

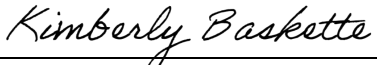
**Examining the Effects of the COVID-19 Pandemic on the Mental Health Status of
Respiratory Therapists**

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A capstone project submitted to the faculty of Radford University
in partial fulfillment of the requirements for the degree of
Doctor of Health Sciences

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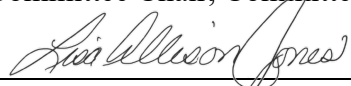
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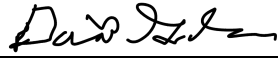
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Abstract

As of December 2021, 800,000 Americans had died from COVID-19, a rate higher than the population of North Dakota (Abraham & Mazumder, 2021). Healthcare workers, including respiratory therapists (RTs) who have spent significant time with COVID-19-positive patients, may be highly vulnerable to ailments such as post-traumatic stress disorder (PTSD) and at risk of other mental health challenges such as anxiety, depression, and other conditions (Blake et al., 2020; DePierro et al., 2020). At baseline, HCWs experienced a considerable risk of adverse mental health outcomes because of the characteristics of their job (Serdà et al., 2021; Preti et al., 2020). Exacerbations of mental distress among HCWs included anxiety (12–45%), depression (20–51%), PTSD (19–51%), psychological distress (37%), acute stress disorder (31%), burnout (29%), sleep disturbance (4–37%), and combined mental disorders (34%; Uphoff et al., 2021). The exhaustion and stress from the COVID-19 pandemic are reflected in the mental health status of RTs, affecting patient care and their family life. This project aimed to focus on the impact the COVID-19 pandemic has had on the mental health status and potential risk factors of front-line workers, specifically RTs.

Objectives: The objective was to examine factors of the COVID-19 pandemic on the mental health status of respiratory therapists, the roles of depression, stress, anxiety, self-efficacy, and the rate of posttraumatic stress disorder.

Methodology: This study utilized the Depression, Anxiety, and Stress Scale - 21 Items (DASS-21), the Impact of Event Scale with Modifications for COVID-19 (IES-COVID19), and the New General Self-Efficacy Scale (NGSE) to collect both survey response data and primary demographic data from degree-seeking RT students at the University of North Carolina Charlotte, and working RTs licensed in North Carolina by the North Carolina Respiratory Care

Board.

Results: Of the 338 surveys emailed to licensed RTs, 61 were received with a response rate of 18%. After working *during* the pandemic, 61% (42) of participants reported suffering from ailments related to depression and anxiety. Depression was reported to be experienced occasionally by participants at a rate of 59.5%, anxiety was experienced weekly at a rate of 40.5%, and stress was experienced weekly at a rate of 33.3% and daily at a rate of 38.1%. The DASS-21 results for stress showed a mean of 13.8 (95% CI), with a minimum score of 7, a maximum score of 28, and an SD of 5.15. The group's characteristics for anxiety showed a mean of 10.73 (95% CI) with a minimum score of 7, a maximum of 21, and an SD of 3.69. Attributes for the group showed a mean of 11.46 on the depression subscale (95% CI) with a low score of 7, a high score of 27, and an SD of 4.7. The RTs who participated in this study reported stress on the high side of normal, mild depression, and severe anxiety levels.

Conclusions: Spearman's rho was significant in correlating depression to anxiety and stress ($p < .001$) and anxiety to depression ($p < .001$). The IES-COVID19 score of 30 was also significant and suggested a powerful impact on RTs from the COVID-19 pandemic. Results concluded that the DASS-21 anxiety and stress subscales correlated significantly with the IES-COVID19 at a ($p < .001$). There was no relationship between self-efficacy scores and the IES-COVID19 scores among the sample group. The RTs who participated in this study reported stress in the higher limits of normal, with some in the severe category, mild depression on average with reported severe levels, and moderate levels of anxiety. Also reported was a high level of self-efficacy with a mean score of 33.2.

Keywords: Respiratory therapists, mental health status, COVID-19, pandemic, front-line healthcare workers

Dedications

If any accolades are to be had, they belong to my family just as much as they do to me. I could never have achieved this without my husband's unwavering love and encouragement, the patience of my two daughters, and my mom's support. During this process, I became a grandmother and learned to experience a love like no other with my beautiful granddaughter, Somma. I love you all.

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List of Abbreviations

BSRT.....	Bachelor of Science in Respiratory Therapy
CAS.....	Coronavirus Anxiety Scale
CERQ-18.....	Cognitive Emotional Regulation Questionnaire
CESD	Center for Epidemiologic Studies-Depression Scale
COVID-19.....	2019 Novel Coronavirus Disease
CPDI	COVID-19 Peri-traumatic Distress Index
DASS-21	Depression, Anxiety, and Stress Scale
GAD-7.....	Generalized Anxiety Disorder 7
GSI.....	Global Severity Index
HADS.....	Hospital Anxiety and Depression Scale
HAM-D	Hamilton Depression scale
HCW	Healthcare Workers
IES-R	Impact of Event Scale-Revised
ISI.....	Insomnia Severity Index
MERS-CoV.....	Middle East respiratory syndrome coronavirus
MSRC	Master of Science in Respiratory Care
NBRC.....	National Board of Respiratory Care
NCRCB.....	North Carolina Respiratory Care Board
PHQ-9	Patient Health Questionnaire 9
PTSD.....	Posttraumatic Stress Disorder
RT	Respiratory Therapist
SARS.....	Severe Acute Respiratory Syndrome

- SARS-CoV2..... Respiratory Syndrome Coronavirus 2
- SOC..... Sense of Coherence-13
- SPFI..... Stanford Professional Fulfillment Index Questionnaire
- TMDP..... Tokyo Metropolitan Distress Scale for Pandemic
- UNCC..... The University of North Carolina at Charlotte
- WSAS..... Work and Social Adjustment Scale

Examining the Effects of the COVID-19 Pandemic on the Mental Health Status of Respiratory Therapists

Chapter One

As we embark on the third year of the pandemic, Americans are still being exposed to and infected by the COVID-19 virus (Beard, 2022), likely due to the spread of new variants, such as the BA.5 omicron sub-variant in July 2022 (Beard, 2022; CDC, 2022). Across the United States, the BQ.1 and BQ.1.1. (sub-variants of the BA.5) accounted for 11 % of infections in October 2022 (Jarvis, 2022). In November of 2022, a total of 5,719 COVID cases were reported in North Carolina (the target population group) in a seven-day period, with 495 individuals severe enough to be hospitalized and eighty-four admitted to the Intensive Care Unit (ICU; Jasper, & Kenney, 2022; NC Department of Health and Human Services [NCDHHS], 2022). In January 2023, according to *The Washington Post*, the new variant, XBB.1.5, was believed to be responsible for up to 70% of cases in the United States (Nirappil & Weber, 2023). The CDC reported a 27% rise in XBB.1.5 cases in the first week of January alone, making it the predominant and easily transmissible variant (CDC, 2023a; Nirappil & Weber, 2023). While the pandemic wave may have lessened, infections, deaths, and the associated pains of stress and anxiety associated with caring for these patients continue.

As of December 2021, 800,000 Americans had died from COVID-19, a rate higher than the population of North Dakota (Abraham & Mazumder, 2021). The US held an exceedingly high per capita death rate compared to other affluent countries. It was ranked 30th in the collective of nations making up the Organization of Economic Cooperation and Development (OECD; Abraham & Mazumder, 2021). Such elevated death rates have affected front-line healthcare workers. Many respiratory therapists (RTs) who have spent a significant amount of

time with COVID-positive patients may have been extremely vulnerable and at risk of mental health challenges such as anxiety, depression, and other ailments (Blake et al., 2020; DePierro et al., 2020).

RTs are licensed by their states and are part of the critical care team. RTs have collaborated with physicians and other front-line healthcare workers since the pandemic began in March 2020. The pressures from working with critically ill patients while facing heavy workloads and staffing shortages trigger stressors for increased anxiety and stress that worsens over time (Santarone et al., 2020). It was expected that healthcare workers hoped for a quick end to the pandemic, allowing for a break from the continual heightened sense of fear, stress, and turmoil; however, the emergence of the Delta, Omicron, and XBB.1.5 variants have not allowed this to happen (Beard, 2022; CDC, 2022; Nirappil & Weber, 2023). Daily exposure to a high-stress work atmosphere filled with loss of life has created a heightened sense of stress, amplified fear, and the feeling of endangerment (Santarone et al., 2020). RTs are front and center in most emergency departments, assisting the healthcare team in saving lives. Keller et al.'s (2022) cross-sectional study concluded that front-line workers, such as RTs working in emergency departments, faced extreme stress when providing care to deteriorating patients and were forced to make lifesaving decisions of care that reached epidemic proportions during the pandemic. A survey of 109 participants, emergency department healthcare workers, reported physical symptoms of fatigue (28.4%), muscle pain (13.8%), and backache (11.9%; Keller et al., 2022). The data showed that physical symptoms and conflicts at work and with family were relational to the number of distressful events in their lives (Keller et al., 2022). Being constantly bombarded with stressful events as a component of occupational stress may lead to physical ailments, burnout, and mental health issues (Keller et al., 2022). In addition to the stress RTs face with

their work, they also face pressure as individuals. The stressful work environment increased economic and family stress, and the heightened fear of contracting the virus has predisposed RTs to be at risk for mental health disorders (Keller et al., 2022).

Personal mental health maintenance contributes to a healthy lifestyle and is needed to maintain healthy relationships at home and on the job. Good mental health practices allow for an individual to have the aptitude to function appropriately as a part of society (US Department of Health and Human Services [DHHS], 2020). Enervated thinking and modifications or variations in mood or behavior as an accompaniment of stress are health conditions known as mental disorders (DHHS, 2020). Mental conditions can be the underlying cause of other disabilities, pain, anguish, and possibly death that can be inflicted upon sufferers (DHHS, 2020). According to the Center for Behavioral Health Statistics and Quality (2015), many individuals in the U. S. suffer from mental health conditions, putting them at considerable risk for increased complications when faced with stressors such as the pandemic (CDC, 2018). Researchers monitoring respiratory viruses noted an emerging mental health concern in individuals in areas widely impacted by psychological trauma due to disasters (DHHS, 2020), such as the COVID-19 pandemic. Healthcare workers, including RTs, serve at the front line in disasters and are thus at risk for psychological trauma (Keller et al., 2022).

The World Health Organization (WHO) announced COVID-19 as a pandemic in March 2020 (Montemurro, 2020). Front-line healthcare workers, such as RTs, were inevitably placed in unwanted and agonizing situations (Blake et al., 2020; DePierro et al., 2020; Greenberg et al., 2020; Roycroft et al., 2020) and while triaging multiple critically ill patients, may have been placed in a position where they had to choose between their ethics and a healthcare facility's policies when determining which patient received specific resources if there was not enough to

go around. This could have resulted in internal mental stress from injury to their morals. Internal mental stress and moral injury can lead to negative, disapproving thoughts about oneself. Such feelings can add to the mental stress of the pandemic and impact healthcare workers significantly, resulting in an inability to conduct necessary job-related functions and potential disruption of personal life (Blake et al., 2020; DePierro et al., 2020; Greenberg et al., 2020; Roycroft et al., 2020).

According to Evans (2021), RTs have reported higher levels of burnout (43.9% vs. 29.6%) since the pandemic began. Significant factors for RT burnout were said to be poor leadership, increased workload, insufficient staffing, COVID-19, lack of recognition, long hours/lack of time off, lack of respect, lack of resources, emotional toll, and high acuity, to name a few (Evans, 2021). A report by Sawadkar & Nayak (2020) emphasized the anxiety many RTs have experienced during the pandemic. For critical COVID-19 patients needing airway support, an RT may have to provide patient care for four to ten hours daily (Equan, Tammy [personal observation]). Caring for patients while being fully garbed in personal protective equipment and utilizing delicate skills to prevent further lung injury was stressful and exhaustive (Sawadkar & Nayak, 2020).

Marvaldi et al. (2021) completed a systematic review of 70 studies that included over 100,000 healthcare workers. Evidence showed that mental stress, sleep complications, and depression were evident among healthcare workers exposed to treating COVID-19 patients. The review revealed a pooled prevalence of anxiety (300%), depression (311%), acute stress (565%), posttraumatic stress (20.2%), and sleep disorders (44.0%; Marvaldi et al., 2021). A study of healthcare and administrative staff showed that prolonged pressure from stress and apprehension was related to despondency and significant depression, leading to the comorbidities of

hypertension, immune compromise, sleeplessness, agitation, and irritability when left untreated (Marijanović et al., 2021). Healthcare workers already experience increasing job stress that affects their mental health due to the complexities of working with acutely ill and unstable patients (Marvaldi et al., 2021). The strain of working with COVID-19 patients may have severely intensified that stress.

Statement of Problem

At the height of the pandemic surge, physicians, nurses, and RTs were viewed on various media outlets throughout the US fighting COVID-19. The public witnessed the stress and exhaustion on the faces of healthcare workers (HCWs) providing care for multiple patients on televised news outlets. Front-line workers experienced stress, exhaustion, and painfully bruised, irritated skin from the continuous daily use of an N-95 mask, allowing them to participate in patient care while keeping themselves, their families, and communities safe. The exhaustion and stress were reflected in the mental status of RTs, affecting patient care and their family life. The COVID-19 pandemic has also significantly impacted RTs and other healthcare workers cognitively. A systematic review and meta-analysis by Sun et al. (2021) of 47 studies showed a significant prevalence of anxiety (37%), depression (36%), and insomnia (32%). The psychological issues reported by participants affected women to a more considerable degree than males. The prevalence of anxiety was 50% for females compared to 36% for males, and depression was 40% for females and 34% for males (Sun et al., 2021).

A recent systematic review and meta-analysis of 38 showed that healthcare workers were at considerable risk of emotional problems related to posttraumatic stress disorder (PTSD; Saragih et al., 2021). Other common mental health issues included depression, anxiety, and stress. As the pandemic progressed, RTs suffered physically and emotionally from being on the front lines of

the pandemic while still facing significant staff shortages (May, 2021). Continual staff shortages increased the amount of critically ill patients and work areas assigned to team members daily, forcing them to manage more critically sick patients than was safe (May, 2021).

Highlighting and identifying potential risk factors leading to changes in mental health status and the needs of RTs during the COVID-19 pandemic was to allow employers to be prepared to mentally treat and support those who have sacrificed their health, time with their family, and potentially their life in the war against COVID-19. Additionally, highlighting potential risk factors allowed RTs to recognize symptoms within themselves and seek assistance and prompt treatment to prevent worsening clinical conditions. Highlighting changes in mental health status enabled RTs to talk with a trusted friend or professional about their feelings.

The RTs participating in the proposed study are experienced practitioners, some seeking a degree online. Working and studying during the pandemic may also have contributed to increased stress or anxiety. A study by McHenry et al. (2022) utilized the Maslach Burnout Inventory for Medical Personnel (MBI-HSS (MP) and the Brief Resilience Scale (BRS) to measure burnout and resiliency in RTs enrolled in an online BS degree while working during the pandemic. Most participants were females with less than 10 yrs. of experience working 35 or more hours per week in adult critical care (McHenry et al., 2022). Results showed that emotional exhaustion and depersonalization were higher in students caring for COVID-19 patients and those under 40 years of age (McHenry et al., 2022). Online degree students shoulder increasing responsibilities both at school and work. It was reasonable to conclude that RT students would have higher levels of emotional exhaustion while seeking advanced education (von Harscher et al., 2018).

