0.0
New Jersey	5	2.8
New Mexico	0	0.0
New York	11	6.3
North Carolina	9	5.1
North Dakota	0	0.0
Ohio	9	5.1
Oklahoma	2	1.1
Oregon	2	1.1
Pennsylvania	23	13.1
Rhode Island	2	1.1
South Carolina	2	1.1
South Dakota	1	0.6
Tennessee	3	1.7
Texas	10	5.7
Utah	1	0.6
Vermont	0	0.0
Virginia	23	13.1
Washington	2	1.1
West Virginia	1	0.6
Wisconsin	2	1.1
Wyoming	0	0.0

Table 6

Job-Related Characteristics of Participants

Job-Related Characteristics	N	Percent
Laboratory Work Sector		

Hospital	148	84.1
Public Health	2	1.1
Reference	12	6.8
Private Practice	5	2.8
Other	9	5.1
Job Title		
MLS/CLS/MT	96	54.5
MLT/CLT	20	11.4
Supervisor/Manager	44	25.0
Director	6	3.4
Other	10	5.7

Table 7

Mean Participant Characteristics

Characteristics	Min.	Max.	Mean	SD
Age	23	73	45.1	12.4
Years of Experience	2	50	19.2	12.7

Hypothesis Testing

Research Question 1

The specific aim for research question 1 was to establish the prevalence of psychological distress, burnout, and turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic. Psychological distress, burnout, and turnover intention were measured by the DASS-21, MBI-HSS, and the TIS-6 respectively. The following hypotheses were tested using descriptive statistics.

$H1_a$: Medical Laboratory Professionals will report higher than normal levels of self-reported stress during the COVID-19 pandemic.

$H1_b$: Medical Laboratory Professionals will report higher than normal levels of self-reported anxiety during the COVID-19 pandemic.

$H1_c$: Medical Laboratory Professionals will report higher than normal levels of self-reported depression during the COVID-19 pandemic.

$H1_d$: Medical Laboratory Professionals will report higher than normal levels of emotional exhaustion during the COVID-19 pandemic.

$H1_e$: Medical Laboratory Professionals will report higher than normal levels of depersonalization during the COVID-19 pandemic.

$H1_f$: Medical Laboratory Professionals will report lower levels of personal accomplishment during the COVID-19 pandemic.

$H1_g$: Medical Laboratory Professionals will report a desire to contribute to turnover during the COVID-19 pandemic.

DASS-21. Medical Laboratory participants were asked to respond to questions on the DASS-21. The DASS-21 separately measures the emotional states of stress, anxiety, and depression on three scales. Each scale consists of 7 questions, and scores were calculated by summing total scores for each scale. Because the DASS-21 is the shortened version of the DASS-42, total summation scores for each scale were multiplied by 2. Notably, scales are not combined to form a composite DASS-21 score. The conventional severity labels for the DASS-21 scales are normal, mild, moderate, severe, and extremely severe. Table 8 presents the mean DASS-21 scores of the participants of this study on each scale, and the recommended cutoff scores for conventional severity labels. Table 9 summarizes the total number of participants that fell into each category on the DASS-21.

The overall score of respondents for the stress scale ranged from 0 to 42, with the mean stress score being 17.75 (SD = 11.60), which is considered “Mild”. The overall score for

participants on the anxiety scale ranged from 0 to 36 with a mean anxiety score of 9.18 (*SD* = 8.81), which falls into the "Mild" category. The overall score for participants on the depression scale ranged from 0 to 42 with a mean depression score of 12.62 (*SD* = 10.74), which is considered "Mild".

Table 8

DASS-21 Mean Scale Scores

Scale	Min.	Max.	Cutoff Scores	Mean	SD
Stress	0	42	Normal (0-14) Mild (15-18) Moderate (19-25) Severe (26-33) Extremely Severe (34+)	17.8	11.6
Anxiety	0	36	Normal (0-7) Mild (8-9) Moderate (10-14) Severe (15-19) Extremely Severe (20+)	9.2	8.8
Depression	0	42	Normal (0-9) Mild (10-13) Moderate (14-20) Severe (21-27) Extremely Severe (28+)	12.6	10.7

Table 9

Total Stress, Anxiety, and Depression Frequencies

Scale	Frequency	Percent
Stress		
Normal	78	44.3
Mild	24	13.6
Moderate	24	13.6
Severe	26	14.8
Extremely Severe	24	13.6
Anxiety		
Normal	95	54.0
Mild	11	6.3
Moderate	32	18.2
Severe	10	5.7
Extremely Severe	28	15.9
Depression		
Normal	81	46.0
Mild	19	10.8
Moderate	31	17.6
Severe	25	14.2
Extremely Severe	20	11.4

MBI-HSS. Respondents were asked to answer 22 questions on the MBI-HSS. The MBI-HSS separately measures burnout across the three subscales emotional exhaustion, depersonalization, and personal accomplishment. The emotional exhaustion subscale contained 9 items, the depersonalization subscale contained 5 items, and the personal accomplishment subscale contained 8 items. Subscale scores were calculated by taking the average rating for each subscale. Higher scores on the emotional exhaustion and depersonalization subscales are associated with higher burnout symptoms, whereas higher scores on the personal accomplishment subscale are associated with lower symptoms of burnout. Burnout symptoms for the MBI-HSS can be categorized as high, moderate, and low. Table 10 summarizes the mean

burnout scores for the participants in this study, as well as the categorizations. Table 11 summarizes the total number of participants that fell into each category on the MBI-HSS.

The overall respondent score for the emotional exhaustion subscale ranged from 0 to 6 with a mean of 3.60 (*SD* = 1.53), falling into the category of "high". The participant scores on the depersonalization subscale ranged from 0 to 6 and was categorized as "moderate" with a mean score of 1.89 (*SD* = 1.45). Respondents scored at a low level on the personal accomplishment subscale, with scores ranging from 1 to 6 and a mean score of 3.44 (*SD* = 1.02).

Table 10

MBI-HSS Mean Subscale Scores

Subscale	Min.	Max.	Categorization	Mean	SD
Emotional Exhaustion	0	6	High Moderate Low	3.6	1.5
Depersonalization	0	6	High Moderate Low	1.9	1.4
Personal Accomplishment	1	6	High Moderate Low	3.4	1.0

Table 11

Emotional Exhaustion, Depersonalization, and Personal Accomplishment Score Frequencies

Scale	Frequency	Percent
Emotional Exhaustion		
Low	25	14.2
Moderate	34	19.3
High	117	66.5
Depersonalization		
Low	66	37.5
Moderate	55	31.3
High	55	31.3
Personal Accomplishment		
Low	119	67.6
Moderate	44	25.0
High	13	7.4

TIS-6. Respondents were asked to answer questions on the TIS-6. The TIS-6 measured participants' desire to stay or a desire to leave their position. A composite score of greater than 18 indicated a desire to leave, whereas a score of 18 or less indicated a desire to stay within the organization. Binary variables for the TIS-6 were computed and transformed based off the composite score. Tables 12 and 13 present the descriptive results of the responses to the TIS-6. The histogram presented in Figure 4 indicates that the responses of the participants to turnover intention were skewed left. The overall respondent score for turnover intention ranged from 8 to 30, with a mean score of 20.16 (SD = 5.18). Notably, 64.8% (n = 114) of participants indicated a desire to leave their position.

Table 12

Turnover Intention Mean Score

Measurement	Min.	Max.	Mean	SD
TIS	8	30	20.16	5.18

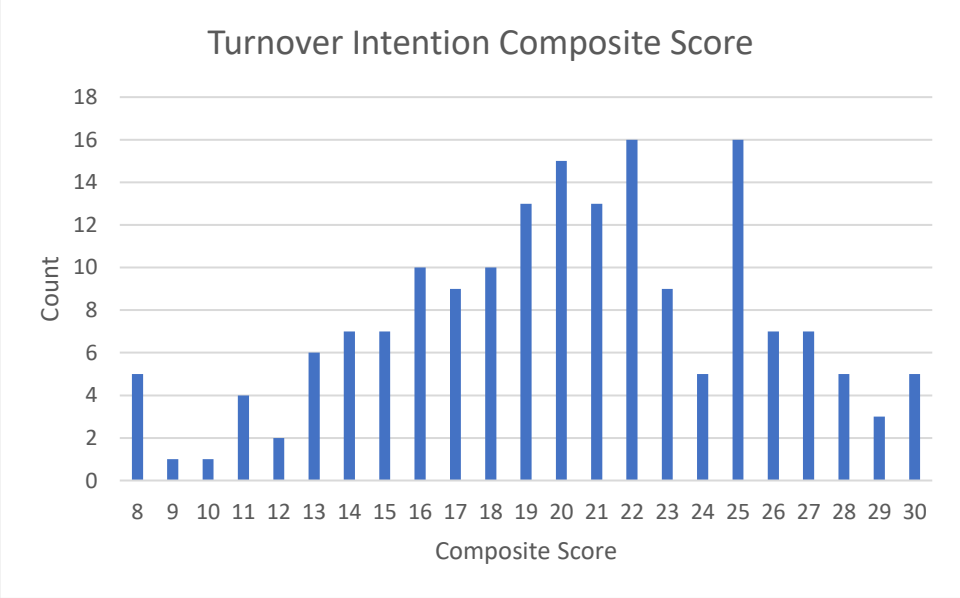
Table 13

Binary TIS- total score

Scale	Frequency	Percent
Desire to Stay	62	35.2
Desire to Leave	114	64.8

Figure 4

TIS-6 Histogram



Research Question 2

The specific aim for research question 2 was to examine whether psychological distress, burnout, and turnover intention scores differed based on demographic variables. Due to the skewness of the response variables, a variety of nonparametric tests were used to conduct the analysis of this research question. The following hypotheses were examined:

$H2_a$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and self-reported stress.

$H2_b$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and self-reported anxiety.