Respiratory therapy students seeking online degrees in the Bachelor of Science in Respiratory Therapy (BSRT) and the Master of Science in Respiratory Care (MSRC) programs at UNCC are likely to have higher stress levels juggling school and work. Many are leaders in their facility, precept inexperienced team members, assist in developing protocols, and may have worked intently with COVID-19 patients (Equan, Tammy [personal observation]). The extra attention and focus on working toward higher education may trigger emotional exhaustion (von Harscher et al., 2018). RTs may score higher on the DASS-21 scale (a scale that measures stress and mental health), reporting a higher level of stress or anxiety.

Purpose of the Research

Examining the mental health status of currently practicing RTs was needed to investigate if RTs experience traumatic stress symptoms related to the COVID-19 pandemic. Exploring if RTs have the self-efficacy to overcome the impact of COVID-19 was also necessary. Finally, the relationship between self-efficacy and the mental health status of RTs were explored. This study examines the mental health status and potential risk factors for depression, stress, and anxiety among RTs. This study sought to determine the current impact of COVID-19 among RTs. An understanding of the mental health status of practicing RTs and the role of SE can assist us in determining if SE plays a role in helping RTs manage the depression, stress, and anxiety associated with the COVID-19 pandemic.

RTs work with critically ill patients from admission with respiratory distress through intubation and the mechanical ventilation experience to extubation and recovery or end-of-life measures. RTs work with patients throughout their hospital stay, from the Intensive Care Unit (ICU) to a medical-surgical floor and discharge. Eventually, due to mental strain, at-risk workers were no longer productive team members (Greenberg et al., 2020), affecting the healthcare

provided to many patients. RTs were likely to need additional support. Identifying risk factors prepared employers and mental health practitioners to treat those in need. Effective interventions, counseling, and social assistance are needed to improve the overall mental health of RTs during and post-pandemic (Sun et al., 2021). The researcher was hoping to get reliable feedback from RTs working during the pandemic to accurately reflect the level of mental health change experienced by this group of front-line workers.

Research Questions and Hypotheses

The following research questions and hypotheses were explored during this study. Research questions one through three investigate the stress, anxiety, and depression experienced by RTs. Questions four through six investigate the relationship between the IES-COVID19 and the DASS-21 anxiety, depression, and stress subscales. Question seven evaluates the level of self-efficacy among the sample of RTs. Questions eight through ten investigate the relationship of self-efficacy to depression, stress, and anxiety, and question eleven examines the relationship between self-efficacy and the impact of COVID-19.

RQ1: What are the distributional characteristics of the DASS-21 stress subscale for RTs in this sample?

This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of stress as measured by the DASS-21 stress subscale.

RQ2: What are the distributional characteristics of the DASS-21 anxiety subscale for RTs in this sample?

This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of anxiety as measured by the DASS-21 anxiety subscale.

RQ3: What are the distributional characteristics of the DASS-21 depression subscale for RTs in this sample?

This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of depression as measured by the DASS-21 depression subscale.

RQ4: Is there a correlation between an IES-COVID19 score and the DASS-21 depression score?

H4.0: There is no significant correlation between an IES-COVID19 score and the DASS-21 depression subscales.

H4.1: There is a significant correlation between an IES-COVID19 score and the DASS-21 depression subscales.

RQ5: Is there a correlation between an IES-COVID19 score and the DASS-21 anxiety score?

H5.0: There is no significant correlation between an IES-COVID19 score and the DASS-21 anxiety subscales.

H5.1: There is a significant correlation between an IES-COVID19 score and the DASS-21 anxiety subscales.

RQ6: Is there a correlation between an IES-COVID19 score and the DASS-21 stress score?

H6.0: There is no significant correlation between an IES-COVID19 score and the DASS-21 stress subscales.

H6.1: There is a significant correlation between an IES-COVID19 score and the DASS-21 stress subscales.

RQ7: What are the distributional characteristics of RTs in this sample who show a high sense of self-efficacy by scoring high on the New General Self-Efficacy Scale (NGSE) during his phase of the pandemic?

This RQ was analyzed with descriptive statistics. It was anticipated that participants

would show a high sense of self-efficacy by scoring high on the NGSE.

RQ8: Is there a relationship between an RT's self-efficacy and depression in this sample?

H8.0: There is no relationship between an RT's self-efficacy and depression.

H8.1 There is a relationship between an RT's self-efficacy and depression.

RQ9: Is there a relationship between an RT's self-efficacy and stress in this sample?

H9.0: There is no relationship between an RT's self-efficacy and stress.

H9.1: There is a relationship between an RT's self-efficacy and stress.

RQ10: Is there a relationship between an RT's self-efficacy and anxiety in this sample?

H10.0: There is no relationship between an RT's self-efficacy and anxiety.

H10.1: There is a relationship between an RT's self-efficacy and anxiety.

RQ11 Is there a correlation between an RT's self-efficacy score and the IES-COVID19?

H11.0: There is no relationship between an RT's self-efficacy score and the IES-
COVID19.

H11.1: There is a relationship between an RT's self-efficacy score and the IES-
COVID19.

Chapter Two

Review of the Literature

In December 2019, an increase in patients admitted with a diagnosis of atypical pneumonia sprang up in China (CDC, 2023b). In January 2020, the infectious agent responsible for the rash of deadly pneumonia became known as COVID-19 (Li et al., 2020; CDC, 2023b). The CDC reported the first case of the Novel Coronavirus in the United States on January 20, 2020 (CDC, 2023b); by February 10, 2020, more than 1,000 persons had died from the SARS-CoV-2 virus. Healthcare workers (HCWs), such as respiratory therapists, who engaged in caring for patients with COVID-19 were at an elevated risk of infection and psychological issues (Işık et al., 2021). Such problems may require intervention and treatment (Lai et al., 2020). Unfortunately, due to the nuances of mental health, those with the greatest need may not accept initial therapy for fear of the stigmas often associated with mental disorders, denial of the need for assistance, or lack of time needed to pursue treatment (Greenberg et al., 2020).

This chapter synthesizes the latest literature on the COVID-19 pandemic and its effect on respiratory therapists (RTs) and other healthcare workers (HCWs), as well as the extent of its mental stress. From May 29, 2022, to May 31, 2022, research began with the Mesh terms ((covid-19 pandemic) AND (mental health)) AND (healthcare professionals) in the PubMed database, which produced 2,506 articles, then the following filters were added AND (Diagnosis/Broad[filter]) in the last five years; Humans; English; Adult: 19-44 years; Middle Aged: 45-64 years; MEDLINE; leaving 121 remaining. Articles were filtered by title and abstract. Forty-one articles not written in English, irrelevant to the subject matter, etc., were excluded from the selection. Twenty-seven more articles were manually removed for various reasons, such as tools used in languages other than English, qualitative methods, or did not apply

to the population group. A Prisma Flow Chart depicting this process is provided in Appendix A. This process identified 53 articles for this literature review.

Threats to the Mental Health of HCWs

The Center for Disease Control's Morbidity and Mortality Weekly report denoted that from August 2020–February 2021, a period of less than one year, there was a significant increase in the amount of post-traumatic stress disorder (PTSD) symptoms reported in the general population (Vahratian et al., 2021). Anxiety in adults increased from 36.4% to 41.5%, and a documented need for intervention rose from 9.2% to 11.7% (Vahratian et al., 2021; Watson, 2022). Amplifications in mental health changes primarily were among young adults 18 to 29 years of age and those with lower education levels (such as a high school diploma; Vahratian et al., 2021). The U.S. Census Bureau's (2021) surveys for April 28–May 10, 2021, showed that 35% of those surveyed displayed depression, 40% anxiety, and 10% received mental health treatment. Also, 15% took psychoactive prescriptions, and 7% did not receive mental health treatment despite the need (U.S. Census Bureau, 2021; Watson, 2022).

HCWs are at particular risk of experiencing anxiety, depression, and symptoms of PTSD, and COVID-19 has been the subject of much research regarding its effect on mental health. Symptoms of mental health changes in HCWs, such as changes in sleep patterns, anxiety, and depression, have been reported during the pandemic (Muller et al., 2020; Norhayati et al., 2021). These impacts steadily increased the more hours HCWs worked. The psychological strain of caring for infected patients during a pandemic can be exacerbated by long shifts, increased workloads, finding the need for personal protective equipment (PPE), fear of passing the infection to family members and experiencing the sadness and loss in the deaths of a family member, workmates, and patients (Işık et al., 2021). Studies conducted since the onset of the

COVID-19 pandemic have highlighted threats to the mental health of HCWs (Işik et al., 2021; Norhayati et al., 2021; Uphoff et al., 2021).

An online cross-sectional study of 509 participants performed by Işik et al. (2021) used several tools to acquire data on the prevalence and risk of depression, insomnia, PTSD, and anxiety in frontline HCWs. The validated tools of the Sociodemographic and Clinical Questionnaire (including preexistence of a mental health history), the Hospital Anxiety and Depression Scale (HADS), the Insomnia Severity Index (ISI), and the Post Traumatic Stress Disorder-Short Scale (PTSD-SS) were used. Results of this study utilizing these validated survey tools showed that “54.2%, 26.3%, 20.8%, and 8.8% of the healthcare professionals had scores above the cut-off values on the psychometric tests for depression, anxiety, insomnia, and PTSD, respectively” (Isik et al., 2021, p.231). The study also determined that younger workers from 20 to 30 years old, nurses, those with a history of mental disorders, and females were at higher risk of having psychological issues.

A limitation of the Işik et al. (2021) study was that although the survey mentions nurses, respiratory therapists were omitted. Respiratory therapists have a similar workflow to how nurses are assigned patients. They are responsible for caring for their patients throughout their shifts, providing medicinal therapy, and communicating with pulmonologists and other physicians regarding the patient’s care plan. This omission creates a gap in the literature for a specific group of frontline HCWs who work closely with the patient from admission until discharge. It also focuses on short-term issues rather than the potential long-term psychological issues facing HCWs.

Norhayati et al. (2021) compared the levels of depressive symptoms among frontline and non-frontline HCWs during the COVID-19 pandemic in Kelantan, Malaysia, from May to July

2020. Three hundred-six participants were recruited, including 160 frontline workers and 146 non-frontline workers. Two self-administered questionnaires, the Hospital Anxiety and Depression Scale (HADS) to measure anxiety and depressive symptoms score and the Medical Outcome Study Social Support Survey to measure social support, were sent via an online survey.

Over 27.5% of front-line workers and more than 37.7% of non-front-line workers showed symptoms of depression on their HADS score (Norhayati et al., 2021). The average score for non-frontline workers was 0.75 points higher than that of the frontline workers after adjusting for sex, duration in the healthcare field, and social support. The independent *t*-test analysis also showed a significant difference in markers for depression scores ($p = 0.043$), with non-frontline workers showing a 0.69 mean score difference compared to the frontline workers (Norhayati et al., 2021). The covariance (ANCOVA) test analysis also confirmed these results with a score of 7.35 (95%CI: 6.83; 7.88) after adjusting for sex, duration in the healthcare field, and social support. All HCWs, whether front-line or non-frontline, showed a psychological impact due to the pandemic, which worsened the longer they were exposed to high-risk environments (Norhayati et al., 2021). A limitation of this study was it might not apply to other populations outside of Malaysia.

A systematic study by Uphoff et al. (2021) noted that some populations were more vulnerable and experienced the adverse mental health effects of the pandemic differently than others. Uphoff et al. searched the MEDLINE database on July 8 and July 9, 2020, along with the COVID-19 database on August 10, 2020, and two preprint databases, MedRxiv (August 11, 2020) and PsyArxiv (July 22, 2020). Twenty-five systematic reviews were carefully examined. The majority of the reviews were of HCWs from various countries, showing the heavy burden leading to psychological symptoms, COVID-19 patients with physical ailments, and children and

adolescents (Uphoff et al., 2021). Mental health was reviewed, including the need to examine signs of depression, distress, and other forms of mental illness. HCWs, as front-line workers, were regarded as a relevant group to be included in the study as they have a high likelihood of poor mental health outcomes, increased risk of exposure to loss of a patient's life, end-of-life care, moral injury, and increased risk of infection (Holmes et al., 2020).

At baseline, HCWs experienced a considerable risk of adverse mental health outcomes because of the characteristics of their job (Serdà et al., 2021; Preti et al., 2020). As depicted in Table 1, exacerbations of mental distress among HCWs included anxiety (12–45%), depression (20–51%), PTSD (19–51%), psychological distress (37%), acute stress disorder (31%), burnout (29%), sleep disturbance (4–37%), and combined mental disorders (34%; Uphoff et al., 2021).

Table 1.

Prevalence of Mental Health Problems by Equity Group.

Population group	Mental health problem	Prevalence ^a
Healthcare workers	Anxiety	12–45%
	Depression	20–51%
	PTSD	19–51%
	Psychological distress	37%
	Acute stress disorder	31%
	Burn-out	29%
	Sleep problems	34–37%
	Combination of mental health problems	34%
COVID-19 patients with other health conditions (cancer, type 2 diabetes, Parkinson's)	Anxiety	40–82%
	Depression	50%
Children and adolescents ^b	Anxiety	19–37%
	Depression	35–44%
	PTSD	6%
	Psychological distress	40%
	Acute stress disorder	17%

^a These estimates represent the range of estimates presented in included reviews, which includes pooled estimates from meta-analyses as well as estimates from primary studies reported in included reviews.

^b Prevalence rates associated with quarantine and social isolation during infectious disease outbreaks.

Note. From “Mental health among healthcare workers and other vulnerable groups during the COVID-19 pandemic and other coronavirus outbreaks: A rapid systematic review”, by Uphoff et al., 2021, *PloS One*, 16(8), <https://doi.org/10.1371/journal.pone.0254821.t002>.

Contributing Factors

Researchers have also studied the factors contributing to the risk of mental health issues in HCWs. Risk factors include internal stress (Xing et al., 2020; Gómez-Salgado et al., 2021), geographical location (Pazmiño Erazo et al., 2021), job characteristics (Bahadirli & Sagaltici, 2021; Pazmiño Erazo et al., 2021; Das et al., 2020; Lai et al., 2020; Serdà et al., 2021; Kebede et al., 2021), and gender (Brennan et al., 2021; Gómez-Salgado et al. 2021; Lai et al. 2020; Das et al., 2020). Internalized stress can harm HCWs and become severe enough to require psychiatric assistance (Pazmiño Erazo et al., 2021). Components associated with this increased stress level are residing/working in areas with prominent levels of infected patients, staff shortages, extended work weeks, job duties/characteristics, and feeling insecure at work/home (Pazmiño Erazo et al., 2021). The primary workload of an RT was to care for patients in respiratory failure or distress. Such work makes their group responsible for providing breathing treatments or aerosol-generating procedures (AGPs) to COVID-positive patients, when necessary (Kerlin et al., 2022), leading to a higher risk for this group than other HCWs.

A cross-sectional survey-based study was conducted by Pazmiño Erazo et al. (2021) from March 30 to April 22, 2020, using the self-administered tests of the PHQ-9 to measure depression, the GAD-7 for anxiety, the Insomnia Severity Index (ISI) to gauge insomnia, and the revised Impact of Event Scale (IES) to measure stress, and post-traumatic stress disorder (PTSD). Participants were recruited throughout Ecuador and its 24 provinces. One thousand twenty-eight responded, including- physicians (54.18%), nurses (33.94%), laboratory workers (2.82%), paramedics (2.62%), psychologists (5.05%), and respiratory therapists (1.36%;

Pazmiño Erazo et al., 2021). Results show that 43.8% of HCWs showed markers of moderate to severe PTSD, 39.2% markers of anxiety, 16.3% insomnia, and 27.3% markers of depression.

Risk factors for symptomatic psychological issues were multifactorial. The researchers indicated that the main risk factors for experiencing depression were working in the geographical locations with the highest concentration of COVID patients; risk factors for anxiety were being an emergency medical technician (EMT; characteristics of the job), the thought/feeling of not having needed protection equipment and being of the female gender (Pazmiño Erazo et al., 2021). A risk factor for insomnia was being a postgraduate doctor. A risk factor for PTSD included working in the province of Guayas, the area with the most substantial number of infected patients (Pazmiño Erazo et al., 2021). Abnormal test scores were reflected in most HCWs, indicating an elevated risk of adverse psychological distress outcomes. Researchers found that 19.26% of HCWs registered in the severe range for PTSD, with a higher prevalence of anxiety among females (Pazmiño Erazo et al., 2021). The pandemic was a limitation of this study due to the flux in stress levels when coping with the pandemic changes.

Another risk for RTs enrolled in degree programs while working was the abrupt change in college and university teaching programs during the pandemic. For those working students, such changes could be another cause of stress. An online cross-sectional study from May 7 to July 23, 2021, was conducted by Wong et al. (2023) on the levels of depression, anxiety, and stress among university students due to the COVID-19 pandemic in Malaysia. The DASS-21 instrument was used to survey students' mental health via social media. Three hundred eighty-eight people participated in the study, with 87% working towards a bachelor's degree, 13% towards a diploma or certificate, and almost 5% towards a Master's (Wong et al., 2023). The multivariable logistic regression tests showed a high correlation between a participant's history

of depression and exercise being linked to depression. Scores of 53.9%, 66.2%, and 44.6% showed the prevalence of moderate to severe depression, anxiety, and stress reported by students (Wong et al., 2023).

While most students (34%) had average scores on the depression subscale, the remaining 12.1% had mild to severe (21.4%) depression. The anxiety subscale showed that (32.7%) had indications of extremely severe anxiety, with 5.2% producing symptoms of mild anxiety and 28.6% classifying as normal. On the stress subscale, 5.2% had signs of extremely severe stress, with 21.1% classified as severely stressed; only 32% of participating students showed signs of normal stress levels (Wong et al., 2023). Also, the more a student exercised, the lower their depression and anxiety scores, as those who exercised up to four times per week had a lower likelihood of being depressed (OR: 0.380, 95% CI: 0.203–0.711, $p < 0.01$); and only an 11.6% prevalence of anxiety. Like other studies, females had a higher prevalence (68.3%) than males (59.8%) of exhibiting signs of depression. Surprisingly, students in a master's program showed less stress (OR: 0.188, 95% CI: 0.053-0.663) in comparison to those in Bachelor programs, apart from students who complained of a poor learning environment (OR: 1.644, 95% CI: 1.010-2.675; Wong et al., 2023). Bachelor students scored higher on depression, anxiety, and stress compared to master's students (Wong et al., 2023).

There have been three significant outbreaks related to coronavirus over the past 20 years: severe acute respiratory syndrome (SARS) in 2003, Middle Eastern respiratory syndrome (MERS) in 2012, and the 2019 novel coronavirus disease in 2019, commonly known as COVID-19 (Das et al., 2020). Due to staffing shortages in the recent outbreak, HCWs from other disciplines were pulled to the front lines. As expected, this led to shock, fear, anxiety, and depression in those workers (Kumar et al., 2020). Fear of the virus, working in unprepared health

centers, dealing with unexpected events in the COVID-19 disease process, and lack of a proven treatment led to increased psychological issues (Kumar et al., 2020). The Lai et al. (2020) study corroborated Das et al.'s (2020) findings that women and those with intermediate degrees have a higher prevalence of depression, anxiety, and stress. Many frontline postgraduate trainees experienced interruptions and gaps in schooling that were frustrating for individuals. Being pulled onto the front lines may have contributed to changes in work shifts, causing sleep disturbances, insomnia, or symptoms of burnout. Struggling with burnout that was not resolved may also lead to depression (Das et al., 2020; Priyam & Sil, 2020; Rodrigues et al., 2018). Additionally, changes in work practice due to adjustments for COVID-19 were challenging, and heavy workloads that do not allow time for breaks or meals can create excess strain and lead to exhaustion. Despite the decrease in the outbreak, HCWs are still working with positive COVID-19 patients and experiencing similar mental issues. Screenings to provide mental health support should continue until the pandemic is lifted.

The literature findings suggest that HCWs require a comprehensive psychological support system, no matter what department or field they work in full-time (Kebede et al., 2021). Leadership would be wise to develop ways to protect their HCWs physically and mentally. HCWs have lived with mental distress resulting from the pandemic since 2020. Respiratory therapists and other HCWs are intimately involved in the care of the patient, working with providers to create treatment and care plans for critically ill COVID patients, which puts workers at risk of acquiring psychological distress and mental health disorders (Special Expert Group for Control of the Epidemic of Novel Coronavirus Pneumonia of the Chinese Preventive Medicine Association, 2020). The pressure of working in healthcare during a pandemic can create

emotional disturbances in HCWs, who are overwhelmed and feel they are not adequately supported (Kebede et al., 2021).

Gómez-Salgado et al. (2021) examined the psychological distress members of the Spanish Association of Specialists in Occupational Medicine and the Association of Specialists in Occupational Nursing in Spain have experienced to determine how a sense of coherence regarding the pandemic has played in mental health. Between April 23 and June 24, 2020, the online Goldberg General Health Questionnaire was used to rate psychological distress, and the Spanish version of the Sense of Coherence-13 (SOC) was used to measure a sense of coherence. A sense of coherence scale looks at how a person views life and maintains their health by using resources to overcome resistance to their health (Riopel, 2019b). The Goldberg General Health tool has a Cronbach's α reliability value of 0.97 and shows excellent consistency. The SOC analyzed participants' life experiences regarding meaningfulness, comprehensibility, and manageability: the tool has a Cronbach's α index of 0.824 and had acceptable consistency (Gómez-Salgado et al., 2021). Four hundred ninety-nine HCWs responded to the survey (Gómez-Salgado et al., 2021). Findings indicated that 72.87% of females, compared to 51.46% of males, exhibited symptoms of elevated mental distress (Gómez-Salgado et al., 2021). Distress also increased in 70.28% of HCWs under the age of fifty-one compared to 60.46% of HCWs older than 51 (Gómez-Salgado et al., 2021). HCWs working in public healthcare facilities also show higher signs of mental distress. Seventy-two percent of respondents working in public facilities reported elevated symptoms of mental pain compared to 61.39% working in private facilities (Gómez-Salgado et al., 2021).

Xing et al. (2020) studied the link between personality traits and mental health to provide a basis and reference for the administration of targeted mental health education. The study was to

investigate the mental health of workers dealing with the 2019 coronavirus in China. Data was collected online from January 25 - February 16, 2020, via the Symptom Checklist-90 (SCL-90).

Five hundred forty-eight participants completed the survey. The average SCL-90 score and values of factors of the medical workers were substantially higher than in the norm group ($p < 0.05$). In comparison, their typical interpersonal relationship sensitivity score was markedly lower ($p < 0.01$; Xing et al., 2020). Additionally, individualized factors affecting the psychological status of medical workers were identified (all $p < 0.05$) as the level of suspicion that they were infected when the coronavirus-related symptoms occurred, the level of apprehension whether they or their family members have been infected, age, whether they have felt supported in high-risk exposure areas, hospitals, and other areas for the coronavirus, and whether their family supported them in their job role/profession ($p < 0.05$; Xing et al., 2020). Persons in stable mental health enacted measures to prevent a worsening decline in their mental health, such as taking time off to rest and relax, keeping a sense of humor, and laughing with friends/family, consoling themselves when alone and no one was around to vent to, seeking compensation, and providing a rational response (Xing et al., 2020). The findings of the Xing et al. (2020) study showed that the overarching mental health status of medical workers was usually poor when dealing with COVID-19. Although some people are generally resilient and can adjust to emergencies, COVID-19 was responsible for the psychiatric symptoms noticed in physicians and their patients (Xing et al., 2020). For medical workers, paying attention to one's mental health is essential. Some specific factors that contribute to HCW risk include fear of COVID (Brennan et al., 2021), fear for family (Lai et al., 2020; Brejnebøl et al., 2021), workplace stress (Birhanu et al., 2018; Pisljar et al., 2011; Saeed et al., 2021), financial stress (Giordano et al., 2021; Al Hariri et al., 2022), and working on the front line (Bahadirli, & Sagaltici, 2021).

Fear of COVID-19

Researchers have shown that HCWs' fear of COVID-19 was a factor contributing to mental distress (Brennan et al., 2021). Experiencing multiple exposures requiring testing could also enhance such fear. A study performed by Brennan et al. (2021) from June 2020 to September 2020 examined the stress-related symptoms of COVID-19, fear, anxiety, and depression in both HCWs and the surrounding community using the Hospital Anxiety and Depression Scale (HADS) and the Fear of COVID-19 Scale. Of the study's 430 individuals tested for the coronavirus, 151 were HCWs. Symptoms of anxiety were categorized as normal in 64.9% of participants, as having anxiety in 35.1% of cases, as borderline in 17.2%, and described as moderate to severe in over 17.9% of participants. The prevalence of anxiety per case was 35.1%, a rate exceeding the norm of the general population (Brennan et al., 2021). Levels of depression were categorized as normal in 80.9% of participants; 19.1% were considered as having depression, 14% as borderline, and 5.1% as having a moderate to severe case of depression.

Brennan et al., 2021 found that HCWs maintained a fear of COVID-19 on par with non-HCWs, about 16.6 % vs. 16.4% (adjusted mean 'cases'). Risks for an increase in anxiety included being of the female gender, being a non-HCW, and experiencing prior COVID-19 testing. Risks for an increase in depression included being female, access issues leading to less education, and repeat testing (Brennan et al., 2021). Despite HCWs experiencing less anxiety and depression than non-HCWs, there was cause for concern about the emotional toll on those experiencing mental health issues. A limitation of this study was that the HCW role was not thoroughly looked at in detail due to the small number of participants.

Fear for Family

Fear of contracting COVID has brought about a variety of reactions, some from among HCWs (Shiwaku et al., 2021). Some workers were asked to quit their jobs because of their families' fear of the virus, others were avoided by their extended family and friends because they worked as front-line responders, and some HCWs could no longer work at their secondary jobs due to the ban on working across multiple facilities, which can decrease their monthly income, leading to increased financial stress (Shiwaku et al., 2021). Being involved in such uncomfortable situations could negatively affect workers and lower their motivation, leading to absenteeism. Shiwaku et al. (2021) surveyed the mental health of HCWs at the Tokyo Medical and Dental University Hospital after the pandemic's start (December). The study aimed to develop a new scale, the Tokyo Metropolitan Distress Scale for Pandemic (TMDP), to assess mental health and social factors surrounding COVID.

Two hundred sixty medical personnel participated in the Shiwaku et al. (2021) study. The initial step was to determine if the TMDP instrument could assess depression and anxiety in subjects. The TMDP demonstrated convergent validity with the Patient Health Questionnaire (PHQ-9; $\gamma = 0.42$, $P < 0.0001$), GAD-7 ($\gamma = 0.50$, $P < 0.0001$), and PSS-10 ($\gamma = 0.44$, $P < 0.0001$). Depression was set as a PHQ-9 ≥ 10 , and anxiety as a GAD-7 ≥ 10 . Eight (8) individuals had PHQ-9 scores ≥ 10 . The TMDP's area under the receiver–operator curve (AUC) for depression was 0.90 (95% CI; Shiwaku et al., 2021). Of the 260 participants, 17 individuals had GAD-7 scores ≥ 10 . The TMDP's AUC for anxiety was 0.89 (95% CI). Results show that the TMDP can accurately detect depression and anxiety with high accuracy. The TMDP's AUC for either a depressive state or anxiety was 0.90 (95% CI; Shiwaku et al., 2021). This new measurement tool can be helpful as a mental health tool.

Evidence showed that HCWs could undergo psychological stress at work and home because they feared bringing the infection home to their families (Lai et al., 2020). The fear of infecting family members weighed heavily on HCWs during the spikes in the pandemic, and many were concerned with exposing their relatives to the coronavirus and contracting the virus themselves. A study by Brejnebøl et al. (2021) examined the COVID-19 impact on the mental health of an otorhinolaryngological department's medical staff in the Capital Region of Denmark. This line of work puts HCWs at risk of inhaling aerosol-generating particles (AGP) produced by the airways that can quickly spread the infection. The participants were scored using the PHQ-9 (depression) and the GAD-10 (anxiety). All medical staff members were included in the survey to examine the physical and mental stressors that could adversely impact the mental health of HCWs (Brejnebøl et al., 2021). The staff's results showed that 22% showed markers for depression and 15.5% for anxiety. Fear of their families being infected (47%) and fear of infection (27%) contributed. Loneliness and isolation also played a role in their mental health; 27% reported friends pulling away from them, and 38% self-isolated due to their line of work (Brejnebøl et al., 2021). In this study, females also showed an increased risk for severe depression and stress (CI 1.49–179).

Workplace Stress

HCWs continually working weekly in a healthcare setting faced contracting the virus, which could result in an increase in workplace stress (Saeed et al., 2021). One-third of workers often complain about workplace stress (Saeed et al., 2021). All jobs have an inherent amount of stress associated with them; however, HCWs are unique, as their jobs can involve life-or-death situations. Their daily work environment allows HCWs to be significantly impacted by workplace stress (Birhanu et al., 2018; Pisljar et al., 2011; Saeed et al., 2021). HCWs have an

elevated risk of psychological disorders after an extended time working under straining workloads, the mental anguish of the increasing amounts of deaths seen daily due to COVID, the decrease in staffing matrix in many facilities, and not having enough support from management (Lai et al., 2020).

Saeed et al. (2021) conducted a study to evaluate the prevalence of anxiety and stress facing physicians in the Iraqi Kurdistan Region created by working during the pandemic. This cross-sectional study was carried out from March 28 to April 15, 2020, via an online survey and the 10-item Perceived Stress Scale to monitor stress and the GAD-7 for anxiety.

Saeed et al. surveyed 370 physicians; 15.4% of the respondents reported a low level of perceived stress, 67.3% a moderate level of stress, and 17.3% reported a prominent level of self-perceived stress. Iraqi physicians also suffered from changes in moods, with 44.3% reporting that they fairly often or very often felt irritated because of unexpected events, 34.6% stating they could not control notable events going on in life, 57.0% reporting stress and nervousness, 35.9% were unable to cope daily functions, 50% were angry they could not get control of their lives. Thirty-four percent felt they could not overcome the sheer number of difficulties facing them (Saeed et al., 2021). Saeed et al. also administered a generalized anxiety disorder survey to 201 Iraqi physicians as part of the same study. Nine percent of the respondents reported zero anxiety, 28.4% reported suffering from mild anxiety, 39.3% suffered from moderate anxiety, and 22.9% suffered from severe anxiety (Saeed et al., 2021). Also, 46.3% of Iraqi physicians reported feeling anxious, on edge, and nervous most every day, 41.3% reported being unable to stop worrying, 53.2% reported worrying too much, and 40.3% had trouble relaxing (Saeed et al., 2021). Forty-six percent feared something terrible might occur (Saeed et al., 2021).

Being a female was linked to having moderate to high stress (95% CI 1.31–4.39), and elevated stress levels were more frequent among women (20.5%) than in men (9.4%), ($P = 0.003$; Saeed et al., 2021). The study found that elevated stress was more frequent in younger physicians, those who were married, and those working in the hot zone of a COVID-19 center, but not to a statistically significant degree (Saeed et al., 2021). It was noted, however, that working in the hot zone of a COVID-19 center (AOR = 2.23 [95% CI 1.02–4.86]) and working as a general practitioner (AOR = 4.16 [95% CI 1.14–15.14]) were significantly linked to moderate to severe anxiety (Saeed et al., 2021). A limitation of this study was that only physicians were surveyed; many other HCWs, like respiratory therapists, face the same risks with potentially similar mental health status changes.