$H2_c$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and self-reported depression.

$H2_d$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and emotional exhaustion.

$H2_e$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and depersonalization.

$H2_f$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and personal accomplishment.

$H2_g$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and turnover intention.

Psychological Distress

Separate Kruskal-Wallis tests were used to analyze the relationship between education, race, work sector, and job title with stress, anxiety, and depression of Medical Laboratory Professionals during the COVID-19 pandemic (Table 14). To assess the relationships between sex and ethnicity with stress, anxiety, and depression, individual Mann Whitney U tests were conducted, and the results are summarized in Table 15. Finally, to assess the relationship between age and years of experience of Medical Laboratory Professionals during the COVID-19 pandemic with stress, anxiety, and depression, separate Spearman's Rho correlations were performed.

Stress. Results from the Kruskal-Wallis test revealed that there was a significant relationship χ^2 (5, N = 176) =14.21, p = .015, found between race and stress of Medical Laboratory Professionals during the COVID-19 pandemic. Spearman's Rho correlations indicated there were significant weak negative associations found between age and stress, r_s = -.17, p = .023, and years of experience and stress r_s = -.22, p = .003. A Mann Whitney U test indicated that there were no significant relationships found between sex and stress and ethnicity and stress.

Anxiety. Results from the Kruskal-Wallis test yielded that there were no significant relationships found between education, race, work sector, and job title with anxiety. Spearman's Rho correlations indicated that there were significant weak negative associations found between age and anxiety, r_s = -.22, p = .004, and years of experience and anxiety, r_s = -.28, p < .001. Notably, a Mann Whitney U test indicated that there were no significant relationships found between sex, ethnicity, and anxiety.

Depression. Results from the Kruskal-Wallis test revealed that there was a significant relationship χ^2 (5, N = 176) =11.92, p = .036, found between race and depression of Medical Laboratory Professionals during the COVID-19 pandemic Spearman's Rho correlations indicated that there were significant weak negative associations found between age and depression, r_s = -.22, p = .003, and years of experience and depression, r_s = -.28, p < .001. Of note, a Mann Whitney U test yielded that there were no significant relationships found between sex and depression and ethnicity and depression.

Table 14

Kruskal-Wallis for Psychological Distress

Variable	χ^2	Df	*p*-value
Stress			
Education	.870	3	.833
Race	14.21	5	.015*
Work Sector	4.85	4	.303
Job Title	1.02	4	.907
Anxiety			
Education	4.51	3	.211
Race	8.14	5	.149

Work Sector	8.57	4	.073
Job Title	6.17	4	.187
Depression			
Education	3.89	3	.274
Race	11.92	5	.036*
Work Sector	2.69	4	.611
Job Title	2.19	4	.700

*****Significant at the 0.05 level

Table 15

Mann-Whitney U Results for Psychological Distress

Variable	Median	*p*-value
Stress		
Sex		.058
Male	12.00	
Female	18.00	
Ethnicity		.845
Hispanic or Latino	19.00	
Not Hispanic or Latino	16.00	
Anxiety		
Sex		.193
Male	6.00	
Female	6.00	
Ethnicity		.204
Hispanic or Latino	11.00	
Not Hispanic or Latino	6.00	
Depression		
Sex		.149
Male	6.00	

Female	10.00	
Ethnicity		.906
Hispanic or Latino	12.00	
Not Hispanic or Latino	10.00	

Burnout

Separate Kruskal-Wallis tests were used to analyze the relationship between education, race, work sector, and job title with burnout scales of Medical Laboratory Professionals during the COVID-19 pandemic (Table 16). To assess the relationships between sex and ethnicity with burnout, a Mann Whitney U test was performed (Table 17). Finally, to assess the relationship between age and years of experience of Medical Laboratory Professionals during the COVID-19 pandemic with burnout, separate Spearman's Rho correlations were performed.

Emotional Exhaustion. A Kruskal-Wallis test did not reveal any statistically significant relationships between education, race, work sector, or job title and emotional exhaustion. Of note a Mann Whitney U test, $U = 14.50$, z = -2.12, $p = .034$ indicated that there was a statistically significant difference found between males (*Median* = 3.22) and females (*Median* = 4.00) Medical Laboratory Professionals emotional exhaustion scores during the COVID-19 pandemic. Spearman's rho correlations yielded that there were significant weak negative relationships between age and emotional exhaustion, $r_s = -.17$, $p = .022$, and years of experience and emotional exhaustion, $r_s = -.22$, $p = .004$.

Depersonalization. Individual Kruskal-Wallis tests revealed that there were no significant relationships between education, race, work sector, or job title and depersonalization. Mann-Whitney U tests indicated that there were no significant relationships found between sex

and depersonalization, and ethnicity and depersonalization. Spearman's rho correlations indicated that there were significant weak negative relationships between age and depersonalization, r_s = -.17, p = .026, and years of experience and depersonalization, r_s = -.17, p = .027.

Personal Accomplishment. Notably, no variables of interest exhibited a statistically significant relationship with personal accomplishment.

Table 16

Kruskal-Wallis for Burnout

Variable	χ^2	Df	*p*-value
Emotional Exhaustion			
Education	1.50	3	.683
Race	9.12	5	.105
Work Sector	1.37	4	.850
Job Title	1.07	4	.899
Depersonalization			
Education	3.87	3	.275
Race	4.99	5	.417
Work Sector	2.40	4	.663
Job Title	.422	4	.981
Personal Accomplishment			
Education	2.15	3	.542
Race	3.14	5	.679
Work Sector	1.12	4	.891
Job Title	6.46	4	.167

Table 17

Mann-Whitney U Results for Burnout

Variable	Median	p-value
Emotional Exhaustion		
Sex		.034*
Male	3.22	
Female	4.00	
Ethnicity		.319
Hispanic or Latino	3.22	
Not Hispanic or Latino	3.94	
Depersonalization		
Sex		.516
Male	1.60	
Female	1.80	
Ethnicity		.313
Hispanic or Latino	1.40	
Not Hispanic or Latino	1.70	
Personal Accomplishment		
Sex		.069
Male	3.75	
Female	3.38	
Ethnicity		.290
Hispanic or Latino	3.81	
Not Hispanic or Latino	3.38	

*Significant at the 0.05 level

Turnover Intention

Separate Chi-square tests of independence were calculated to examine the relationship between sex, education, race, ethnicity, work sector, and job title with turnover intention of

Medical Laboratory Professionals during the COVID-19 pandemic. With an alpha level set at 0.05, results from the Chi-square tests of independence showed that there were no statistically significant differences amongst sex, education, race, ethnicity, work sector, and job title on turnover intention of Medical Laboratory Professionals. Table 18 summarizes the results from the Chi-square.

Table 18

Chi-square contingency table with demographic variables and turnover intention

Demographic Variable	Desire to Stay	Desire to Leave	χ^2	*p*
	n	*n*		
Sex			2.33	.127
Male	13	14		
Female	49	100		
Education			.436	.933
Associate	7	12		
Bachelor	34	60		
Master	19	36		
Doctorate	2	6		
Race			2.50	.777
American Indian/Alaska Native	1	1		
Asian	5	5		
Native Hawaiian or Other Pacific Islander	1	1		
White	49	89		
More Than One Race	2	5		
Black or African American	4	13		
Ethnicity			1.014	.314

Hispanic or Latino	5	5		
Not Hispanic or Latino	57	109		
Work Sector			.275	.991
Hospital	52	96		
Public Health	1	1		
Reference	4	8		
Private Practice	2	3		
Other	3	6		
Job Title			2.547	.636
MLS/CLS/MT	34	62		
MLT/CLT	7	13		
Supervisor/Manager	18	26		
Director	1	5		
Other	2	8		

Separate Mann Whitney U tests were performed to examine the relationship between age and years of experience with turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic. Results from both Mann Whitney U models yielded that there were no significant differences found in age and years of experience on turnover intention of Medical Laboratory Professionals, with an alpha level set at 0.05. Table 19 provides a summary of the Mann Whitney U results.

Table 19

Mann Whitney U Analyzing the Association of Age and Years of Experience with Turnover Intention

Variable	Median	*p*-value
Age	44.0	.242

Years of Experience	16.0	.132

Research Question 3

The specific aim for research question 3 was to investigate whether psychological distress and burnout were predictors of turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic.

$H3_a$: There is a predictive relationship between self-reported stress and turnover intention.

$H3_b$: There is a predictive relationship between self-reported anxiety and turnover intention.

$H3_c$: There is a predictive relationship between self-reported depression and turnover intention.

$H3_d$: There is a predictive relationship between emotional exhaustion and turnover intention.

$H3_e$: There is a predictive relationship between depersonalization and turnover intention.

$H3_f$: There is a predictive relationship between personal accomplishment and turnover intention.

Psychological Distress

Binary logistic regression was used to investigate if there was a relationship between stress, anxiety, and depression separately with the likelihood of turnover intention. Prior to performing binary logistic regression, the following assumptions were assessed: 1) the dependent

variable must be discrete, 2) there should be no major outliers in the data, and 3) there should be no high intercorrelations (multicollinearity). All assumptions were checked, and there were none found to be violated. Each model was adjusted for age, sex, race, ethnicity, and highest level of education achieved. The reference group for psychological distress were those who fell into the category of "Normal" for stress, anxiety, and depression. Due to the small number of subjects who fell into the categories of "Severe" and "Extremely Severe" for anxiety, the categories were collapsed to create one category for the logistic regression analysis. Table 20 summarizes the results of the binary logistic regression models.

Stress. The overall model for stress was statistically significant, χ^2 (9, N = 176) = 53.39, p = <.001. The odds that turnover intention will occur in those presenting with stress is 1.13 times more likely than those who are not stressed. Notably, as the severity level of stress increased, the odds of turnover intention also increased. The overall model for the severity levels of stress was statistically significant, χ^2 (12, N = 176) = 47.43, p = <.001. Those reporting extremely severe levels of stress are 35.44 times more likely to exhibit turnover intention than those who have normal levels of stress. Overall stress and all severity levels of stress were statistically significant at predicting turnover intention amongst participants.