Working during a pandemic also contributes to mental health issues, as noted by the experience workers had during previous epidemics. One year after the SARS outbreak, HCWs were six times more likely to experience psychiatric symptoms than others (Preti et al., 2020). A few years later, workers still showed effects from the SARS epidemic, with 30% of HCWs who frequently worked during the outbreak of SARS still reporting a high level of emotional exhaustion after a considerable time (Preti et al., 2020; Uphoff et al., 2021). Safety measures imposed during the epidemic were linked to PTSD, increased alcohol intake, and acute stress disorder (Brooks et al., 2018; Uphoff et al., 2021). Insomnia, an issue affecting sleep patterns, was noted to be increased in HCWs compared to the population despite other outcomes being similar among the groups (Sheraton et al., 2020; Uphoff et al., 2021). Lack of sleep decreases focus, attention span, and the functionality needed to care for critical patients.

Financial Stress

In addition to workplace stress, many HCWs experienced financial stress (Al Hariri et al., 2022; Giordano et al., 2021). Quarantines were implemented during the pandemic's initial stages, and elective medical procedures were restricted. Many HCWs were called off for work shifts due to decreased operations being allowed. Reducing monetary funds for months or weeks created financial stress and worry for some HCWs, particularly those not on the front-line (Equan, Tammy, personal observation). Giordano et al. (2021) assessed the life quality of Latin American orthopedic trauma surgeons at the beginning of the COVID-19 pandemic. Surgeons from 14 Latin American countries responded to an online survey from April 17 to April 27. Two hundred twenty respondents completed the survey. Ninety-one percent of surgeons reported being anxious about their financial situation; 35.9% being extremely anxious, 55.9% slightly so, and 57.7% reported feeling emotionally exhausted, overwhelmed, overextended, and uneasy with the isolation standards in place surrounding COVID-19 and felt uncertain as to how long it would last before things return to normal. Seventy-five percent of surgeons thought their professional practices would change due to COVID-19 (Giordano et al., 2021).

COVID-19 has had negative implications on Latin American surgeons from a financial, professional, and mental health perspective, leading to symptoms of burnout in the profession (Giordano et al., 2021). Burnout has had an effect on many HCWs during the pandemic. Nurses have been identified in the literature as at risk for psychosocial symptoms due to depression, anxiety, and stress (Serdà et al., 2021; Chorwe-Sungani, 2021). Like nurses, RTs face similar needs for mental health support. The COVID-19 impact on HCWs was concerning; their skills were vital, and their work was fundamental to preventing and caring for infected patients (Choi et al., 2020; Gázquez Linares et al., 2021). The self-perceived threat needs to be strongly

considered; studies show that self-perceived threat from COVID-19 can engender severe psychosocial issues (Lai et al., 2020; Pérez-Fuentes et al., 2020; Gázquez Linares et al., 2021).

Mental health issues may affect HCWs differently depending on their economic status.

Al Hariri et al. (2022) performed a cross-sectional survey of frontline HCWs in the Department of Emergency Medicine of the American University of Beirut Medical Center (AUBMC). The study aimed to research the mental health of those working in the emergency department (ED) during the pandemic. During May and July 2020, an online survey was sent to 149 HCWs consisting of nurses, residents, and physicians in the AUBMC ED, of which 74 completed, included the Generalized Anxiety Disorder 7 (GAD-7) and the Patient Health Questionnaire 9 (PHQ-9; Al Hariri et al., 2022). Moderate to severe depression markers were identified in 25.68% of the HCWs based on their PHQ-9 score, and their GAD-7 and PHQ-9 scores on the anxiety and depression scales were statistically significantly higher among HCWs in the lower-income group working during the pandemic (Al Hariri et al., 2022). Survey results demonstrated a negative relationship between COVID-19 and psychological health concerning household income. A limitation of this study was that most participants were nurses who made less money than physicians. In the U.S., nurses tend to make a higher income over time compared to respiratory therapists (RTs). RTs may be more inclined to anxiety and depression due to financial pressures associated with the pandemic.

Other Risk Factors

Researchers have shown a variety of factors that place HCWs at risk (ALGhasab et al., 2021; Uphoff et al., 2021). Table 2 provides a list of factors organized by the domains of work environment, social network, and personal characteristics and circumstances (Uphoff et al., 2021). Some risk factors included in the systemic review were individuals of younger ages, being

of the female gender, occupation as a nurse, working on the front line, and the negative effects of stigma by others of your role in working during the pandemic (Uphoff et al., 2021). An updated August 2020 review determined that a higher risk of exposure of front-line workers was associated with increased symptoms of depression and anxiety but not PTSD (Bell & Wade, 2020). An independent risk factor for adverse outcomes and elevated depression was being a front-line worker (ALGhasab et al., 2021; Bahadirli & Sagaltici (2021). HCWs who feel they have a decrease in their efficiency on the job, an increase in depression, diminished concentration, decreased cognition, lack of energy, and are slow to process thoughts are at risk for worsening depression outcomes.

Table 2.

Risk Factors for Adverse Mental Health Outcomes.

Domain	Risk factors
Personal characteristics and circumstances	Female
	Younger age
	Lower household income
	Physical or previous mental health condition
	Being single
	Experiencing quarantine
	Worries about risk of getting infected
	Sense of loss of control
	Disruption to personal life
Work environment	Feeling unprepared
	Nurse
	High risk of contact with patients/ frontline worker
	Infected colleague
	Working in hardest hit area
	Job stress and dissatisfaction
	Precautionary measures perceived as impediment
Social network	Non-voluntary assignment to high-risk role
	Worries about family members getting infected
	Social rejection/stigma
	Social isolation

Note. From “Mental health among healthcare workers and other vulnerable groups during the COVID-19 pandemic and other coronavirus outbreaks: A rapid systematic review”, by Uphoff et al., 2021, *PloS One*, 16(8), <https://doi.org/10.1371/journal.pone.0254821.t003>.

Front Line Work

Respiratory therapists work in emergency departments (ED) throughout the United States and, as such, were part of the front-line in caring for COVID patients. Being a front-line worker places HCWs at substantial risk for mental stress (Bahadirli & Sagaltici, 2021). HCWs in the EDs need mental health support and models to protect them from experiencing severe PTSD (Bahadirli & Sagaltici, 2021). An HCW staffing the ED was usually the first point of contact for COVID patients, creating a sense of duty and responsibility for taking care of them. A study by Bahadirli and Sagaltici (2021) was conducted to determine the possible rate of PTSD and factors associated with PTSD symptom severity in physicians and nurses working in EDs. Although RTs are also front-line workers, they were not included in this study. The PTSD Checklist for DSM-5 and the Depression, Anxiety, and Stress Scale-21 instruments were administered to 783 HCWs (physicians and nurses) working in EDs. The probable PTSD rate of the total sample was 19.2%, 22.9% in providers, and 15.1% in nurses. Otherwise, depression, anxiety, and stress levels were the same for both providers and nurses (Bahadirli & Sagaltici, 2021). Exacerbations in depression, anxiety, contracting the coronavirus, a history of chronic disease, and being a female were all indicators of elevated PTSD symptoms (Bahadirli & Sagaltici, 2021). Additional signs of increased risks for PTSD were having to work long shifts, being new to healthcare, and a decreased economic status of low wages (Bahadirli & Sagaltici, 2021). This study considers physicians at a higher PTSD risk than nurses, unlike other studies.

Healthcare workers are always needed to provide care to patients, even more so during a pandemic when patient loads increase along with the need for more workers. Not much data could be found on HCWs in sub-Saharan Africa (Ali et al., 2021), so nurses were recruited from

the Aga Khan University Hospital in Nairobi (AKUHN) to participate in a survey study between August and November 2020. The validated questionnaires used included the PHQ-9, the GAD-7, the 7-item Insomnia Severity Index Questionnaire (ISI), the IES-R, and the 16-item Stanford Professional Fulfillment Index Questionnaire (SPFI). The questionnaires showed good internal consistency and Cronbach alpha of 0.835, 0.837, 0.871, 0.955, and 0.837 for PHQ-9, GAD-7, ISI, IES-R, and SPFI, respectively (Ali et al., 2021). One hundred seventy-one participants completed the survey; almost 64.9% were front-line workers fighting COVID-19, with the majority being married females. A tiny percentage, 1.8%, reported a pre-existing mental health issue (Ali, Shah, & Talib, 2021). Nurses reported depression, anxiety, insomnia, distress, and burnout in these increments of 45.9%, 48.2%, 37.0%, 28.8%, and 47.9% (Ali et al., 2021). As reported in Table 3, nurses working on the front-line acknowledged they sustained increased symptoms of moderate to severe depression, mental distress, and exhaustion. Women reported more instances of burnout than men (Ali et al., 2021). The authors concluded that being a front-line worker was a risk factor for depression and burnout.

Table 3.

Comparison of Demographic and Mental Health Disorders Among the Frontline and Second-line Nurses.

	Total	Frontline	Secondline	P value
Age (n = 164) (median [IQR])	33.47 [29.80, 35.32]	33.49 [29.52, 36.09]	33.30 [29.97, 35.81]	0.817
Gender				0.741
Male	50 (29.2%)	34 (30.6%)	16 (26.7%)	
Female	120 (70.2%)	76 (68.5%)	44 (73.3%)	
Prefer not to disclose	1 (0.6%)	1 (0.9%)	0 (0.0%)	
Marital Status				0.506
Single	61 (35.7%)	37 (33.3%)	24 (40.0%)	
Married	104 (60.8%)	69 (62.2%)	35 (58.3%)	
Other	6 (3.5%)	5 (4.5%)	1 (1.7%)	
History of Mental Health Disorder				0.553
Yes	3 (1.8%)	3 (2.7%)	0 (0.0%)	
No	168 (98.2%)	108 (97.3%)	60 (100.0%)	
Depression		(n = 110)	(n = 60)	0.026
None	92 (54.1%)	52 (47.3%)	50 (66.7%)	
Mild	57 (33.5%)	39 (35.5%)	18 (30.0%)	
Moderate	12 (7.1%)	11 (10.0%)	1 (1.7%)	
Severe	9 (5.3%)	8 (7.3%)	1 (1.7%)	
Score	4.00 [2.00, 7.00]	5.00 [2.00, 9.00]	3.00 [1.00, 6.00]	0.009
Anxiety		(n = 109)	(n = 59)	0.681
Minimal	87 (51.8%)	55 (50.5%)	32 (54.2%)	
Mild	66 (39.3%)	42 (38.5%)	24 (40.7%)	
Moderate	12 (7.1%)	9 (8.3%)	3 (5.1%)	
Severe	3 (1.8%)	3 (2.8%)	0 (0.0%)	
Score	4.00 [2.00, 7.00]	4.00 [2.00, 7.00]	4.00 [2.00, 6.00]	0.383
Insomnia		(n = 109)	(n = 59)	0.052
None	106 (63.1%)	69 (63.3%)	37 (62.7%)	
Subthreshold	52 (31.0%)	30 (27.5%)	22 (37.3%)	
Moderate	9 (5.4%)	9 (8.3%)	0 (0.0%)	
Severe	1 (0.6%)	1 (0.9%)	0 (0.0%)	
Score	6.00 [2.00, 9.00]	6.00 [1.00, 9.00]	6.00 [3.00, 9.00]	0.533
Distress		(n = 108)	(n = 59)	0.039
Normal	119 (71.3%)	74 (68.5%)	45 (76.3%)	
Mild	19 (11.4%)	12 (11.1%)	7 (11.9%)	
Moderate	9 (5.4%)	4 (3.7%)	5 (8.5%)	
Severe	20 (12.0%)	18 (16.7%)	2 (3.4%)	
Score	15.00 [6.00, 26.00]	16.00 [5.00, 28.50]	14.00 [7.00, 23.00]	0.501
Avoidance	0.90 [0.30, 1.40]	0.90 [0.30, 1.70]	0.70 [0.30, 1.10]	0.205
Intrusion	0.80 [0.30, 1.30]	0.80 [0.20, 1.30]	0.80 [0.40, 1.30]	0.900
Hyperarousal	0.50 [0.20, 1.00]	0.50 [0.20, 1.20]	0.50 [0.20, 0.80]	0.619
Burnout		(n = 107)	(n = 58)	0.005
≤ 1.33	86 (52.1%)	47 (43.9%)	39 (67.2%)	
> 1.33	79 (47.9%)	60 (56.1%)	19 (32.8%)	
Professional Fulfillment		(n = 107)	(n = 57)	0.298
≤ 3.00	133 (81.1%)	84 (78.5%)	49 (86.0%)	
> 3.00	31 (18.9%)	23 (21.5%)	8 (14.0%)	
Professional Fulfillment	54.17 [41.67, 75.00]	54.17 [37.50, 75.00]	54.17 [45.83, 70.83]	0.967
Work Exhaustion	50.00 [25.00, 62.50]	50.00 [25.00, 75.00]	37.50 [25.00, 56.25]	0.011
Interpersonal Disengagement	16.67 [0.00, 37.50]	25.00 [0.00, 37.50]	12.50 [0.00, 25.00]	0.027

* N was not the same down the column because variable availability of results.

<https://doi.org/10.1371/journal.pone.0254074.t001>

* N was not the same down the column because variable availability of results.

Note. From “COVID-19 and mental well-being of nurses in a tertiary facility in Kenya”, by Ali et al. 2021, *PloS one*, 16(7), e0254074, <https://doi.org/10.1371/journal.pone.0254074>.

Front-line workers reported higher scores in depression, anxiety, insomnia, distress, and burnout compared to second-line workers or support staff. Depression (moderate to severe) among front-line vs. second-line nurses was 17.3% vs. 3.4% ($p = 0.026$); anxiousness was 11.1% vs. 5.1% ($p = 0.681$); sleep inefficiency was 9.1% vs. 0.0% ($p = 0.052$); mental duress was 20.4% vs. 11.9% ($p = 0.039$); exhaustion was 56.1% vs. 32.8% ($p = 0.005$; Ali et al., 2021). Front-line workers showed a significant risk and prevalence of mental health symptoms that may threaten the already weakened work force from staff shortages occurring at the height of the pandemic. Future COVID outbreaks from further variants may cause front-line workers multiple, repeated exposures to high-stress levels, which can lead to PTSD. Chen et al. (2021) describe PTSD as a chronic yet common mental illness occurring post-natural and other disasters and accidents responsible for the complications of depression. Studies also reveal that several years after the SARS epidemic, HCWs were still suffering from depression (McAlonan et al., 2007; Liu et al., 2012; Chen et al., 2021). Exhaustion and stress can initiate and exacerbate anxiety, despondency, despair, depression, and irritability, causing mood swings leading to behavioral disturbances (Huang et al., 2013; Chen et al., 2021).

In the Chen et al. (2021) study, 597 HCWs responded to the questionnaires for the Center for Epidemiologic Studies-Depression Scale (CES-D) to evaluate markers of depression, the IES-R to measure symptoms of PTSD, and the Pittsburgh Sleep Quality Index (PSQI) scale for sleep quality 95% confidence intervals (CI) were calculated. Survey results indicated that 45.23% of subjects displayed symptoms of PTSD, and the average PSQI score was 6.320 ± 3.587 . PTSD symptoms correlated with an increased prevalence of depression. Staff analysis showed

that HCWs who did not participate in the Hubei aid program offered despite having zero traumatic exposures before the COVID-19 outbreaks and PTSD may still tend towards depression in females (Chen et al., 2021).