Anxiety. Anxiety was also a significant predictor of turnover intention, χ^2 (9, N = 176) = 19.89, p = .019. The likelihood of turnover intention increased by 1.08 for those exhibiting anxiety, as compared to those who do not have anxiety. The overall model for the severity levels of anxiety was statistically significant, χ^2 (11, N = 176) = 20.20, p = <.043. Severe/Extremely severe anxiety was also found to be a statistically significant predictor of turnover intention (OR = 5.31, 95% CI = 1.78 – 15.89). Of note, mild anxiety and moderate anxiety were not significant predictors of turnover intention.

Depression. Depression was also found to be a significant predictor of turnover intention amongst Medical Laboratory Professionals, χ^2 (9, N = 176) = 46.02, p = <.001. Notably, all severity levels of depression were also found to be significant predictors of turnover intention, χ^2 (12, N = 176) = 47.48, p = <.001. As the level of severity level of depression increased, so did the odds of turnover intention.

Table 20

Logistic Regression Predicting the Likelihood of Turnover Intention from Psychological Distress

Predictor	Odds Ratio	95% Confidence Intervals	p-value
Stress[1]	1.13	[1.08, 1.18]	<.001*
Normal	REF	REF	REF
Mild	3.00	[1.09, 8.26]	.033***
Moderate	7.38	[2.16, 25.20]	.001*
Severe	12.22	[3.20, 46.73]	<.001*
Extremely Severe	35.44	[4.35, 288.74]	<.001*
Anxiety[1]	1.08	[1.03, 1.14]	<.001*
Normal	REF	REF	REF
Mild	.55	[.15, 1.99]	.360
Moderate	1.65	[.68, 4.03]	.272
Severe/Extremely Severe	5.31	[1.78, 15.89]	.003*
Depression[1]	1.13	[1.08, 1.19]	<.001*
Normal	REF	REF	REF
Mild	6.19	[1.78, 21.56]	.004**
Moderate	6.59	[2.27, 19.14]	<.001*
Severe	11.55	[3.07, 43.39]	<.001*
Extremely Severe	30.72	[3.76, 251.14]	.001*

Adjusted for age, sex, race, ethnicity, and high level of education achieved.
[1]Continuous average score
*Significant at the .001 level
**Significant at the .01 level
***Significant at the .05 level

Burnout

Binary logistic regression was also used to investigate if there was a relationship between emotional exhaustion, depersonalization, and personal accomplishment separately with the likelihood of turnover intention. Each model was adjusted for age, sex, race, ethnicity, and highest level of education achieved. The reference group for burnout were those who fell into the category of "Low" for the three dimensions of burnout. Table 21 summarizes the binary logistic regression results for Medical Laboratory Professionals on the category of burnout.

Emotional Exhaustion. The overall model for emotional exhaustion was found to be statistically significant, χ^2 (9, N = 176) = 70.79, p = <.001. The likelihood for turnover intention increased by 2.96 for those exhibiting symptoms of emotional exhaustion, as compared to those who did not. The overall model for severity level of emotional exhaustion was also found to be statistically significant, χ^2 (10, N = 176) = 53.13, p = <.001. Notably, as the severity level of emotional exhaustion increased, so did the odds of turnover intention. Medical Laboratory Professionals exhibiting high levels of emotional exhaustion (OR = 28.73, 95% CI = 7.99 - 103.28) had greater odds of turnover intention than those who had low levels of emotional exhaustion.

Depersonalization. The overall model for depersonalization and turnover intention was found to be significant, χ^2 (9, N = 176) = 44.68, p = <.001. Depersonalization was found to be a statistically significant predictor of turnover intention. The odds of a Medical Laboratory

Professional experiencing depersonalization contributing to turnover intention increased by 2.46 as compared to those who do not exhibit this symptom. The overall model for severity level of depersonalization was statistically significant, χ^2 (10, N = 176) = 49.75, p = <.001.

Personal Accomplishment. The overall model for personal accomplishment being a predictor for turnover intention was not statistically significant, χ^2 (9, N = 176) = 7.60, p = <.575. The overall model for the severity level of personal accomplishment was also not a statistically significant predictor for turnover intention, χ^2 (10, N = 176) = 11.57, p = <.315. Of note, the higher the level of personal accomplishment, the less likely that participants would contribute to turnover intention.

Table 21

Logistic Regression Predicting the Likelihood of Turnover Intention from Burnout

Predictor	Odds Ratio	95% Confidence Intervals	*p*-value
Emotional Exhaustion[1]	2.96	[2.13, 4.12]	<.001*
Low	REF	REF	REF
Moderate	4.18	[1.05, 16.57]	.042**
High	28.73	[7.99, 103.28]	<.001*
Depersonalization[1]	2.46	[1.75, 3.46]	<.001*
Low	REF	REF	REF
Moderate	5.19	[2.27, 11.89]	<.001*
High	20.32	[6.67, 61.84]	<.001*
Personal Accomplishment[1]	.85	[.62, 1.17]	.312
Low	REF	REF	REF
Moderate	.98	[.46, 2.10]	.953

High	.24	[.06, .90]	.034**

Adjusted for age, sex, race, ethnicity, and high level of education achieved.
[1]Continuous average score
*Significant at the .001 level
**Significant at the .05 level

Qualitative Results

Qualitative data was collected using open-ended questions at the end of the survey. Participants who completed the quantitative survey were also the same subjects who participated in the qualitative data collection. Completing the open-ended qualitative questions was optional for participants. Qualitative questions were analyzed and coded separately; however, due to the similarity of the questions overlapping themes occurred, thus qualitative questions were grouped and themed by the category of the questions (psychological distress, laboratory morale, and turnover). Qualitative data will be merged with quantitative data in the discussion section of this paper.

There was one overall qualitative research question that was measured by six open-ended qualitative questions. Open-ended question 7 explored new career paths that Medical Laboratory Professionals have taken since exiting the profession. This question did not add value to the research question, and thus was excluded from overall analysis. Responses to open-ended question 7 are summarized and displayed in Appendix F.

The specific aim for research question 4 was to assess Medical Laboratory Professionals perception of psychological distress, morale in the laboratory, and turnover intention during the COVID-19 pandemic. Based on the recommendation of Creswell & Creswell (2018), no hypotheses were formed for the qualitative portion of the study.

Qualitative Analysis

Qualitative questions one and two addressed the aspect of psychological distress. Participants were asked to respond to the following questions:

$QUAL_1$: What services are available for coping with psychological distress at your organization?

$QUAL_2$: What methods have you utilized to cope with psychological distress?

A total of 129 participants responded to $QUAL_1$ and 122 participants responded to $QUAL_2$. Five overarching themes occurred from these questions: 1) *Coping with professional supervision,* 2) *Healthy coping strategies,* 3) *Unhealthy coping strategies,* 4) *Barriers to coping,* and 5) *Contributions to turnover.* Table 22 summarizes themes and codes associated with participant responses.

Table 22

Themes Relating to Coping With Psychological Distress in the Laboratory

Themes	**Codes**
Coping With Professional Supervision	Therapy/Counseling
	Employee Assistance Programs
	Meditation
Healthy Coping Strategies	Exercise
	Religion
	Talking To/Spending Time With Loved Ones
	Hobbies
	Reducing Work Hours
	Not Taking Work Home

Unhealthy Coping Strategies	Consumption of Alcohol
	Binge-Eating
	Not Seeking Help
Barriers to Coping	Inability To Cope
	Lack of Knowledge of Services
	Not Utilizing Services
	No Services Offered
	Time Constraints
Contributions to Turnover	Quitting Job
	Changing Professions

Coping with professional supervision. To cope with psychological distress, Medical Laboratory Professionals identified several services offered by their organizations that related to coping with professional supervision. The most common service that was identified by participants was employee assistance programs. Another common service that participants identified was therapy/counseling services. A frequently reported category for psychological services offered and utilized was meditation. Notably, 15 participants identified medication as a main method utilized for coping with psychological distress.

Healthy coping strategies. Medical Laboratory Professionals identified several methods of healthy coping strategies that were utilized during the COVID-19 pandemic, with the most common strategy being exercise. Another common coping strategy that was utilized was talking to and spending time with loved ones. Several participants turned to religion and prayed to cope with psychological distress during the COVID-19 pandemic. Many participants turned to specific hobbies including puzzles, reading, listening to music, watching tv, fishing, needlework, and

gardening. Other healthy coping strategies mentioned were not taking work home and reducing work hours.

Unhealthy coping strategies. In addition to healthy coping strategies, Medical Laboratory Professionals also identified unhealthy coping strategies that were utilized during the COVID-19 pandemic. The most noted unhealthy coping strategy was the consumption of alcohol. Another unhealthy coping strategy mentioned by participants was eating/binge eating to deal with psychological distress. One participant stated, "*I haven't looked to any just try and deal on my own",* which was also coded as an unhealthy coping strategy.

Barriers to Coping. Barriers to coping included the inability to cope, lack of knowledge of services, and no services offered/utilized. Some Medical Laboratory Professionals responses to the first two qualitative questions alluded to the inability to cope due to time constraints. Some participant responses included, "*there are services available but when I am at work, I do not have time for any of these*", "*I do not have much time to focus on this. I try to make sure to get enough sleep*", and "*not enough time. by the time you get home, you would just want to rest*". Notably, one participant stated "*Let my built-up stress pour out in the form of tears on my way home from work- then lock it away. I had no time for activities to regulate my nervous system and bring peace, like walking my dog/ other things I enjoy*".