Kebede et al. (2021) studied front-line medical staff's self-perceived stressors and emotional responses in Addis Ababa COVID-19 Treatment Centers and obstetrics emergency and abortion care, Ethiopia 2020. The COVID-19 staff questionnaire was sent via survey from June 1 to June 30, 2020, to 399 front-line HCWs included in the study. Negative emotional responses were found in 94.4% of workers during the outbreak; nurses were 10.53 times more susceptible to negative emotions than OBY/GYN specialists. Most workers, 95.5% at COVID-19 treatment centers and 84.2% at the obstetrics emergency and abortion care unit, perceived symptoms and the outbreak-related stressors (Kebede et al., 2021). HCWs who maintained a decreased level of motivational factors and social support all reported negative emotional responses. Countries such as Saudi Arabia also reported findings of depression, anxiety, and stress among front-line workers related to the pandemic. Alhurishi et al. (2021) also reported HCWs being at risk for mental health disorders and psychological distress by COVID-19. HCWs must maintain mental health stability, especially during infectious epidemics. Alhurishi et al.'s cross-sectional study was to evaluate the levels of depression, anxiety, stress, sleep disturbances, and PTSD experienced by HCWs during the COVID-19 pandemic in Saudi Arabia. Data collection began in March 2020 to May 2020 via the PHQ-9 for depression, the GAD-7 for anxiety, the ISI for insomnia, and the IES-R for distress questionnaires via a survey link.

Two hundred HCWs participated in Alhurishi et al.'s (2021) study, with 57% working on the front-line with COVID-19 patients. Findings show that 73% reported suffering from depression, 69% from anxiety, 62%, and 83% from distress. The Alhurishi et al. study found that

35% of physicians had severe symptoms of depression compared to 20% of nurses ($p < 0.05$); however, 15% ($P < 0.05$) of women reported severe depression and 11% ($P < 0.05$) anxiety when compared to men. Gender, profession, and job role played a role in the risk and severity of symptoms. Women were two times as likely to report mental issues with depression (OR, 1.94; 95% CI, 0.89–4.22; $P = < 0.05$) and anxiety (OR, 1.42; 95% CI, 0.34–5.94; $P = < 0.05$) compared to men. A profession as a nurse, or a similar role such as RT, was linked with a higher severity of anxiety (OR, 0.57; 95% CI, 0.32–1.30; $P < 0.05$), (OR, 0.72; 95% CI, 0.05–9.31; $P < 0.05$) when compared to other HCW roles or physicians. Being on the front line with COVID patients was shown to put one at significant risk for depression (OR, 0.48; 95% CI, 0.09–2.37; $P = < 0.05$) and distress (OR, 0.92; 95% CI, 0.44–1.92; $P = < 0.05$; Alhurishi et al., 2021). This study shows that not all HCWs are affected equally regarding depression, anxiety, stress, and other psychological disorders. Individualized treatment was needed to care for the various roles, professions, and work practices of HCWs.

High staff turnover and high patient acuity led to burnout among many HCWs, especially RTs. Causes of burnout were reported as poor staffing, inequitable workload, an atmosphere of burnout in the department, and poor leadership (Strickland et al., 2022). Strickland et al. (2022) studied burnout and organizational domains via a cross-sectional survey of 26 facilities around the U. S. from January 2021 to March 2021 (Strickland et al., 2022; Miller et al., 2021). Identified sections of the Safety, Communication, Operational Reliability, and Engagement tool were used to gather data on burnout and exhaustion. Over 3,000 RTs received the survey, yielding a response rate of 37%. RTs reported burnout at a rate of 79%, with levels ranging from mild (37%), moderate (32%), and severe (10%). Statistical analysis indicated that RTs who engaged in higher work hours staffed in the ICU or worked below minimum staffing and

endured a high level of exposure to COVID-19 suffered a higher risk from burnout (Strickland et al., 2022; Miller et al., 2021). The qualitative phase of the study reported themes of patient mortality, fluctuating changes in policy, lack of staff, poor compensation, exhaustion, and fatigue (Strickland et al., 2022). Other studies also supported RTs being especially vulnerable to burnout (Roberts et al., 2022; Forrest et al., 2021; Kerlin et al., 2022; Miller et al., 2021). RTs also reported feeling a lack of respect despite the vast efforts put forth as a group (Strickland et al., 2022).

Spain also investigated the mental health of its front-line workers during the pandemic. During the initial quarantine phase in March 2020, Erquicia et al. (2020) aimed to analyze the impact of the pandemic on the mental health of Igualada Hospital workers in Spain. Three hundred ninety-five professionals participated. Instruments used for measurements included the DASS-21, the Hamilton Anxiety Rating Scale (HARS), and the Montgomery-Asberg Depression Rating Scale (MADRS), which are also used to assess anxiety and depressive symptoms. Scoring indicated that emotional distress was more severe in females than males, as highlighted by the increased scores on the DASS-21 in female workers (3.39 ± 1.55 ; 2.58 ± 1.54 ; $F(392.1) = 20.69$; $p < 0.001$). Seventy-one percent of HCWs presented with anxiety symptoms, and 31.4% were in the moderate to severe range according to the (HARS) scoring (Erquicia et al., 2020). The MADRS findings indicated that 60.3% of HCWs reported experiencing symptoms of depression, 12.2% in the moderate to severe range and depression, and 48.1% experienced mild depression. The study showed varying levels of mental distress depending on the category. Depending on the surrounding events, stressors were typically linked to increased levels of psychological distress, such as workers who experienced quarantine, those with young children, and those who lost a loved one to COVID are linked with increased levels of mental distress (Erquicia et al., 2020).

This study showed a significant risk for HCWs working during the height of the pandemic. Healthcare facilities should develop interventions for staff who need further support.

Studies have found a strong link between a HCW's discerned work conditions and their mental health (Blanchard et al., 2022). Lack of support from leadership led to worsening health conditions. A 2022 study by Blanchard et al. surveyed emergency HCWs, emergency room physicians, nurses, residents, and emergency medical providers in the U. S. across ten sites from November 19, 2020, to December 31, 2020. The sites varied in size and location (Birmingham, Dallas, Detroit, Fulton County, Los Angeles, New Orleans, New York City, Omaha, Providence, and Washington, DC). The online survey included demographics, the Patient Health Questionnaire for Anxiety and Depression (PHQ-4), a 5-item job stress scale, and an organizational support scale. Seven hundred one HCWs participated, with 23% scoring positive for anxiety and depression and 39.7% for burnout (Blanchard et al., 2022). Nurses comprise the largest group of emergency room providers showing signs of anxiety and depression. As a group, they had a significantly higher likelihood of being positive for mental health issues related to depression, anxiety (adjusted odds ratio [aOR] 2.04, 95% confidence interval [CI] 1.11–3.86) and burnout (aOR 2.05, 95% CI 1.22–3.49) when compared to other emergency workers (Blanchard et al., 2022).

Data shows that RTs face an elevated risk of prevalence for depression and anxiety (symptoms of PTSD). Blanchard et al. (2022) also supported evidence of HCWs being afraid of infecting their family members and others they loved, financial concerns, and fear of the public's view of their job role by reporting adverse conditions related to their mental health. Not to be overlooked are places of work and how the organization responds to the fears of its workforce. Leadership failure was a cause of burnout reported by many HCWs (Blanchard et al., 2022).

Failure to recognize the role of these organizational factors can result in unfair blaming of symptomatic individuals for their failure to show resilience. A multifactorial approach was needed to assist HCWs with their mental health issues/concerns due to the pandemic and the excess hardship brought about by it (Blanchard et al., 2022).

Determinants of well-being among RTs working in ICUs were observed in the Roberts et al. (2022) study. The mixed-method survey was conducted online from July 2020 to May 2021 of RTs and other HCWs at the University of Pennsylvania Health System. The semi-structured interviews followed from April 2021 to May 2021 with ten ICU RTs. Study tools included the 7-item Well-Being Index (WBI), the 16-item Stanford Professional Fulfillment Index (SPFI), and several questions regarding work factors (Roberts et al., 2022). An evaluation of the well-being of RTs to other healthcare groups indicated RTs were at a significantly elevated risk of burnout (odds ratio 2.32 [95% CI 1.41-3.81]), depression (odds ratio 2.73 [95% CI 1.65-4.51]) and poor job fulfillment (odds ratio 0.51 [95% CI 0.31-0.85]; Roberts et al., 2022). Seventy-five percent of RTs suffered from burnout and 58% from depression (Roberts et al., 2022). Other ICU workers also had a decrease in well-being during the pandemic. However, the well-being of RTs was significantly lower compared to other HCWs (Kerlin et al., 2022; Roberts et al., 2022). Failure from leadership to meet RTs' needs leads to burnout due to safety issues, an imbalance in work-life balance, inadequate staff, and conflict in general (Roberts et al., 2022).

Physicians. Being a front-line worker and having heavy job responsibilities can also be a factor in developing mental health issues. Mental health symptoms have consistently been reported as caused by the global pandemic. Physicians have a significant responsibility in working with COVID patients (Aebischer et al., 2020; Kozu et al., 2022; Roberts, Daniels, Hulme et al., 2021a; Roberts, Daniels, Hulme et al., 2021b; Das et al., 2020; Monterrosa-Castro

et al., 2020; Vlah Tomičević & Lang, 2021). In a study of Latin American pediatric rheumatologists (LAPRs) by Kozu et al. (2022), anxiety and depression were experienced by LAPRs during the pandemic and affected their mental health. The study aimed to evaluate the mental health of 318 LAPRs via a survey using the GAD-7 to measure anxiety and the PHQ-9 for depression. The response rate for the Kozu et al. study was 40%, representing 65% of Latin American countries. Twenty-seven percent of providers worked on the front line, and 49% reported issues with moderate to severe depression and anxiety despite not having a preexisting history of any mental health symptoms (Kozu et al., 2022). Working on the COVID front line (37% vs. 17%, $p = 0.015$), experiencing helpless feelings (39% vs. 17%, $p = 0.009$), and suffering from burnout (39% vs. 11%, $p = 0.0001$) were indicators significantly higher in LAPRs showing the symptom of anxiety and sleep disturbances (Kozu et al., 2022). Preventive strategies need to be developed and promoted for HCWs experiencing psychological disorders.

Another survey of front-line physicians practicing in the UK and Ireland in anesthetics, intensive care medicine (ICM), and emergency medicine (EM) during a peak in the pandemic in January 2021 was conducted by Roberts, Hirst, et al. (2021). The study aimed to understand the prevalence of mental health distress. Research conducted in the Spring and Winter of 2020 identified elevated rates of psychological trauma among physicians (Roberts, Daniels, Hulme, et al., 2021a; Roberts, Daniels, Hulme, et al., 2021b). The pandemic was lingering, making it necessary to trace the psychological impact on HCWs to create appropriate policies and service provisions for treatment. The findings were compared to quantify the progressive psychological implications for mental health (Roberts, Hirst, et al., 2021). Initial participants of the first survey were asked to participate in the second follow-up survey using the (GHQ-12) and the IES-R again (Roberts, Daniels, Hulme, et al., 2021b). Data was collected in the UK from January 28,

2021, to February 11, 2021, and in Ireland from February 1, 2021, to February 15, 2021 (Roberts, Hirst, et al., 2021; Roberts, Daniels, Hulme, et al., 2021a; Roberts, Daniels, Hulme, et al., 2021b).

One thousand seven hundred nineteen physicians responded to all COVID-19 Emergency Response Assessment (CERA) surveys, 40.8% from anesthesia, 45.3% from EM, and 9.5% from ICM. Results show that the frequency of mental distress was 53.2% ($n=801$), showing an increase from the initial survey's 44.7% ($n=1334$; Roberts, Daniels, Hulme, et al., 2021a; Roberts et al., 2021). The median GHQ-12 score was 15.0, higher than all previous surveys (Roberts et al., 2021). The frequency of mental trauma was 28.4%, higher than the initial 23.7% during the first outbreak of the pandemic (Roberts, Daniels, Hulme, et al., 2021b; Roberts et al., 2021). PTSD symptoms were also elevated at 17.2% compared to the first survey's 12.6% (Roberts, Daniels, Hulme, et al., 2021b; Roberts et al., 2021). Of note, all fields reported an increase in trauma prevalence, with ICM providers reporting the highest at 31.1%. A limitation of the studies by Roberts and colleagues was that pre-pandemic data could not be collected, preventing some comparisons. However, the rise in worsening mental trauma was significant and impacted HCWs as the pandemic continues or if other outbreaks occur. All HCWs, especially those on the front line, must be evaluated for risk factors and the potential for long-term mental health treatment and support (Roberts et al., 2021).

In March 2020, the Croatian Minister of Health espoused the crisis with the respiratory syndrome coronavirus 2 (SARS-CoV-2) epidemic, which later became classified as a pandemic. An increased prevalence of depression, anxiety, stress, and PTSD was found among Croatian doctors and nurses in the study conducted by Vlah Tomičević & Lang (2021). The cross-sectional study was conducted on family medicine providers online with the Depression,

Anxiety, and Stress Scale (DASS-21) and the Impact of Event Scale-Revised (IES-R) questionnaires from May 1 to May 15, 2020. Both the DASS-21 and IES-R were previously validated for use in Croatia with a high Cronbach's α reliability coefficient for the DASS-21 questionnaire (0.90, 0.82, and 0.88) and IES-R (0.79 to 0.94) depending on the subscale (Jakšić et al., 2012; Crawford & Henry, 2003; Beck et al., 2008; Vlah Tomičević & Lang, 2021). Five hundred thirty-four HCWs were surveyed. Elevated stress levels were identified in over 30.9% of family practitioners, anxiety was found in 33.1%, depressive markers in 30.7%, and PTSD was seen in 33.0 (Vlah Tomičević & Lang, 2021). Again, women were found to have higher scores in the DASS-21 anxiety subscale and IES-R scores. Chronic conditions and comorbidities were linked to increased levels of PTSD, depression, anxiety, and stress, along with having responsibility for young, school-aged children on a stress subscale in DASS-21 ($p < 0.043$; Vlah Tomičević & Lang, 2021). One interesting finding from this study was the results of COVID-19 on HCWs' mental health status compared to a recent earthquake in the area, which did not impact the scores. This study was conducted in the preliminary stages of the pandemic, and results could have improved or worsened since that time.

The strain on HCWs due to the pandemic was great. When faced with intense stress, a person needs to adapt and find a way to cope. Psychological resilience is the ability to process extreme stress and adversity and keep a normal, stable psychological profile while functioning normally (Russo et al., 2012; Arslan et al., 2021). Resilience offers refuge from stress in the workplace. If HCWs who face constant demands in the workplace run out of helpful resources, they fall victim to stress (Fletcher & Sarkar, 2013; Arslan et al., 2021). Arslan et al. (2021) investigated the resilience of physicians (medical doctors and dentists) working during the pandemic. Participants completed an online survey from April 13–23, 2020, containing the

Psychological Resilience Scale and the Hospital Anxiety Depression Scale (HAD-A/HAD-D) instruments. Both internal consistency and reliability are satisfactory for the HAD-A and HAD-D as measured by Cronbach's alpha coefficient, showing 0.88 for the anxiety subscale and 0.73 for the depression subscale (Arslan et al., 2021). Six hundred and seventy-one physicians provided measurements from the scored instruments. Physicians who reported being adequately trained to deal with COVID, who had experience working in healthcare for many years, and who had children reported higher resilience scores ($p < 0.05$). The physicians with low scores below the cutoff on the HAD-D/HAD-A also reported significantly higher scores on the Psychological Resilience Scale ($p < 0.05$). Depression and anxiety scores were increased in females reporting a chronic disease, those with heavy workloads, and those who had close exposure to COVID-19 patients ($p < 0.05$; Arslan et al., 2021). The literature was consistent with females having a risk factor for depression and anxiety; clinicians should carefully evaluate all female HCWs if needed.