Of note, 13 Medical Laboratory Professionals responded to QUAL1 and reported that they were unsure of what services their organization offered to cope with psychological distress. Specific responses included "*No idea",* "*Not sure*", "*I think there are some, but I don't know what*", and "*I think they have some, but I'm not familiar with them or how to obtain them*".

Of the 129 responses to QUAL1, 23 participants noted that their organization did not offer any services for coping with psychological distress. Of the 122 responses to QUAL2, 10 participants did not utilize any methods to cope with psychological distress. One participant stated, "*Unfortunately, nothing but just trying to find relaxing things to do at home*".

Contribution to turnover. The theme contribution to turnover was identified by 7 Medical Laboratory Professionals. All 7 participants mentioned that they left their position. Some of the responses included, "*I changed jobs halfway through the pandemic to deal with distress*", "*I did leave my job and took on a less stressful role which helped*", and "*I left my position in 2022*". Notably, one participant highlighted that they left the profession entirely, "*I quit my job, left my profession that I loved and now work in research*".

Qualitative questions three and four addressed aspects of morale in the medical laboratory during the COVID-19 pandemic. Participants were asked to respond to the following questions about morale in the laboratory:

> *$QUAL_3$:* What interventions have been implemented within your organization to increase morale in your laboratory?
>
> *$QUAL_4$:* What interventions have been successful or unsuccessful with increasing morale in your laboratory?

A total of 117 participants responded to $QUAL_3$ and 92 responded to $QUAL_4$. Four themes emerged from the responses to the questions: 1) *Rewards and recognition,* 2) *Effective communication practices,* 3) *Supportive work environment,* and 4) *No attempts to increase morale.* Table 23 summarizes the five themes and categories associated with each theme.

Table 23

Themes Relating to Morale in the Laboratory

Themes	Codes
Rewards and Recognition	Self-Recognition
	Organization Recognition
	Gifts
	Monetary Incentives
	Parties
	Food
	Rewards Points Program
Effective Communication Practices	Meetings
	Discussions
	Open Communication
	One-on-Ones
	Daily Huddles
	Weekly Updates
Supportive Work Environment	Adequate Staffing
	Scheduling
	Teamwork
	Frequent Breaks
	Mental Health Resources
	Committees
No Attempts To Increase Morale	No Attempts Made
	No Attempts Successful

Rewards and Recognition. Medical Laboratory Professionals highlighted that during the COVID-19 pandemic, morale increased due to recognition. Recognition was given to laboratory

professionals in several forms including public recognition and recognition days from the organizations. Medical Laboratory Professionals also recognized one another as a form of "self-recognition". One response from a participant stated, "*We had an opportunity to give shout outs to coworkers and recognize one another*".

Medical Laboratory Professionals also highlighted rewards as an intervention to increase morale. Rewards included salary increases, bonuses, parties, point-based rewards program, gifts, and food. Notably, the most frequently listed reward given was monetary gifts. Specific responses included, "*We were given raises which helped*", "*A few small thank you/retention bonuses*", "…extra pay incentives- extra money for extra shifts, bonuses, raises". The majority of Medical Laboratory Professionals identified monetary gifts as a successful way to increase morale. Specifically, one response was "*Raises increase morale*".

The second most frequent reward mentioned by Medical Laboratory Professionals was food. One participant wrote, "*appreciation luncheons by the department*", another participant wrote, "*pizza parties",* while another participant stated, "*Starbucks given, lunch and breakfast*". The consensus amongst Medical Laboratory Professionals was that food was ineffective at raising morale.

Effective Communication Practices. Medical Laboratory Professionals indicated that one intervention implemented in the medical laboratory during the COVID-19 pandemic was effective communication practices. Laboratories implemented more team meetings, open discussions, daily huddles, one-on-ones, and weekly updates provided by leadership. Medical Laboratory Professionals indicated that being able to openly communicate and communicate effectively increased morale in the laboratory. One participant stated, "*The best tactic remains frequent and transparent communications*".

Supportive Work Environment. A supportive work environment pertains to Medical Laboratory Professionals getting the support that they need to accomplish their tasks and help with their wellbeing. Medical Laboratory Professionals reported many categories that fall under supportive work environment to increase laboratory morale, and they included: adequate staffing, flexible scheduling, teamwork, frequent breaks, mental health resources, and various committees. Comments from participants included, "Trying to staff, positive vibes, teamwork, use of travelers", "Ensuring employees take breaks and lunches and decrease overtime", "They have implemented an employee experience committee to boost morale", "Just supporting each other and being understanding of each other's needs. Having people to talk to at work as Covid was happening was very important as I look back", and "the most successful interventions have been around adequately staffing for redundancy and providing adequate time off".

No Attempts to Increase Morale. Of note, 54 participants responded that there have been no attempts made to increase morale in their laboratory. One participant responded to the question "*None were implemented while I was there. It was very much suck it up buttercup".* Another participant stated, "*Absolutely none. The opposite occurred. All team building exercises, leadership training and most events have been removed since COVID. No effort has been out into increasing morale*". Other responses from participants included "*None",* "*Absolutely nothing",* and "*None were attempted. It seemed the paltry resources that were in place for the lab were diverted towards the morale of other departments*".

Qualitative questions five and six set out to explore factors contributing to turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic. Participants were asked to respond to the following questions:

$QUAL_5$: What factors contributed to you leaving your organization?

$QUAL_6$: What factors contributed to you leaving the profession?

A total of 63 participants responded to $QUAL_5$ and 44 participants responded to $QUAL_6$. After coding and categorizing responses, nine themes emerged: 1) *Strife with leadership,* 2) *Dissatisfied with salary,* 3) *Importance of work life balance,* 4) *Working Conditions,* 5) *Recognition/Appreciation,* 6) *Professional development and career advancement,* 7) *Burnout,* 8) *Psychological distress,* and 9) *Personal factors.* Table 24 summarizes themes and categories relating to the qualitative questions.

Table 24

Themes Relating to Turnover in the Laboratory

Themes	**Codes**
Strife With Leadership	Poor Management
	Micromanaging
	Lack of Support
	Harassment
	Lack of Respect
	Bullying
	Favoritism
Dissatisfied With Salary	Low Pay
Importance of Work Life Balance	Flexible Scheduling
Working Conditions	Excessive Workload
	Being Overworked
	Perceived Job Demands
	Staffing Shortages
	COVID-19-Related Issues

	Depletion of Resources
	Safety Concerns
Recognition/Appreciation	Feeling Unappreciated
	Lack of Recognition
Professional Development and Career Advancement	Lack of Growth
	Lack of Fulfillment
Burnout	Feeling Burned Out
	Low Personal Accomplishment
	Overworked
Psychological Distress	Stress
	Anxiety
	Depression
Personal Factors	Age
	Relocation
	Family-Related Issues

Strife With Leadership. Medical Laboratory Professionals cited several conflicts with management which caused them to leave. Issues included lack of respect from leadership, feeling unsupported by management, being harassed by leadership, bullying, favoritism, micromanaging, and poor management. Specific quotes from participants included, "*lack of respect from management", "we did not have an effective lab leader", "newly hired, bullying discriminatory leadership from merger",* and "*being harassed by my boss".*

Dissatisfied With Salary. Of note, a recurring theme mentioned by Medical Laboratory Professionals was issues regarding compensation. Medical Laboratory Professionals cited low pay as a reason for leaving their organizations and the profession. Responses included, "*Compensation", "Money", "Poor pay", "Too much work, too little pay", "Being a traveler offered me the wage I was looking for",* and *"Travelers making 3-4x what our rank-and-file staff made".*

Importance of Work Life Balance. Seeking better work life balance was also a factor that contributed to turnover. Specific responses regarding work life balance included "*no longer wanted to work overnights, holidays, and weekends", "left to be a traveler to have more stability with regards to home life", "I left to take a position with a schedule that better fit family needs", "desired having weekends and holidays off", "poor work life balance (constantly missed weekends/holidays and could never make plans farther out than the current week", "as a supervisor, I feel the department policy on forbidding any type of work from home is outdated,* and "*I wanted to spend more time with family".*

Working Conditions. Another major factor that Medical Laboratory Professionals attributed to turnover was working conditions during the COVID-19 pandemic. Working conditions included excessive workload, perceived job demands, shortage of personnel, depletion of resources, toxic environments, safety concerns, and COVID-19 related issues. Responses from laboratorians included "*too many responsibilities for one person*", "*salaried supervisor working more than 50 hours per week to fill coverages on the off-shifts to include phlebotomy*", "*I was asked to work evening shift when I was hired for dayshift to compensate for staffing shortages*", "*working third shift involuntarily",* "*chaotic work environment*", "*inability to take PTO due to staffing issues*", and "*…ridiculously unfair and unbalanced schedule*".

Relating to safety concerns, participants mentioned, "*Safety problems and critical errors being swept under the rug*" and "*I observed many safety violations, and the hospital administration did not do anything to make it better. I will not work in a place that puts the patient's care in jeopardy*".

There were also concerns raised regarding COVID-19 guidelines and issues. One participant stated, "*Masking and COVID operational issues*", "*obsessing over COVID-19 fears*", and "*Day shift techs and phlebotomist were offered the Covid vaccine a month before night shift even though night shift were responsible for drawing all Covid patients*". Notably, one participant recounted an incident that occurred in their facility that caused them to leave, "*I left because during the vaccine mandate, my hospital was repeatedly protested by members of the community who opposed mandatory vaccination and masking. a hospital employee was shot to death at work by a patient*". Two participants also cited refusal to take the COVID vaccine as reasons for leaving their organizations.