A comparison among medical students in Switzerland by Aebischer et al. 2020 compared the physical and mental health of Swiss medical students and those on the front line of COVID-19 with their non-involved peers. Data collection began May 9 - May 14, 2020, via an online survey containing the measurement tools of the GAD-7 for anxiety, the PHQ-9 for depression, and the Maslach Burnout Inventory to ascertain burnout. Five hundred fifty medical students and 227 residents were included in the data analysis. Nearly 50% of the medical students participated in the COVID-19 response, and 30% worked on the frontline. Sixty-one percent of residents also worked on the frontline. Residents and students alike had timely employer communication, access to needed information, and excellent access to PPE. Front-line medical students' responses reported a similar ratio of COVID-19 symptoms or confirmed diagnoses ($p = 0.81$),

decreased levels of anxiety ($p < 0.001$), depression ($p < 0.001$), and burnout ($p < 0.001$ for depersonalization item), compared with their non-involved peers (Aebischer et al. 2020).

Health outcomes of frontline medical students did not differ significantly compared with their non-frontline peers. Scores for burnout were lower in front-line students than front-line residents ($p < 0.01$ for the emotional exhaustion item); all other remaining health outcomes showed no significant difference. There were no significant differences in psychological health between front-line students and their non-front-line peers (Aebischer et al., 2020). Continued access to needed PPE, adequate support, and timely information by employers assumably lowered anxiety in front-line responders. The higher levels of adverse mental health symptoms in non-involved students may be explained by difficulties adjusting to the difference in online teaching vs. classroom instruction, worries regarding testing performance, and increased social isolation (Cao et al., 2020; Aebischer et al., 2020). A potential protective factor for the higher scores on the sense of coherence could be linked to having a meaningful share in the pandemic (Aebischer et al. 2020). A limitation of this study was that gender and age were not considered in the psychological factors. More research was needed to build preventative measures to mitigate mental health decline.

The Das et al. (2020) study objective was to assess the mental health of pan-Indian front-line doctors of tertiary care hospitals in India from May 23, 2020 - June 6, 2020, an online survey containing the PHQ-9 for depression and the Perceived Stress Scale to assess stress levels was open. Four hundred twenty-two participants indicated that 63.5% of front-line doctors showed a prevalence of depression, and 45% had a prevalence of stress. Doctors reported that 14.2% experienced moderately severe depression, and 3.8% experienced severe depression. Thirty-seven percent of physicians reported a prevalence of moderate stress, and 7.6% reported

experiencing severe stress (Das et al., 2020). A significant risk factor for the prevalence of moderate or severe perceived stress was working ≥ 6 hours/day (adjusted odds ratio: 3.5; 95% CI, 1.9-6.3; $P < .0001$), additionally, being single (adjusted odds ratio: 2.9; 95% CI, 1.5-5.9; $P = .002$) and working ≥ 6 hours/day (adjusted odds ratio: 10.3; 95% CI, 4.3-24.6; $P < .0001$) contributes significantly to the progression of moderate to moderately severe, or severe depression (Das et al., 2020). Pan-Indian doctors with moderately severe to severe depression shared a significant association ($P < .05$) with being female ($P < .001$) and a postgraduate trainee ($P = .011$; Das et al., 2020). Higher PSS scores were seen in those women, singles, interns/house staff, front-line workers, those working excessive hours per day (≥ 6 hours/day), those living with family and fear of infecting them, and those with chronic illnesses (Das et al., 2020).

Anxiety among front-line internal medicine physicians working in the department of a tertiary care hospital in Turkey was investigated by Uyaroglu et al. (2020). This cross-sectional study was conducted via an online survey with the Turkish versions of the GAD-7 and the Beck Anxiety Inventory questionnaire from April 1- April 14, 2020. One hundred and thirteen participants responded. In the study, 63.7% worked on the front lines caring for patients with COVID. Results of the study showed that women had a significant association with increased scores in all scales compared to men ($P < 0.005$). Also noticed was an elevation in anxiety levels and scores for those with a history of chronic disease and family members over 65 years old ($P < 0.005$; Uyaroglu et al., 2020).

General practitioners in Columbia, South America, were included in the Monterrosa-Castro et al. study to determine the prevalence of anxiety and its link to demographic and psychosocial factors. This cross-sectional study was carried out online and included the GAD-7, a questionnaire on psychosomatic problems, and the Fear of COVID-19 Scale. Five hundred

thirty-one general practitioners participated in the survey. Anxiety symptoms were reported in 40% of Colombian general practitioners intensified by being of the female gender, social discrimination due to being a front-line worker, anguish, job disappointment, nightmares, stress, and other symptoms. Conversely, being made to feel safe at your job, maintaining job satisfaction, and having trust in the government were all linked with a decreased level of anxiety (Monterrosa-Castro et al., 2020). Results showed that workers with symptoms of anxiety often feared having symptoms of COVID, feared infecting the family at home, felt disappointed at work, felt stressed out about going to work the next day, and considered leaving their profession to protect their family, compared with those without symptoms of anxiety ($p < 0.05$). Both groups experienced some form of social discrimination due to their job roles and the pandemic. ($p < 0.05$; Monterrosa-Castro et al., 2020).

Nurses. Like physicians, nurses have a significant responsibility in the day-to-day care of patients, especially those requiring critical care. Therefore, nurses experience and work under greater stress due to COVID-19 (Chorwe-Sungani, 2021; Serdà et al., 2021; Gázquez Linares et al., 2021; Erquicia et al., 2020). Some stress was natural and expected in daily living, but continued exposure to extreme amounts of stress over time increases the risk of psychological events (Serdà et al., 2021). Extreme emotional duress of HCWs during epidemics, such as the Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak, the novel coronavirus, and SARs, emphasizes that many workers exhibit mental health symptoms, such as anxiety and depression (Serdà et al., 2021; Park & Park, 2020; Khalid et al., 2016).

Serdà et al. (2021) collected data on HCWs via online media from April 4 to April 10, 2020. The questionnaires used for collection included the Cognitive Emotional Regulation Questionnaire (CERQ-18) to measure cognitive and emotional regulation mechanisms, the

Generalized Anxiety Disorder Scale (GAD-7) to identify symptoms of anxiety and depression, and the nine-item Patient Health Questionnaire (PHQ-9). One thousand four hundred fifty-two (1452) HCWs participated in the study. Results showed that based on cognitive and emotional regulation mechanisms, 7.5% of HCWs were candidates for psychological support; also, 54.1% of nurses, 16.5% of nursing assistants, 15.6% of professionals, and 12.8% of doctors were prospects for psychological intervention (Serdà et al., 2021). Nurses and nurse assistants in this study had less ability to cope with distress than physicians, putting them at a higher risk of experiencing a mental disorder. The results are supported by findings in a study conducted by Sirois & Owens (2021). Being a nurse or nurse aid (profession), being between thirty to thirty-nine (30-39) years old (age group), and suffering from depression or anxiety are considered to be risk factors for the need for additional mental health support (Serdà et al., 2021). A limitation of the study was that the long-term effect of the pandemic on HCWs may need to be repeated over time.

COVID-19 has created anxiety among HCWs that prevents them from working as efficiently as they can because of the burden of mental health symptoms they are fighting while working; emotional stability is needed for the best outcomes. A study by Chorwe-Sungani (2021) found that anxiety can cripple or interfere with a nurse's performance of job functions. The primary aim of this study was to evaluate anxiety with COVID-19 and functional impairment among nurses in Malawi. Data was collected online from 102 nurses, nurse midwives, technicians, and registered nurses in Malawi from August 2020 to September 2020 via the Coronavirus Anxiety Scale (CAS) and the Work and Social Adjustment Scale (WSAS). Study results established that 25.5% of participants suffered from COVID-19-related anxiety and 48% from impairment in functional status. Impairments in functional status were elevated in

hospital HCWs (58.6%, $n = 34$), with a mean WSAS score of 20.6 ± 10.4 (Chorwe-Sungani, 2021). The type of care front-line workers provide can be stressful, especially when working with extremely critical patients on the verge of death, the need to be proficient in multiple advanced protocols, and heavy assignments; this makes many HCWs extremely susceptible to stress and easily overwhelmed (Maben & Bridges, 2020; Chorwe-Sungani, 2021). At times, HCWs may not be able to ascertain whether a problem exists or cannot deal with their mental health issues while focusing on care for COVID-19 patients (Chorwe-Sungani, 2021). Literature suggests that those suffering from a stress-related injury may not easily recognize it or take proper steps to receive the needed mental health support (Maben & Bridges, 2020).

Gázquez Linares et al. (2021) examined the perceived threat of COVID-19 on the mental health of actively employed nurses, considering a COVID diagnosis, their own or a person close to them. Data was collected with the Questionnaire on the Perception of Threat from COVID-19 to analyze the self-perceived threat and the General Health Questionnaire to score mental health. Three hundred fifty-one nurses responded to the survey. Nine percent of nurses received a positive diagnosis of COVID-19, and 62.7% of workers also had someone they knew diagnosed with COVID-19 (Gázquez Linares et al., 2021). Females reported significantly higher levels of a perceived threat than males (females had a higher average score ($M = 33.26$, $SD = 6.28$) than males ($M = 31.06$, $SD = 5.93$)). Nurses diagnosed with COVID and others who knew someone close to them who also became positive felt a more profound sense of perceived threat due to COVID-19 (Gázquez Linares et al., 2021). HCWs reporting elevated levels of self-perceived threat would correlate with elevated scores in mental health and show symptoms of depression, dysfunction, hostility, anxiety, and sleep disturbances.

In their policy brief, the United Nations reported that HCWs are especially vulnerable to the psychological effects of the COVID-19 pandemic (United Nations (UN), n.d.). Further research into posttraumatic stress, self-perceived social support, and the consequences surrounding the pandemic was conducted by Nowicki et al. (2020) between May 1 - May 15, 2020, via web interviews. Three hundred twenty-five nurses from Poland participated in the study. All nurses completed the Impact Event Scale-Revised (IES-R), the Multidimensional Scale of Perceived Social Support (MSPSS), the Changes in Outlook Questionnaire (CIOQ), the Safety Experience Questionnaire (SEQ), and the Meaning in Life Questionnaire (MLQ) research tools. Regarding traumatic stress, findings showed that the highest score was in the “avoidance” dimension (1.86 ± 0.73). For nurses, the highest support rates came from significant others (22.58 ± 5.22 ; Nowicki et al., 2020). Increased mean scores were noted among participants in the subscale measuring positive psychological changes (18.56 ± 4.04). The average MLQ score was (5.33 ± 0.87). In the “presence” subscale, a slightly higher result was reported (5.35 ± 1.14 ; Nowicki et al., 2020). More pronounced positive changes in the COVID-19 epidemic were reported in nurses living in rural areas and those who were married. However, more pronounced negative psychological differences have been reported in single nurses, those without children, those in undergraduate degree programs, and those who completed a course certification (Nowicki et al., 2020). Traumatic stress brought about by the pandemic can affect HCWs on various levels. Those who are single and without children may be at an increased risk of adverse psychological issues and need further support.

The influence of the pandemic on the mental health of ICU nurses was the subject of a descriptive study in October 2020 and January 2021 by (Guttormson et al., 2022). The study aimed to examine burnout, moral distress, and mental health. Nurses selected through the

American Association of Critical Care Nurses newsletters and social media were surveyed; 488 workers in the U.S. responded. Among ICU patients are higher workload acuity, increased severity of illness, respiratory distress, and higher mortality rates (Murphy et al., 2020; Guttormson et al., 2022). Survey instruments used in the study include the Measure of Moral Distress in Healthcare Professionals (MMD-HP) to measure moral distress in situations related to care, the Professional Quality of Life Scale (PROQOL-5) for burnout, the Trauma Screening Questionnaire (TSQ) to measure traumatic stress, and the Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS) to measure anxiety and depression (Guttormson et al., 2022). All the instruments are validated. The MMD-HP shows high internal reliability (0.93), construct, and discriminant validity. The ProQOL shows validity and acceptable internal reliability (Cronbach's alpha >0.8). The TSQ shows exceptional sensitivity (0.86) and specificity (0.93) in determining PTSD in affected patients and has strong internal and construct validity (Cronbach's alpha 0.8 to 0.9; Guttormson et al., 2022).

Guttormson et al., 2022 reported an increase in both burnout and distress due to the pandemic in HCWs. The burnout and distress rates increased during the pandemic. Nurses reported moderate to severe anxiety (31.1%), moderate to severe depression (44.6%), and (46.7%) HCWs were at risk for developing PTSD. Elevated levels can be understood when 55.6% of workers reported feeling afraid that their life was threatened or that they may die caring for one of their positive COVID-19 patients (Guttormson et al., 2022). Failure on the part of the administration, equipment shortages, etc., were responsible for reports of feeling a lack of support from leadership, anxiety, and depression (Guttormson et al., 2022). The pandemic severely affected nurses working in the ICU, and they, like RTs, face potential mental health damage.

Other Health Care Workers. Studies have been performed on other HCWs to examine the pandemic's effect (Pedraz-Petrozzi et al., 2021; Zhang et al., 2021; Daviskiba et al., 2021; ALGhasab et al., 2021; Ibar et al., 2021; MacKenzie et al., 2021; Cag et al., 2021; Bassi et al., 2021; Bassi et al., 2021; Li et al., 2020; Teo et al., 2021; Magnavita et al., 2020; Cipolotti et al., 2021; Salazar de Pablo et al., 2020; Cai et al., 2020). During the height of the pandemic, front-line workers experienced long work hours, fear of contracting the virus during patient care, and the deaths of their patients and team members (Pedraz-Petrozzi et al., 2021); these events created an emotional impact. To compare the emotional effects of COVID-19 on various populations, Pedraz-Petrozzi et al. (2021) studied the pandemic's effect on HCWs in Lima (Peru), medical students among the faculty at Medicine of Cayetano Heredia University (UPCH), and the area population.

Three hundred seventy-five volunteers participated in Pedraz-Petrozzi et al.'s study, including 125 medical students, a mix of 125 health personnel (some worked as frontline personnel), and 125 of the area population (Pedraz-Petrozzi et al., 2021). The PHQ-9 was used to assess characteristics of depression, the GAD-7 for anxiety markers, and COVID-19 Peritraumatic Distress Index (CPDI) scales were used to determine the emotional impact of COVID via an online survey from August 20- November 20, 2020 (Pedraz-Petrozzi et al., 2021). Findings indicate that changes in sleep patterns, critical thinking, mood, and behavior in HCWs are linked to the pandemic. Higher CPDI scores correlated COVID-19 frontline health personnel with higher psychological distress and diminished functionality, as noted by their higher PHQ-9 scores compared with the other groups. The scoring of other groups identified higher depression scores; of note, being young or female correlated with pandemic depression and stress (Pedraz-

Petrozzi et al., 2021). Front-line HCWs have an increased risk of acquiring psychological symptoms and exhibiting harmful behavior due to the pressures of the pandemic.

Since the COVID-19 outbreak originated in Wuhan, China, much can be learned from studying the mental health of the HCWs in that area. Zhang et al. (2021) proposed studying anxiety and depression in front-line HCWs during the COVID-19 outbreak as a basis for mental health intervention programs. From March 5 to March 15, 2020, the Hamilton Anxiety Scale (HAM-A) and Hamilton Depression Scale (HAM-D) were used to evaluate the depression and anxiety of medical staff in Wuhan Cabin Hospital. Two hundred seventy-six responses were received from participants. For total staff, anxiety had a rate of prevalence of 27.9%, with 18.1% for depression; for physicians, there was a 19.8% rate of prevalence for anxiety, with 11.5% for depression; among nurses, the prevalence of anxiety was 32.2% and 21.7% for depression. Again, women were at higher risk for anxiety and depression than men, along with nurses, in comparison to physicians (Zhang et al., 2021). The study results of increased anxiety and depression in nurses, rather than physicians, may be due to the extended amounts of time nurses, or those in similar roles, such as RTs, spend working with isolated patients, having increased contact and increased risk of infection that can make workers inclined to exhaustion and stress (Tam et al., 2004; Zhang et al., 2021). A limitation of this study was that all participants worked in a hospital setting, and results may not be generalizable to other populations.