Recognition/Appreciation. Two major themes that emerged from Medical Laboratory Professionals that contributed to them leaving their organization and profession was the lack of recognition and lack of appreciation of laboratorians in the field. Participant responses were "*Being unappreciated", "no gratitude from bosses", "the corporation does not care about its employees", "Being unappreciated by my organization led me to retire", "sense that administration did not care about the laboratory", "lab departments do not get equal treatment",* and "*the laboratory will never get the respect it deserves, despite the level of education and expertise required".*

Professional Development and Career Advancement. Another factor contributing to turnover of Medical Laboratory Professionals was the lack of growth within the field and lack of

upward mobility within the organizations. Specific responses were, "*Feeling forced to stay in my current position without the ability to move upward", "Inability to grow within my organization", "not being trained further", "lack of upward mobility",* and *"Lack of ability to grow within the profession".* One participant mentioned that they left the profession to further their education in order to obtain a better position.

Burnout. Burnout was also mentioned a major contributor to turnover by Medical Laboratory Professionals. Specific responses included, "*Burnout*", "*burnout and being overworked*", "*feeling burned out as a manager trying to hold everything together*", and "*I left after COVID completed, but I was burned out*". Another dimension of burnout that was mentioned by Medical Laboratory Professionals was low personal accomplishment. Specific responses were "*extreme lack of fulfillment*" and "*not being fulfilled*", and "*lack of ability to use my educational background*".

Psychological Distress. Medical Laboratory Professionals mentioned psychological distress being a contributing factor to them leaving their organization and/or profession during the COVID-19 pandemic. One common attribute of psychological distress that was frequently mentioned was stress. Responses included, "*Stress related to the pandemic and being an essential employee",* "*extreme stress",* "*constant stress at work, anxiety working with other burnt out/ negative people*", and "*I am highly considering getting out of this field due to constant stress".* Medical Laboratory Professionals also cited anxiety and depression as contributions to their turnover. One participant stated, "sense of hopelessness that the situation would ever improve". Notably, one participant stated, "*stress, having to be available 24/7, impact on physical and mental health, unable to sleep, losing weight, deepening depression and anxiety, panic attacks, hating coming to work, hating working with patients who wouldn't help themselves*

by masking or getting the vaccine, decreased empathy, felt like it was hopeless and nothing I did could help, actual physical response (sick to my stomach, increased heart rate, panic) to the sound of a text message from my work phone - I still have PTSD from this sound when I hear it on others phones".

Personal Factors. Some Medical Laboratory Professionals alluded to personal factors being the reason for them leaving the organization and the profession. Some of the personal factors included relocation, age (retirement), needing to be closer to family, death of a loved one, and lack of childcare during the pandemic. Specific responses from participants included "*I had trouble getting another job in my field due to my age"* and "*…the death of a loved one and subsequent actions from that".*

Chapter Summary

Chapter IV provided the results from both quantitative and qualitative analyses for this mixed methods study. Table 25 presents a summary of the quantitative research questions and associated hypotheses testing. Figure 5 highlights the overall themes that emerged from the qualitative research question.

Table 25

Quantitative Research Question Hypotheses Testing

Research Question	Hypothesis	Accepted or Rejected
1	$H1_a$: Medical Laboratory Professionals will report higher than normal levels of self-reported stress during the COVID-19 pandemic.	Accepted
1	$H1_b$: Medical Laboratory Professionals will report higher than normal levels of self-reported anxiety during the COVID-19 pandemic.	Accepted
1	$H1_c$: Medical Laboratory Professionals will report higher than normal levels of self-reported depression during the COVID-19 pandemic.	Accepted

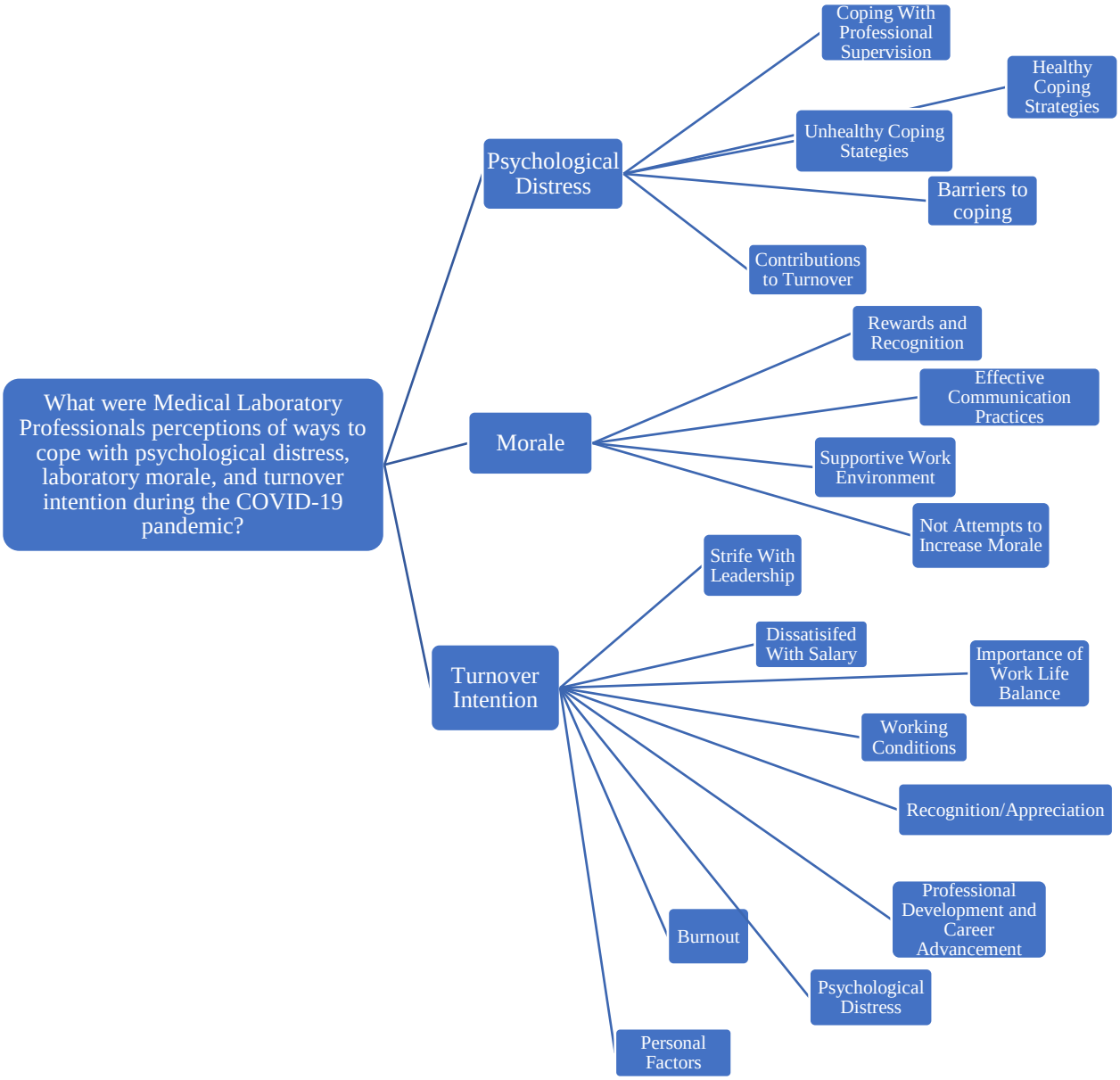
1	$H1_d$: Medical Laboratory Professionals will report higher than normal levels of emotional exhaustion during the COVID-19 pandemic.	Accepted
1	$H1_e$: Medical Laboratory Professionals will report higher than normal levels of depersonalization during the COVID-19 pandemic.	Accepted
1	$H1_f$: Medical Laboratory Professionals will report lower levels of personal accomplishment during the COVID-19 pandemic.	Accepted
1	$H1_g$: Medical Laboratory Professionals will report a desire to contribute to turnover during the COVID-19 pandemic.	Accepted
2	$H2_a$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and self-reported stress.	Accepted*
2	$H2_b$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and self-reported anxiety.	Accepted**
2	$H2_c$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and self-reported depression.	Accepted *
2	$H2_d$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and emotional exhaustion.	Accepted***
2	$H2_e$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and depersonalization.	Accepted**
2	$H2_f$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and personal accomplishment	Rejected
2	$H2_g$: There will be a statistically significant relationship between demographic variables (age, sex, race, ethnicity, highest level of education, work sector, job title, and years of experience) and turnover intention.	Rejected
3	$H3_a$: There is a predictive relationship between self-reported stress and turnover intention.	Accepted
3	$H3_b$: There is a predictive relationship between self-reported anxiety and turnover intention.	Accepted
3	$H3_c$: There is a predictive relationship between self-reported depression and turnover intention.	Accepted
3	$H3_d$: There is a predictive relationship between emotional exhaustion and turnover intention.	Accepted
3	$H3_e$: There is a predictive relationship between depersonalization and turnover intention.	Accepted

3	*$H3_f$:* There is a predictive relationship between personal accomplishment and turnover intention.	Rejected

* Only Race, Age, and Years of Experience were statistically significant
** Only Age and Years of Experience were statistically significant
*** Only Sex, Age, and Years of Experience were statistically significant

Figure 5

Emerging Themes from the Qualitative Research Question



Chapter V: Discussion

Chapter Overview

This chapter opens with a brief overview and summary of the research study and problem. Next, a discussion of research findings from the quantitative and qualitative arms of the study. Next, the mixed methods integration is discussed. Finally, the chapter concludes with limitations for the study, recommendations for future research, and an overall conclusion.

Study Overview and Summary of Problem

The COVID-19 pandemic has greatly overwhelmed the healthcare system worldwide and caused significant strain on resources. Healthcare systems have been forced to deal with shortages of space, equipment, and most importantly healthcare workers (Myers & Liu, 2022). Healthcare professionals have experienced increased workloads and staffing shortages, which in turn has led to increased physical and psychological distress (Alrawashdeh et al., 2021). The healthcare field is also experiencing a critical shortage of workers. Since the beginning of the COVID-19 pandemic, hospitals have reported a decline of approximately 105,000 employees (Hughes, 2022). Medical Laboratory Professionals are the second most in-demand allied health profession currently needed (AMN Healthcare, 2021).

The impact of the COVID-19 pandemic on frontline healthcare workers, such as nurses and physicians, have been greatly studied throughout the pandemic; however, there are limited studies analyzing the psychological well-being and turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic, and there are currently no studies in the United States analyzing these factors. This study utilizes a convergent mixed methods study to examine the factors contributing to turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic. Identifying reasons for turnover during the

current COVID-19 pandemic could mitigate turnover during the next pandemic and allow the Medical Laboratory workforce to retain employees and keep up with demand.

Interpretation of Results

Demographics. The majority of the participants in this research study were found to be white females, with an average age of 45 years. These findings are consistent with the current structure of the Medical Laboratory workforce in the United States. There is a disproportionate gender gap in the field of Medical Laboratory Science, as confirmed by biannual wage surveys conducted by ASCP. The 2021 ASCP wage survey consisted of 9,819 participants, and it was found that 83% of those participants identified as female (Garcia et al., 2022). The 2019 ASCP wage survey consisted of 19,397 participants, and 81% of respondents identified as female (Garcia et al., 2020). In addition to the Medical Laboratory workforce being predominately female, it has also historically been predominately white. Results from the 2021 and 2019 ASCP wage survey indicated that respectively, 73% and 75% of participants identified as white (Garcia et al., 2020; Garcia et al., 2022). The Medical Laboratory workforce is also aging as indicated by the ASCP wage surveys. According to the 2019 ASCP wage survey, the average age of Medical Laboratory Professionals was 42, and that age increased to 43 as reported in the 2021 ASCP wage survey (Garcia et al., 2020; Garcia et al., 2022).

Most of the respondents in this study also indicated that the highest level of education completed was a bachelor's degree, the most common work sector was the hospital, and the most common job title was MLS/CLS/MT. These findings are also consistent with the current structure of the Medical Laboratory workforce. Of the 9,819 participants sampled in the 2021 ASCP wage survey, 62% of respondents indicated that the highest level of education achieved was a bachelor's degree, 56% held a job title of MLS/MT/CLS, and 69% of respondents worked

in a hospital (Garcia et al., 2022). Results from the 2019 ASCP wage survey indicated that of the 19,397 participants, the highest level of education achieved was a bachelor's degree (59%), 51% held a job title of MLS/MT/CLS, and 70% worked in a hospital (Garcia et al., 2020).

Findings from the two most recently published ASCP wage surveys shed light on the current structure and demographics of the Medical Laboratory workforce in the United States. Results from the demographic data collected in the present research study are consistent with the current trend of Medical Laboratory Professionals in the United States. Though the present study was conducted on a smaller scale (N = 176), the results reflected what has been found in previous studies.

Research Question 1. *What is the prevalence of self-reported psychological distress and burnout amongst Medical Laboratory Professionals during the COVID-19 pandemic?*

The findings revealed that based on overall scores from the DASS-21, participants in this study were categorized as "mild" on the severity scale for all three domains of psychological distress: stress, anxiety, and depression, deviating from the baseline category of "normal". These findings indicate that during the COVID-19 pandemic, Medical Laboratory Professionals experienced psychological distress at a level that deviated from the normal reference range, as indicated by the severity scale of the DASS-21.

The findings from this study are consistent with those in the literature reviewing prevalence psychological distress amongst other healthcare professionals during the COVID-19 pandemic. Que et al. (2020) found that during the COVID-19 pandemic, healthcare workers in China experienced anxiety and depression at a mild level, which is consistent with what Medical Laboratory Professionals experienced in the United States, based on the current study.

Akova et al. (2022) found that healthcare professionals in Turkey also experienced higher than normal levels of psychological distress during the COVID-19 pandemic. The results from their study indicated that healthcare workers in Turkey had high levels of stress, anxiety, and depression on the severity scale (Akova et al., 2022). This differs from the current study of Medical Laboratory Professionals in the United States, which indicated they experienced mild levels of stress, anxiety, and depression. One possible reason for the difference in scores on the severity levels could be that this study was conducted at the end of the pandemic, whereas, the aforementioned study was conducted during the heart of the pandemic. Another reason for the difference in severity levels is that the previously mentioned studies were conducted on all healthcare workers, whereas the present study only considers Medical Laboratory Professionals.

One study found that Medical Laboratory Professionals in Ghana experienced mild levels of stress, extremely severe levels of anxiety, and moderate levels of depression during the COVID-19 pandemic (Swaray et al., 2021). This study was also conducted during the heart of pandemic which could contribute to the differences found on the severity levels for anxiety and depression, compared to the current study.

The results from this study indicated that overall, Medical Laboratory Professionals experienced high levels of emotional exhaustion, moderate levels of depersonalization, and low levels of personal accomplishment during the COVID-19 pandemic. Notably, MBI-HSS scores indicated that 85.5% and 62.5% of Medical Laboratory Professionals deviated from the category of “low” on the domains of emotional exhaustion and depersonalization, respectively. MBI-HSS scores also indicated that 67.6% of Medical Laboratory Professionals experienced feelings of low personal accomplishment during the COVID-19 pandemic.

The findings from this study regarding burnout were consistent with similar burnout studies throughout the literature. Similar to findings from the present study, Jalili et al. (2021) found that healthcare workers experienced high levels of emotional exhaustion, moderate levels of depersonalization, and low levels of personal accomplishment during the COVID-19 pandemic. Another study on healthcare workers in Turkey indicated that healthcare workers experienced moderate/high levels of emotional exhaustion, moderate/high depersonalization, and low personal accomplishment (Akova et al., 2022).

Results from the TIS-6 indicated that more than half of Medical Laboratory Professionals (64.8%) desired to leave their position during the COVID-19 pandemic. The findings from Medical Laboratory Professionals in this study on the measurement of turnover intention is similar to studies conducted on other professions of healthcare workers. One study conducted on nurses in the United States indicated that 31% of nurses intended to leave their positions during the COVID-19 pandemic (Raso et al., 2021). Similarly, Kitila et al. (2021) found that 52% of health extension workers in Ethiopia had a desire to leave their position during the COVID-19 pandemic.

The findings from research question 1 are significant, because they indicate that Medical Laboratory Professionals have experienced elevated levels of psychological distress, burnout, and turnover intention during the COVID-19 pandemic. The result of this study adds to the existing literature for healthcare workers experiencing psychological distress, burnout, and turnover intention during the COVID-19 pandemic.

Research Question 2. *Does self-reported psychological distress, burnout, and turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic differ based on demographic variables?*

Findings from this study indicated that stress and depression differed based on race of Medical Laboratory Professionals in the United States. There was also a significant negative correlation found between age, years of experience, stress, anxiety, and depression. Psychological distress did not differ amongst Medical Laboratory Professionals based on education, work sector, job title, sex, and ethnicity. Findings from this study partially echo what was found in similar study conducted on Medical Laboratory Professionals in Ghana during the COVID-19 pandemic. Researchers found that factors such as age, sex, professional cadre, marital status, and number of children were significantly associated with psychological distress (Swaray et al., 2021). Similar results were found in a study conducted with healthcare workers in Turkey during the COVID-19 pandemic. Akova et al. (2022) found that depression differed based on age, occupation number of children, and years of experience. Researchers also found that anxiety differs based on sex, age, marital status, occupation, number of children, and years of experience (Akova et al., 2022). Lastly, Akova et al. (2022) found that stress differed based on age, number of children, and years of experience. The results from Akova et al. (2022) were similar to the results produced by this study.

Results from this study also revealed that there was a significant difference on the scale of emotional exhaustion between males and females. Female Medical Laboratory Professionals had significantly greater scores on the emotional exhaustion scale of burnout, than male Medical Laboratory Professionals during the COVID-19 pandemic. There was also a significant negative correlation found between age, years of experience, emotional exhaustion, and depersonalization. Burnout did not differ amongst Medical Laboratory Professionals based on education, race, work sector, job title, and ethnicity. These findings are somewhat similar to findings made by Nowrouzi-Kia et al. (2022). In a study conducted on Medical Laboratory Professionals in

Ontario, Canada, it was found that burnout during the COVID-19 pandemic differed based on age and highest level of education attained (Nowrouzi-Kia et al., 2022). The findings from this study are also similar to the findings produced by Akova et al. (2022). Researchers found that all domains of burnout differed based on age, years of experience, occupation, and number of children (Akova et al., 2022).

Of note, there were no significant differences found in turnover intention amongst based on demographic groups of Medical Laboratory Professionals during the COVID-19 pandemic. This outcome contradicts findings in the literature. A study conducted on healthcare workers in Saudi Arabia during the COVID-19 pandemic found that turnover intention differed based on sex and job title (Al-Mansour, 2021). A second study found turnover intention differed by age amongst healthcare workers in Peru during the COVID-19 pandemic (Yáñez et al., 2020). Lastly, Kitila et al. (2021) observed differences in turnover intention amongst health extension workers in Ethiopia during the COVID-19 pandemic based on years of service, level of education, marital status, and age.

Research Question 3. *Are self-reported psychological distress and burnout predictors of turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic?*

The findings from this study revealed that overall stress was a significant predictor of turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic. Furthermore, each level of stress severity was found to be a significant predictor of turnover intention. Notably, as the level of stress increased, the odds of turnover intention increased as well. Results from the current study also show that overall anxiety is a significant predictor of turnover intention amongst Medical Laboratory Professionals. Only the collapsed category of

severe/extremely severe anxiety is a significant predictor of turnover intention amongst Medical Laboratory Professionals. The current study also reveals that overall depression is a significant predictor of turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic. Depression follows a trend similar to stress, in which as severity levels increase, the odds of turnover intention increases.