Previous studies have shown that COVID-19 front-line workers are susceptible to diverse mental health challenges. A survey of HCWs in the Detroit, Michigan, area was conducted by Daviskiba et al. (2021) to examine symptoms of mental illness in HCWs. The group recognized the need to identify those at risk for adverse mental health outcomes by exposure to the depression, anxiety, and stress created by the pandemic. Validated tools were used to measure

HCWs' symptoms: the Perceived Stress Scale for psychometric symptoms, the Patient Health Questionnaire depression scale, the GAD-7 for anxiety, and the Posttraumatic Stress Disorder Checklist for DSM-5 for PTSD. One hundred twenty-nine HCWs responded with findings of 30.2% needing additional screening with a clinician to follow up on their anxiety, 20.9% positive for moderate to severe depression, and 16.3% showing symptoms of traumatic stress (Daviskiba et al., 2021). Although this study sample was small, it clearly distinguishes the elevated levels of psychological symptoms that front-line HCWs face every shift.

Another case study in Saudi Arabia investigated the levels of depression among HCWs due to the virus. HCWs are known to be incredibly involved with infected patients while managing their care, which can lead to increased stress, overwhelming anxiety, and exhaustion. ALGhasab et al. (2021) noted that at the height of the pandemic, social taboos, the increase in patient admissions, the unrelenting media coverage, the lack of successful treatment, and crushing workloads contribute to the mental burdens of HCWs. These data support findings from the Lai et al. study, which showed that HCWs responding to the COVID-19 influx reported increased rates of depression, anxiety, insomnia, and distress (Lai et al., 2020; ALGhasab et al., 2021). ALGhasab et al. conducted a hospital-based survey via a region-stratified, 2-stage cluster sample of 554 participants in multiple hospitals from April 29, 2020, to June 30, 2020. The measurement instrument included the PHQ9 for the quantification of depressive markers. On trend with other studies, the findings of this study showed women are at significant risk for depression at a prevalence of 75.0% compared to 24.8% in men. Saudi HCWs reported depression symptoms at a rate of 61.4% ($P < .001$, 95% CI), and fear of infecting their families was reported by 77.6% of workers. Significant depression was noted in 25.7% of workers under the age of 29. Workers aged 30 to 39 reported suffering mild to moderate depression at a rate of

49.1% to 59%, respectively; workers over the age of 40 also reported suffering mild to moderate depression (ALGhasab et al., 2021). Again, job roles/professions were shown to have a statistically significant ($P < .001$, 95% CI) link between job duties and depression, with a prevalence of 50.3% of workers reporting mild symptoms and 35.6% reporting moderate to severe depressive symptoms. Also, in agreement with other studies, 59.4% of physicians reported dealing with significant depression compared to 35.6% of nurses and 5.0% of other healthcare professionals (ALGhasab et al., 2021).

ALGhasab et al. (2021) also correlated the educational degree held by respondents with the incidence of depression. The most common degrees attained by participants in the study were bachelor's degrees (52%), diplomas (21%), Ph.D. (20%), and master's degrees (6.7%). Among degree holders, the highest results for symptomatic depression were found in 58.4% of those with bachelor's degrees and 20.8% of those holding PhDs ($P \leq .05$, 95% CI; ALGhasab et al., 2021). Sixty-one percent of Saudi nationals showed a significant amount of depression, with 83.2% of those having a fear of infecting their families reporting significant depression at 83.2% ($P < .001$, 95% CI). (ALGhasab et al., 2021).

The height of the pandemic exposed HCWs around the globe to unprecedented burdens, unusual dilemmas requiring problematic decisions, scarce resources, and the stress of taking care of personal health and the patient's health while caring for critical patients (Greenberg et al., 2020; Lee et al., 2021). Lee et al. (2021) studied front-line HCWs in the South Chungcheong Province of Korea via a questionnaire regarding their perceptions of COVID-19, experience working during the MERS-CoV epidemic, and symptoms of PTSD measured by the PTSD Checklist for the Diagnostic and Statistical Manual of Mental Disorders. Three hundred ninety-six hospital workers' scores were analyzed. Findings show that non-medical personnel shared a

stronger link with PTSD than HCWs according to general fear (odds ratio [OR], 6.67; 95% confidence interval [CI], 1.92 to 23.20), supply shortages (OR, 1.29; 95% CI, 1.07 to 1.56), and issue-specific fear (OR, 1.29; 95% CI, 1.05 to 1.59; Lee et al., 2021). HCWs who had experienced the MERS-CoV crisis were more susceptible to PTSD than those who had not in terms of general fear (OR, 1.70; 95% CI, 1.22 to 2.37), supply shortages (OR, 1.24; 95% CI, 1.10 to 1.40), and issue-specific fear (OR, 1.21; 95% CI, 1.06 to 1.38; Lee et al., 2021). The findings did not show substantive differences in age, sex, marital status, and occupation, except among workers who possessed experience with the MERS virus ($p < 0.05$) and chronic disease ($p < 0.05$; Lee et al., 2021). Mental health intervention may be helpful in future epidemics.

HCWs are subject to high-stress levels, with adverse effects that can lead to burnout. Ibar et al. describe burnout symptoms as total emotional exhaustion and a diminished sense of self and personal accomplishment. Their 2021 study evaluated burnout and stress in Hospital de Clínicas “José de San Martín” workers in Buenos Aires using the cortisol in hair strands as a stress biomarker (Ibar et al., 2021). Two hundred thirty-four HCWs participated in this study design. Samples of hair were retrieved from the posterior vertex of the scalp. HCWs were also scored on the following surveys: perceived stress, social support, burnout scale, life event scale, and sociodemographic data. The samples of hair cortisol were measured by an automated chemiluminescent method. Results showed that 40% of the HCWs presented hair samples indicated that the cortisol levels were outside of the healthy reference range; of those samples, 63% contained values outside of the measurable upper limits of 128 pg/mg of hair (Ibar et al., 2021). Only 37% of samples showed typical values below the lower limit of 40 pg/mg of hair (Ibar et al., 2021). As a whole, the group’s cortisol levels in their hair samples were associated with their perceived levels of stress ($r = 0.142$, $p = 0.030$) and emotional exhaustion (EE; $r =$

0.143, $p = 0.029$).; Ibar et al., 2021). Burnout was identified in 12% of the studied workers, and those suffering from burnout presented with higher levels of hair cortisol compared to those without ($p = 0.034$). There was also a correlation between abnormal cortisol levels and depersonalization tendencies (Ibar et al., 2021). A limitation of this study is that cortisol levels have been measured only once during the pandemic; follow-up studies need to be performed to evaluate stress and burnout at this pandemic stage.

HCWs, by nature of their work, typically report higher levels of depression, anxiety, and insomnia compared with the general population. (Mueller et al., 2020; MacKenzie et al., 2021). There are HCWs with preexisting mental health issues; this population was recruited by MacKenzie et al. for a cross-sectional study from April 24, 2020 – May 12, 2020. Detroit area HCWs diagnosed with mental health disorders completed an online survey that included the Perceived Stress Scale (PSS), the GAD-7, the Patient Health Questionnaire-8 (PHQ-8), and the Posttraumatic Stress Disorder Checklist (PCL). Sixteen out of 129 HCWs reported a pre-existing psychiatric diagnosis. One hundred twenty-nine HCWs responded. Findings show that 12.4% self-reported a pre-existing psych diagnosis; all were European American and worked and lived by themselves; 56.3% were residents, and 50% worked in the ED. All HCWs with a pre-existing diagnosis reported adequate social and emotional support from family and friends. These HCWs reported their perceptions of the pandemic on their psychological symptoms by reports of increased severity linked to worse psychological outcomes and higher levels of stress from avoiding physical contact with others due to social distancing (MacKenzie et al., 2021). Findings showed a positive correlation between severity, symptoms, and total scores on each of the specific stressors and mental health scales (MacKenzie et al., 2021). A limitation of this study was that the survey was done outside of the acute phase of the pandemic. HCWs with existing

disorders need support to prevent worsening psychological issues, and ongoing support may be required before another health crisis.

COVID-19 introduced significant mental health challenges, especially among HCWs. A prevalence of distress can be found in the HCW population (Ali et al., 2020). Screening for psychiatric distress was performed in an acute hospital setting in the South-East of Ireland. Ali et al. (2020) conducted an observational cohort study to understand the pandemic's psychological impact on HCWs in Ireland from June 8, 2020 – June 22, 2020. Four hundred seventy-two HCWs participated from two distinct acute hospital settings, A and B. The validated surveys of the Depression, Anxiety, and Stress Scale (DASS-21) to measure and the Impact of Event Scale-Revised (IES-R) to measure PTSD were used for scoring. The DASS-21 reflected positive scores for depression in 42.6% of workers, while anxiety and stress were shown in 45.1% of workers. The IES-R measured distress on three subscales: intrusion, avoidance, and hyperarousal; 41.3% of the scores alluded to PTSD. Workers on site B scored significantly higher across all parameters of depression (5.24 vs. 4.08, $p<0.01$), anxiety (4.66 vs. 3.3, $p<0.01$), stress (8.91 vs. 6.33, $p<0.01$), and PTSD (0.058 vs. 0.043, $p<0.01$). Worse outcomes were also noted in HCWs with underlying medical ailments (Ali et al., 2020). Valuable insight and suggestions to improve the mental health of HCWs were provided by 63.8% of these experienced workers. Eighty-six percent suggested inclusiveness and being allowed to share in decision-making, 83% wanted up-to-date communication, 78% suggested implementing areas to rest and staggering rosters, 69% requested improving the staffing matrix to facilitate providing care and time off for workers, 66% wanted on-site support for mental health and personal interaction, 66% suggested an increase in education and training sessions, and 51% indicated an increased development of

childcare facilities would be beneficial (Ali et al., 2020). Improved communication and access to mental health can help decrease the pandemic's effect on HCWs.

Anxiety would be a given when working in life-threatening situations, such as with COVID-19-infected patients; exposure to this viral infection was a significant challenge to HCWs (Pfefferbaum & North, 2020; Cag et al., 2021). Viral outbreaks cause HCWs to work both physically and mentally to try and cope with the heightened stress, risk of exposure, overwhelming workloads, and being forced into moral or ethical dilemmas they may disagree with on a personal level (Cag et al., 2021). HCWs work long hours (usually 12 hours) on regular shifts, and the pandemic has increased work hours, which means undergoing stress for a more extended period over the week while being exposed to infection for a longer time (Cag et al., 2021). Cag et al. aimed to investigate anxiety levels among HCWs on the front line globally. An international online survey containing the Beck Anxiety Inventory to measure anxiety was conducted over two weeks from March 18, 2020. One thousand four hundred sixteen HCWs from 75 countries responded to the survey. Globally, the anxiety status of HCWs was 35.5%, reporting as normal to minimal, 27.5% as low, 20.3% as moderate, and sixteen percent (16.7%) as severe.

Risk factors for increased levels of anxiety included being female ($p = 0.001$), occupation ($p = 0.017$), being of a younger age ($p = 0.001$), having limited knowledge of the virus ($p = 0.005$), insufficient PPE ($p = 0.001$) inadequate access to handwashing soaps and sanitizers ($p = 0.008$), a history of chronic illness ($p = 0.001$) pre-existing mental health issues ($p = 0.001$), and residential areas with high income ($p = 0.048$) were significantly linked to an elevation in anxiety (Cag et al., 2021). One in six HCWs reporting in the survey has severe anxiety; imagine the number of workers with elevated anxiety still working at the bedside if only half of them had

accessed the survey. Globally, front-line workers have anxiety related to the pandemic, with 20% reporting it to be moderate and 17% suffering from severe anxiety (Cag et al., 2021), showing these HCWs are dealing with mental health issues daily.

The pandemic exposed HCWs around the globe to the risk of PTSD. In Italy, the Lombardy region was the hardest hit by COVID-19 (Bassi et al., 2021). HCWs felt the burden of providing care. Bassi et al. (2021) studied the mental health changes in HCWs after the peak of COVID to evaluate for PTSD symptoms and the role of positive mental health via an online survey with the PTSD Checklist for DSM-5 and the Mental Health Continuum Short-Form between April 15 and May 3. Six hundred fifty-three participants responded during the national lockdown phase. Results show that 39.8% of HCWs had an interim determination of PTSD; 33.4% reported flourishing, 57.7% reported moderate symptoms, and 8.9% reported languishing mental health (Bassi et al., 2021). Regression analysis highlighted women vs. men, nurses vs. technical/rehabilitation HW, frontline vs. second-line workers, and languishing vs. moderately mentally healthy HW were at a higher likelihood to receive an interim determination of PTSD; in contrast, flourishing participants were more likely not to receive a similar diagnosis (Bassi et al., 2021). Typically, HCWs have a higher exposure to PTSD than the general population. According to the DSM-5 diagnostic criteria, the mean prevalence of PTSD among physicians was 14.8% (Sendler et al., 2016) and 18% for nurses (Mealer et al., 2009), compared to 7-8% (Kessler et al., 2005) in the general population (Bassi et al., 2021; Li et al., 2020). Professional psychological intervention addressing positive mental health promotion and prevention of PTSD can help support HCWs (Bassi et al., 2021).

Establishing a crisis intervention center for HCWs could assist in understanding the mental health status of front-line workers and preventing some psychiatric disorders. Liu et al.

(2020) followed HCWs (doctors, nursing staff, and other hospital staff) in mainland China for six weeks and compared their mental health status before and after the outbreak to provide a theoretical reference for the future. An electronic version of the Symptom Check List-90 (SCL-90) scale and a sociodemographic questionnaire were initially administered. The first test (5018 returned questionnaires) was implemented from January 29 to February 3, 2020, during the outbreak in China; the second test (1570 returned questionnaires) was implemented from March 13 to March 18, 2020, during the epidemic's decline (Min & Xia, 2020), with a 6-week interval between the two tests.

The SCL-90 includes nine factors that reflect various psychological symptoms of the individual: Somatization (SOM), obsessive-compulsive disorder (O-C), Interpersonal Sensitivity (I-S), Depression (DEP), Anxiety (ANX), Anger-Hostility (HOS), Phobic Anxiety (PHOB), Paranoid Ideation (PAR), and Psychoticism (PSY). Also, a Global Severity Index (GSI), Total Score (T-S), Positive Symptom Total (PST), and Positive Symptom Distress Index (PSDI) can be calculated for 13 comprehensive assessments of mental health levels (Liu et al., 2020). After six weeks, findings showed that the post-test Global Severity Index (GSI) score, SCL-90 total score, and PST, PSDI, O-C, I-S, DEP, ANX, PHOB, PAR, PSY, and HOS scores were significantly less than the pretest scores ($p < 0.05$; Liu et al., 2020). Occupational category results showed that the scores of nursing staff diminished significantly for 12 indexes and that the doctors' and other hospital staff's scores also greatly diminished. There was a significant difference between the pretest (50.78 ± 28.18) and post-test (45.00 ± 28.49) scores for the degree of worry about the epidemic (Liu et al., 2020). HCWs strongly felt that the primary issues affecting them due to the pandemic were economic challenges, interpersonal communication matters, and mental health issues (Liu et al., 2020). During outbreaks, attention should be paid to psychological crisis

interventions for healthcare workers to prevent worsening mental health status in front-line workers.