There have been limited studies investigating the impact of psychological distress on turnover intention of healthcare employees during the COVID-19 pandemic. Although the number of studies are limited, the findings from this study are consistent with the few studies in the literature investigating this phenomenon. Hou et al. (2021) found that healthcare workers with anxiety, stress, or depressive symptoms were at higher risk of turnover intention during the COVID-19 pandemic. Likewise, Tabur et al. (2022) found that anxiety was a significant predictor of turnover intention amongst healthcare professionals in China during the COVID-19 pandemic. It was also found that the more severe the anxiety was, the more the healthcare professional considered leaving their position (Tabur et al., 2022).

The results from this study indicated that overall emotional exhaustion and depersonalization were significant predictors of turnover intention amongst Medical Laboratory Professionals during the COVID-19 pandemic. As the severity levels of emotional exhaustion and depersonalization increased, so did the odds of turnover intention. Personal accomplishment was not a significant predictor of turnover intention amongst Medical Laboratory Professionals.

The results from this study are consistent with those studies reviewed in the literature. Scanlan & Still (2019) found that there is a positive association between burnout and turnover intention among mental health personnel in Australia. Similarly, researchers in China reported

that there was a strong positive relationship found between the burnout scales emotional exhaustion and depersonalization on turnover intention (Feng et al., 2022).

The findings from research question three are significant and indicate that overall, psychological distress and burnout are significant predictors of turnover intention amongst Medical Laboratory Professionals in the United States. Therefore, healthcare organizations should aim to combat psychological distress and burnout in their Medical Laboratory Professionals in order to reduce turnover intention and retain their workforce.

Research Question 4. *What were Medical Laboratory Professionals perceptions of ways to cope with psychological distress, laboratory morale, and turnover intention during the COVID-19 pandemic?*

Medical Laboratory Professionals responded to qualitative research questions regarding coping with psychological distress, morale, and turnover intention in the laboratory during the COVID-19 pandemic. Based on responses to open-ended questions, it was found that Medical Laboratory Professionals cope with psychological distress in both healthy and unhealthy ways. The most common method that organizations offer for coping with psychological distress is through services with professional supervision, such as counseling, employee assistance programs, and meditation. Medical Laboratory Professionals expressed that they also utilize some of these coping mechanisms outside of the workplace. Interestingly, there were also several barriers to coping reported by Medical Laboratory Professionals, which included lack of knowledge of services offered by their organization, or just choosing not to cope at all. Many Medical Laboratory Professionals reported not having time to cope due to heavy workloads and just not enough time in the day.

Medical Laboratory Professionals described both successful and unsuccessful methods of increasing morale in the laboratory. The most frequently reported way to both increase and decrease morale in the laboratory was through rewards and recognition. Medical Laboratory Professionals identified lack of recognition and insufficient salaries as the main drivers of decreasing morale in the laboratory. In turn, receiving recognition and increasing salary as well as offering monetary incentives was successful at increasing morale in the laboratory. Participants described a common way leadership attempted to increase morale was by providing food for the employees. Medical Laboratory Professionals collectively expressed that providing food was not a sufficient way to increase morale in the laboratory. Though free food was appreciated by participants, they felt that as if food was a way to mask the bigger problems that needed to be addressed in the laboratory.

Medical Laboratory Professionals also commonly reported effective communication to both increase and decrease morale. When communication is not effective and transparent in the laboratory, participants reported a reduction in morale. Contrarily, when leadership provided effective communication such as open discussions, meetings, and daily huddles, participants felt laboratory morale increased.

Participants also described a supportive work environment as necessary to increase morale in the laboratory. Medical Laboratory Professionals reported that adequate staffing and teamwork were significant ways to increase morale in the laboratory. They noted scheduling was a huge problem with decreasing morale in the laboratory. Due to the staffing shortage of Medical Laboratory Professionals as a whole, participants reported they were required to work more hours and were not allowed to take time off when needed. This significantly decreased morale in the laboratory.

Frequent themes emerged when Medical Laboratory Professionals were asked about contributions to turnover intention during the COVID-19 pandemic. Interestingly, one of the frequently listed contributions to turnover intention was low salary. Medical Laboratory Professionals felt that they were not paid fair wages for the amount of work and education that is required. Another frequently mentioned theme that contributed to turnover intention was recognition/appreciation. The majority of Medical Laboratory Professionals reported that they did not feel appreciated in their position. They also reported that there is a significant lack of recognition for the laboratory from organizations, and that contributed to turnover intention. They also frequently reported conflicts with leadership as contribution to turnover intention. They reported feeling that leadership was poor and that leadership did not support them during the COVID-19 pandemic.

The working conditions during the COVID-19 pandemic also contributed to Medical Laboratory Professional turnover intention. Many cited that there was an increase in workload, and they were overworked as a result of the staffing shortage of Medical Laboratory Professionals. Because of this, Medical Laboratory Professionals reported that their work-life balance suffered. People who left their organizations reported they left to pursue other jobs that offered better work-life balance. Medical Laboratory Professionals reported they did not want to continue working weekends and holidays, so they found other positions that did not have that requirement.

There were also several COVID-19 related issues that contributed to Medical Laboratory Professional turnover intention. Some of these issues included lack of personal protective equipment and resources for safety, and surprisingly the COVID-19 vaccine mandate that was implemented in most healthcare facilities in the United States. A few Medical Laboratory

Professionals expressed that they refused to take the COVID-19 vaccine, and subsequently, they had to seek other employment.

Medical Laboratory Professionals also cited lack of growth and lack of fulfillment as contributors to turnover intention. Some Medical Laboratory Professionals left their position to further their education. Some reported they needed more of a challenge, so they left their positions. They also reported that the career ladder in the laboratory was not possible to climb, and so they felt they could not grow.

Burnout and stress, anxiety, and depression were also frequently mentioned reasons for turnover intention in the laboratory during the COVID-19 pandemic. Some Medical Laboratory Professionals reported that the added stress of the pandemic and the uncertainty contributed to their psychological distress, and they felt they had to leave their positions and profession.

There has only been one published qualitative study investigating Medical Laboratory Professionals during the COVID-19 pandemic. Gohar & Nowrouzi-Kia (2022) conducted a qualitative study on Medical Laboratory Professionals in Canada, to explore their experiences working during the COVID-19 pandemic. Their findings were similar to findings in this study in regard to staffing shortages, lack of recognition/appreciation, depleted resources, and increased workload (Gohar & Nowrouzi-Kia, 2022). Gohar & Nowrouzi-Kia (2022) also found that Medical Laboratory Professionals reported poorer mental health due to the stressors of the COVID-19 pandemic, which is similar to what was found in this study. Similarly, Adatara et al. (2023) conducted a qualitative study on nurses in Ghana and found that they suffered from extreme stress and burnout caused by excessive workload due to inadequate staffing, which is similar to what was found in the current study.

Mixed Methods Integration

The results from the quantitative arm of study indicated that Medical Laboratory Professionals were experiencing psychological distress (stress, anxiety, and depression) at rates higher than normal during the COVID-19 pandemic. The qualitative results echoed this quantitative finding. Medical Laboratory Professionals reported feelings of stress, anxiety, and depression due to work environments and uncertainties of the pandemic. The quantitative study also revealed that Medical Laboratory Professionals also experienced elevated levels of burnout, specifically high emotional exhaustion, moderate depersonalization, and low personal accomplishment. The results from the qualitative analysis mimicked the quantitative findings and provided explanations for reasons of burnout. The most frequently reported reasons for burnout were excessive workload, staffing shortages, and poor work-life balance. Participants also reported lack of growth and fulfillment within their career, which mirrors the quantitative finding of low personal accomplishment.

The quantitative results also revealed that over half (64.8%) of Medical Laboratory Professionals intended to leave their position during the COVID-19 pandemic. Psychological distress, specifically stress, anxiety, and depression were found to be significant predictors of turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic. Similarly, two aspects of burnout, emotional exhaustion, and depersonalization, were also found to be significant predictors of turnover intention amongst Medical Laboratory Professionals. The results from the qualitative study strengthen these quantitative findings. Respondents reported reasons for their turnover from their respective organizations and profession as stress, anxiety, burnout, and other factors. Although personal accomplishment was not found to be a significant

predictor of turnover intention, it was a frequently reported reason by Medical Laboratory Professionals for leaving the profession.

Study Limitations

This study was the first of its kind conducted in the United States; however, it was not without limitations. One limitation of this study was the sampling method used. The study utilized a convenience sampling method, followed by snowball sampling. Because of the sampling methods used, it is possible that the study may lack generalizability and be prone to sampling bias. Participants were recruited via professional social media groups on Facebook and LinkedIn. Because all certified Medical Laboratory Professionals in the United States do not have access to social media or may not be members of the professional groups used for recruitment, there was a clear potential for sampling bias. Some of the insignificant statistical findings in this study could be due to the sampling and recruitment methods. Also, nonparametric statistical methods were used due to the data not being normally distributed, which too could be caused by the sampling and recruitment strategies used.

Another limitation found within this study was the insufficient sample size. Because survey data was collected via social media platforms, all certified Medical Laboratory Professionals within the United States were not recruited for this study. Although 221 Medical Laboratory Professionals accessed the survey, 45 had to be excluded due to missing data. Because of the sample size being too small, the statistical power of the study was reduced and the margin for type II errors was increased.

Finally, this study was limited by the lack of previous research on Medical Laboratory Professionals. Most of the previous research studies conducted on psychological distress,

burnout, and turnover intention of health care workers during the COVID-19 pandemic were conducted on those serving on the front lines. This limitation highlights the need for future research studies conducted on Medical Laboratory Professionals.

Recommended Future Studies

Several recommendations for future research emerged from the findings in this study. The first would be to replicate this study on a larger scale. Recruiting could take place through Medical Laboratory professional organizations such as ASCP, ASCLS and AMT. This recruiting method could yield a larger sample size, which would allow for greater generalizability for the research findings. In addition to expanding the study, it is also recommended that more sociodemographic variables are collected on participants. Findings from the literature regarding other healthcare professionals indicate that other variables, such as marital status and number of children could influence psychological distress, burnout, and turnover intention. It would be of interest to see if additional sociodemographic variables would impact Medical Laboratory Professionals as well.

Another recommendation for a future research study would be to take a deep dive into exploring coping mechanisms for psychological distress amongst Medical Laboratory Professionals. This is a topic that has been explored on front line healthcare workers, but not for Medical Laboratory Professionals. Findings from the recommended research study would allow for organizations to develop and implement more methods to aid Medical Laboratory Professionals in coping with psychological distress. Researchers could also perform a longitudinal study to measure changes in psychological distress amongst Medical Laboratory Professionals overtime, after new coping mechanisms are implemented within organizations.

Another future study would be for organizations to take the feedback provided by Medical Laboratory Professionals regarding laboratory morale, and implement changes based on these findings. Implementing changes to increase morale in the laboratory could have a positive effect on employees, and thus work to retain the workforce. Researchers could then measure turnover intention of Medical Laboratory Professionals pre and post implementation.

Conclusion

This mixed methods study set out to investigate the factors that contributed to turnover intention of Medical Laboratory Professionals during the COVID-19 pandemic. Results yielded that during the COVID-19 pandemic, Medical Laboratory Professionals suffered from higher-than-normal levels of psychological distress, specifically stress, anxiety, and depression, and elevated levels of burnout. It was also found that during the COVID-19 pandemic, over half of Medical Laboratory Professionals had a desire to leave their position. In addition to psychological distress and burnout, several other factors were discovered that contributed to turnover intention. Some of these factors included low salary, poor work life balance, strife with management, being undervalued and unappreciated, and poor working conditions. In addition, Medical Laboratory Professionals who reported exacerbated feelings of psychological distress during the COVID-19 pandemic did not have many healthy ways of coping.

The results from this study highlight a significant need for organizations to develop programs to cope with psychological distress and mitigate burnout. The development of these programs could prevent turnover intention in Medical Laboratory Professionals, and thus retain the workforce that is desperately needed. This study also highlights the issue that Medical Laboratory Professionals have with lack of recognition and appreciation from organizations. These organizations need to develop more ways to recognize these hidden healthcare heroes, and

that could in turn preserve the Medical Laboratory workforce. Furthermore, it is also recommended that organizations further examine the salary gap between Medical Laboratory Professionals and other healthcare workers. Increasing the pay scale for Medical Laboratory workers would be a way to mitigate turnover and turnover intention. Overall, organizations should focus on visibility, recruitment, and retention of Medical Laboratory Professionals. They should also promote work environments that diminish burnout and psychological distress to mitigate turnover intention of Medical Laboratory Professionals.

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Appendix A: MBI-HSS License

mind garden

www.mindgarden.com

To Whom It May Concern,

The above-named person has made a license purchase from Mind Garden, Inc. and has permission to administer the following copyrighted instrument up to that quantity purchased:

Maslach Burnout Inventory forms: Human Services Survey, Human Services Survey for Medical Personnel, Educators Survey, General Survey, or General Survey for Students.

The three sample items only from this instrument as specified below may be included in your thesis or dissertation. Any other use must receive prior written permission from Mind Garden. The entire instrument form may not be included or reproduced at any time in any other published material. Please understand that disclosing more than we have authorized will compromise the integrity and value of the test.

Citation of the instrument must include the applicable copyright statement listed below.
Sample Items:

MBI - Human Services Survey - MBI-HSS:
I feel emotionally drained from my work.
I have accomplished many worthwhile things in this job.
I don't really care what happens to some recipients.

MBI - Human Services Survey for Medical Personnel - MBI-HSS (MP):
I feel emotionally drained from my work.
I have accomplished many worthwhile things in this job.
I don't really care what happens to some patients.

MBI - Educators Survey - MBI-ES:
I feel emotionally drained from my work.
I have accomplished many worthwhile things in this job.
I don't really care what happens to some students.

Cont'd on next page

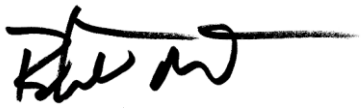
MBI - General Survey - MBI-GS:

I feel emotionally drained from my work.
In my opinion, I am good at my job.
I doubt the significance of my work.

MBI - General Survey for Students - MBI-GS (S):

I feel emotionally drained by my studies.
In my opinion, I am a good student.
I doubt the significance of my studies.

Sincerely,



Robert Most
Mind Garden, Inc.
www.mindgarden.com

Appendix B: TIS-6 Permission

From: roodtg8@gmail.com
Subject: RE: Access and Permission for TIS-6
Date: April 5, 2023 at 5:17 AM
To: Keandra Walthall walthallkl@vcu.edu

Dear Keandra

You are welcome to use the TIS for your research (please accept this e-mail as the formal permission letter). For this purpose please find the TIS-15 attached for your convenience. The TIS-6 (version 4) consists of the first six items high-lighted in yellow. You may use any one of these two versions. The TIS is based on the Theory of Planned Behaviour.

The only two conditions for using the TIS are that it may not be used for commercial purposes (other than for post graduate research) and second that it should be properly referenced as (Roodt, 2004) as in the article by Bothma & Roodt (2013) in the SA Journal of Human Resource Management (open access).

It is easy to score the TIS-6. Merely add the item scores to get a total score. The midpoint of the scale is 18 (3 x 6). If the total score is below 18 then the it indicates a desire to stay. If the scores are above 18 it indicates a desire to leave the organisation. The minimum a person can get is 6 (6 x 1) and the maximum is 30 (5 x 6). No item scores need to be reflected (reverse scored) for the TIS-6. Please note that there are items that need to be reverse scored for the TIS-15 (indicated by an R before the item number).

It is recommended that you conduct a CFA on the item scores to assess the dimensionality of the scale. We found that respondents with a matric (grade12) tertiary school qualification tend to understand the items better and consequently an uni-dimensional factor structure is obtained.

If you wish to translate the TIS in a local language, you are welcome to do so. It is recommended that a language expert is used in the translate - back translate method. I wish you all the best with your research!

Best regards

Gert

Prof Gert Roodt

From: Keandra Walthall <walthallkl@vcu.edu>
Sent: Tuesday, 04 April 2023 18:09
To: groodt@uj.ac.za
Subject: Access and Permission for TIS-6

Hello Professor Roodt,

My name is Keandra Walthall and I am currently a PhD Candidate at Virginia Commonwealth University, Health Related Sciences Department. I am writing today to request access and permission to use the TIS-6 as a measurement for my dissertation titled, "Factors Associated With Turnover Intention of Medical Laboratory Professionals During the COVID-19 Pandemic: A Mixed Methods Approach" under the direction of my dissertation committee chair, Dr. Melissa Jamerson (hrickomj@vcu.edu). This research project will explore the impact that the COVID-19 pandemic has had on the well-being of Medical Laboratory Professionals, as well as the medical laboratory workforce.

I am requesting permission to use the TIS-6 to measure turnover intention amongst Medical Laboratory Professionals. Thank you for your consideration of my request.

Kind Regards,

Keandra Walthall, MS, M(ASCP)CM
PhD Candidate
Virginia Commonwealth University
[redacted]
Email: walthallkl@vcu.edu

Turnover intenti..v4.doc

Appendix C: Research Flyer

Appendix D: Participant Information Sheet

VCU IRB PROTOCOL NUMBER: HM20026600

RESEARCH PARTICIPANT INFORMATION SHEET

STUDY TITLE: Factors Associated With Turnover Intention of Medical Laboratory Professionals During the COVID-19 Pandemic: A Mixed Methods Approach

You are invited to participate in a research study about the impact of the COVID-19 pandemic on Medical Laboratory Professionals in the United States. This study is being conducted by Keandra Walthall, MS, M(ASCP)^{CM} and Dr. Melissa Jamerson from the College of Health Professions at Virginia Commonwealth University. This study is being conducted as part of a dissertation.

To qualify for this study, you must:

1. Hold a certification issued by the American Society for Clinical Pathology (ASCP) or American Medical Technologists (AMT),
2. Be located in the United States,
3. And have worked in a Medical Laboratory during the COVID-19 pandemic (mid-February 2020 - June 2022).

In this study, you will be asked to answer questions relating to your personal experiences and feelings while working during the COVID-19 pandemic. This study has been approved by the Virginia Commonwealth University Institutional Review Board (HM20026600). There are no known risks if you decide to participate in this research study. There are no costs to you for participating in the study. You are free to decline to answer any question you do not wish to answer for any reason.

The information collected may not benefit you directly, but the information learned in this study may allow for the development of workplace interventions targeting the well-being of Medical Laboratory Professionals.

This survey is anonymous, meaning no personal identifiers or IP addresses will be collected. No one will be able to identify you or your answers, and no one will know whether you participated in the study. Should the data be published, no individual information will be disclosed.

Your participation in this study is voluntary. By completing this survey, you are voluntarily agreeing to participate, and you indicate that you have read and fully understand the above information.

If you have any questions or concerns while completing this survey, please contact **Keandra Walthall at walthallkl@vcu.edu.**

If you have any questions, concerns, or complaints about this study now or in the future, please contact:

Dr. Melissa Jamerson
Virginia Commonwealth University - College of Health Professions
Department of Medical Laboratory Sciences
P.O. Box 980583
Richmond, VA 23298-0583
Phone: (804) 828-2984
Email: hrickomj@vcu.edu

Appendix E: Pilot Survey Feedback Form

Pilot Survey Follow-Up

1. How long did it take you to complete the survey?

2. Were any questions difficult to understand? If yes, please provide which questions need to be modified/clarified.

3. Are there any questions that you would add to this survey?

4. Do you have any suggestions for improving this survey?

Thank you for completing the pilot study! Your participation is greatly appreciated.

Appendix F: Qualitative Question 7 Summary of Responses

"If you left the profession, what field are you working in now?"