Another comparison study of HCWs before and after working on the front lines was conducted by Li et al. (2020) on medics working with the Chinese central government (January 24 - March 31, 2020) in Hubei and Wuhan. The study aimed to examine the mental health status of HCWs during the outbreak and their prevalence of PTSD after returning home. Soon after returning home, medics were surveyed from April 4–6, 2020. Two hundred twenty-five surveys were completed containing questionnaires regarding demographics, social relations, mental health status, and other work-related information (Li et al., 2020). The IES-R was used to measure PTSD, and the DASS-21 was used to evaluate their mental health status on the front line. Findings show that 46.7% of the medics reported elevated levels of depression, 35.6% reported anxiety, and 16.0% experienced symptoms of stress when working with COVID-19 patients. Although the medics reported having elevated levels of social support, a small number, only 19.6%, requested mental health counseling during that time. After the medics returned to their residences, the prevalence of PTSD symptoms was 31.6% (Li et al., 2020).

A significant association between mental health status, age, and relationships were linked to symptoms of PTSD. Anxiety symptoms correlate with symptoms of intrusion, avoidance, and PTSD ($p < 0.01$); stress ($p < 0.01$) was also associated with PTSD (Li et al., 2020). Older HCWs (41- 60 years old) are more likely to produce symptoms of intrusion in comparison with younger HCWs (21- 30 years old). Mental health counseling was significantly associated with PTSD symptoms ($p < 0.01$). The prevalence of depression and anxiety symptoms noted by the medics was much higher than in the general population (Li et al., 2020). Compared with a PTSD prevalence of 31.6%, research showed that the lifetime prevalence of PTSD in the region's

general population ranges from two percent to nine percent (Atwoli et al., 2015). Despite not contracting the virus during their deployment and having good social support, medics reported high levels of PTSD (Li et al., 2020). They showed a need for clinical support from mental health professionals. Measures should be employed to provide immediate mental health support during an outbreak and provisions for long-term follow-up afterward to mitigate the prevalence of PTSD symptoms.

When many think of HCWs undergoing mental stress due to the pandemic, they think of front-line workers. Other healthcare disciplines have also been negatively affected. Teo et al. (2021) examined the psychological impact of COVID-19 on what they considered a hidden, vulnerable group, namely, laboratory workers. These HCWs also face a high-risk exposure to the virus when handling infected blood samples and with increased workloads. A multicenter study by Teo et al. was conducted via online questionnaires in Singapore with the GAD-7 scale, the Zung Self-Rating Depression Scale (SDS), and the Numeric rating scale on fear (NRS). One hundred twenty-two lab workers participated.

The researchers report that more than 50% of the cohort experienced mild to severe fear, anxiety, and depression (Teo et al., 2021). An increase in depression score was also linked with increased physical exhaustion (OR = 6.1, 95% CI 1.4–29.1, $p = .02$), loss of appetite (OR = 2.7, 95% CI 1.2–6.0, $p = .02$), diminished sleep quality (OR = 7.5, 95% CI 2.9–19.4, $p = .005$), and the use of sedatives (OR = 3.9, 95% CI 1.1–13.5, $p = .03$; Teo et al., 2021). Despite having many years of work experience, laboratory staff who reported anxiety were also at a higher likelihood to have a combined depressive disorder (OR 4.6, 95% CI 1.6–13.0, $p = .004$) and diminished sleep quality (OR 5.8, 95% CI 1.8–18.2, $p = .003$) whether young or old and regardless of

experience (Teo et al., 2021). Laboratory staff also need access to programs that promote mental health initiatives and provide support.

Prolonged stress caused by the pandemic can give way to sleep disturbance, decrease sleep quality, and place HCWs at risk for anxiety (Magnavita et al., 2020). The Magnavita et al. study was conducted in a public company in Italy. Staff was asked to get tested for the coronavirus and complete a questionnaire on early symptoms of COVID. Five hundred ninety-five HCWs partook in the study. Respiratory symptoms were shown in 56.1% of cases, and 29.3% showed no signs (Magnavita et al., 2020). Results showed that 16.6% of workers reported feeling anxious, and 20.3% reported depression symptoms with a significant increase in the estimated risk (OR = 4.3; 95%CI = 2.4–7.4 for anxiety, OR = 3.5; 95%CI = 2.0–6.0 for depression; Magnavita et al., 2020). HCWs with positive screenings should improve sleep quality and seek other support.

Generic mental health support may not work for all HCWs due to everyone's personality, job role, contact with COVID patients, and history of psychosocial issues may determine distress levels, the strength of concerns, and the type of intervention that was most useful (Cipolotti et al., 2021). A study by Cipolotti et al. at a leading neuroscience hospital in the UK examined how an individual's personality contributes to their perceived distress, concerns, and needed interventions during the pandemic. An online survey was performed with the created survey. One hundred fifty-eight participants took part in the survey. In females and workers with a history of mental illness, results showed an elevated incidence of distress. Staff concerns were reported to be centered around infection risks, challenges at work, and social change. Factors that determine distress affect their job role and exposure to COVID-19 patients (Cipolotti et al., 2021). The majority of the workers reported experiencing distress that was serious enough to affect their

everyday function, and almost four-fifths of surveyed staff reported they were under considerable stress (Cipolotti et al., 2021). Individualized support plans are needed to treat symptoms of mental distress better.

Healthcare workers remain at risk for both physical and mental health outcomes. A systematic review performed by Salazar de Pablo et al. (2020) contained 115 articles and worked to identify studies reporting on physical and psychological health outcomes in HCWs infected/exposed to Severe Acute Respiratory Syndrome -SARS-, Middle East Respiratory Syndrome -MERS-, and the Novel coronavirus -COVID-19. The number one identifier of infection by the virus was fever, which had been reported by 75.9% of HCWs. Other physical findings of a health issue include 47.9% cough (95%CI), 43.6% myalgias (95%CI), 42.3% chills (95%CI), 41.2% fatigue (95%CI), 34.6% headaches (95%CI), 31.2% dyspnea (95%CI), 25.3% sore throat (95%CI), 22.2% nausea/vomiting (95%CI), 18.8% diarrhea (95%CI; Salazar de Pablo et al., 2020). Sixty-two percent of HCWs reported mental health outcomes by exposure to the virus. Other reported health concerns include 43.7% fear (95%CI), 37.9% insomnia (95%CI), 37.8% psychological distress (95%CI), 34.4% burnout (95%CI), 29.0% anxiety features (95%CI), 26.3% depressive symptoms (95%CI), 20.7% PTSD (95%CI), 16.1% somatization (95%CI), and 14.0% feelings of being stigmatized (95%CI; Salazar de Pablo et al., 2020). All these symptoms have been present at some point during the past three outbreaks of SARS, MERS, and COVID-19. (Salazar de Pablo et al., 2020).

Mental health, resilience & social support were examined in the Cai et al. (2020) study of HCWs during the pandemic. The SCL-90, the Chinese version of the Connor-Davidson resilience scale (CD-RISC), and the Social Support Rating Scale (SSRS) were used to measure symptoms. One thousand five hundred twenty-one HCWs participated in the study. Findings

show the prevalence of mental health issues to be 14.1%. Workers without experience working during a public crisis or emergency showed worse mental health performance in resilience and social support. They were inclined to suffer from abnormal psychiatric issues in sensitivity and anxiety compared with experienced staff (Cai et al., 2020). Newly hired staff with limited experience showed a substantially lower level of resilience and significance across the three aspects of tenacity, strength, and optimism. New, inexperienced staff had substantially lower scores in subjective and objective support and SSRS total scores than experienced staff ($p < 0.05$; Cai et al., 2020). This study showed that important levels of training, job experience, resilience, and good social support are necessary for healthcare workers to be prepared to work on the front lines in a public health emergency.

As the pandemic continues, understanding critical issues related to impaired mental health is needed; such factors are essential to providing the best interventions for those in need (Van Wert et al., 2022). An additional study of HCWs and the effect of the pandemic was performed in the United States by Van Wert et al. (2022). This cross-sectional survey study was conducted from September 9, 2020, to November 26, 2020, in Baltimore, MD. Six hundred-five HCWs from various job roles participated. Survey tools included the Patient Health Questionnaire-2 (PHQ-2) for depression, Generalized Anxiety Disorder-7 (GAD-7) to measure anxiety, the Adult PROMIS Short Form v.1.0—Sleep Disturbance 4a to check sleep disturbances, the Impact of Event Scale-Revised (IES-R) for measurement of PTSD, the Maslach Burnout Inventory 2-item (MBI-2) for burnout, and the Connor-Davidson Resilience Scale 2-item (CD-RISC-2) to measure resilience (Van Wert et al., 2022). Factors identified as increasing mental health symptoms were the time spent in direct patient care of COVID-19 patients, the stress of the job, a worker's perception of social stigma, and work safety issues (Van Wert et al.,

2022). Workers who spent a large amount of the work week with positive patients in relation to those who did not show worsening depression (aOR 3.9; 95% CI, 1.3-11.7), anxiety (aOR, 2.6; 95% CI, 1.1-5.8), and burnout (aOR, 2.6; 95% CI, 1.1-6.0; Van Wert et al., 2022). Results showed that 14.2% of HCWs disclosed signs of depression, 43.1% with anxiety, sleep difficulties 31.6%, 22.3% with PTSD, depersonalization 21.6%, 46.0% with mental fatigue, and low resilience in 23.1% (Van Wert et al., 2022). The prolonged exposure to the pandemic over these years has impacted HCWs, creating life-altering issues such as depression, PTSD, insomnia, and mental exhaustion that can put current patients at risk and cause dysfunction in the family.

Alleviating Factors

Researchers have identified factors that can assist in alleviating mental stress in HCWs (Uphoff et al., 2021). Protective factors were discussed in the Uphoff et al. review and are provided in Table 4. Several protective factors were aligned with risk factors, such as work experience and appropriate facility strategies to care for their employees and COVID patients while maintaining a safe environment for both (Uphoff et al., 2021). HCWs with more work experience, training, and education, a sound social support system, a balanced workload each shift, being kept abreast of new developments and changes in policies, and time off to rest and recover mentally felt more protected and fared better mentally (Uphoff et al., 2021). Based on the literature and panel discussions, workplace support was vitally important for mental health improvement. Psychological support, open communication with leadership, and expressing feelings about the workplace were all considered necessary and essential (Uphoff et al., 2021). This review was conducted early during the COVID-19 pandemic, and some factors may have changed. More study was needed.

Table 4.***Protective Factors for Adverse Mental Health Outcomes.***

Domain	Protective factors
Personal characteristics and circumstances	Sense of control
	Coping ability/resilience
	Experience in the job
	Sense of duty/sense of altruism
	Acceptance of risk
Work environment	Availability of medical resources
	Efficient healthcare system
	Infection control and precautionary measures in place
	Strict implementation of guidelines
	Availability of training and education
	Good communication/receiving up-to-date information
	Access to mental health support/psychological interventions
	Adequate time off work
	Balanced workload
	Working in a managerial or administrative role
Peer support/having a cohesive team	
Social network	Social support

Note. From “Mental health among healthcare workers and other vulnerable groups during the COVID-19 pandemic and other coronavirus outbreaks: A rapid systematic review”, by Uphoff et al., 2021, *PloS One*, 16(8), <https://doi.org/10.1371/journal.pone.0254821.t004>.

The pandemic has created an exigency in public health that has brought about extreme stress levels; the longer the pandemic extends, the more elevated the levels of PTSD can be (Watson, 2022). The COVID-19 pandemic has affected the entire globe. It places us all in a collective trauma while dealing with it personally, leading to a profound jolt that induces a state of trauma throughout a community (Benight & Bandura, 2004).

Social Cognitive Theory and the Use of Self-Efficacy in PTSD

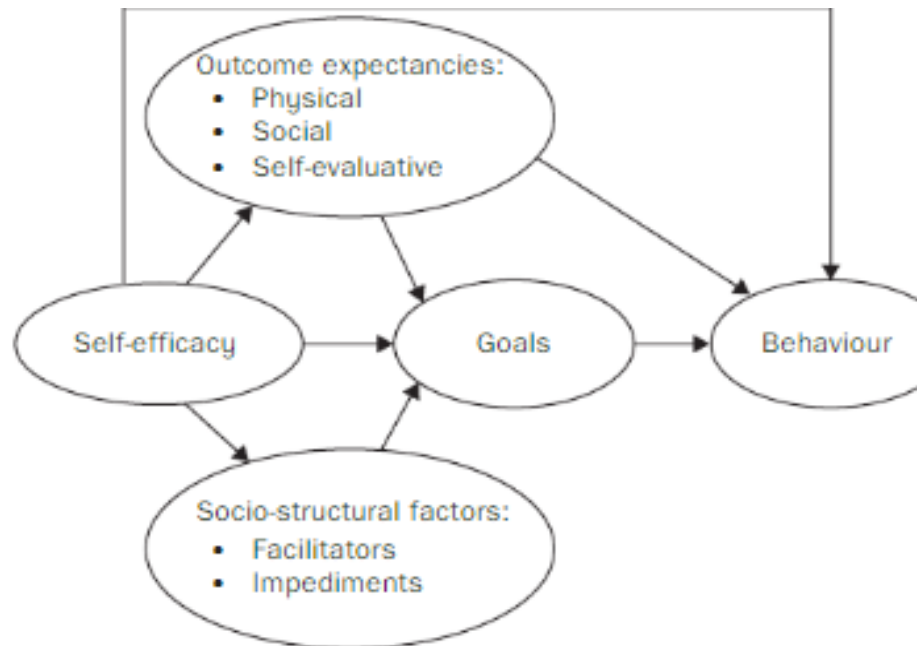
Albert Bandura (1986) developed the Social Cognitive Theory (SCT) to explain how individual and outside influences affect behavior based on prior experience, psychosocial status,

tangible environment, and cognition (Wong & Monaghan, 2020). SCT can be used to understand how self-efficacy, environmental factors, and motivation are related to acquiring and maintaining certain behaviors (Graf et al., 2021). SCT was commonly used in applications of health behavior and was an isthmus connecting the cognitive and behavioral theories of internal and external determinants (Baranowski et al., 2002; Mimiaga et al., 2009). The idea descends from social learning theory, which shows that people grasp and comprehend information via their own experiences and by being attentive to the experiences of others (Rimer & Glanz, 2005; Bezner & Held Bradford, 2020). Primary constructs in SCT that modify or influence behavior include personal factors, environmental factors, and aspects of the behavior itself. Efforts to change behavior are contingent on identifying the positives and the negatives in each of the three constructs (Bezner & Held Bradford, 2020). The goals, the acknowledged impediments, and the facilitators (Wong & Monaghan, 2020).

Expectations in outcomes occur across three dimensions - consequences, positive or negative consequences, and short-term or long-term consequences; these are then divided into physical outcomes, social outcomes, and self-evaluative outcome expectations (Luszczynska & Schwarzer, 2015; Sutton, 2001). These expectancies (seen in Figure 1) encompass expectations of discomfort or symptoms, anticipation regarding behavior change, the short- and long-term effects of behavior change, anticipated social encounters post changes, and how all the changes were to affect them in the future (Luszczynska & Schwarzer, 2015). SCT was usually used to explain mental health issues post-disasters (Alexander & Ward, 2018). HCWs exposed to the

Figure 1.

An illustration of social cognitive theory.



Note. From “Social cognitive theory,” Luszczynska, A. & Schwarzer, R., 2015, pp. 225-251.
https://www.researchgate.net/publication/284667057_Social_Cognitive_Theory.

pandemic need to maintain a sense of functionality despite the environmental burdens associated with the pandemic; being able to do so was referred to as self-efficacy (Benight & Bandura, 2004; Alexander & Ward, 2018). Perceived self-efficacy, as a construct, is connected to a person’s behavior and can be used in clinical practice to induce behavior change (Schwarzer & Jerusalem, n.d.).

Self-efficacy theory (SET) was a subset of SCT (Sutton, 2001). Perceived self-efficacy was needed to recoup from traumatic experiences within the framework of social cognitive theory (Benight & Bandura, 2004). Self-belief, or self-efficacy, is the individual HCWs’ belief that they can manage their life circumstances while maintaining functionality despite being

surrounded by traumatic stressors associated with the pandemic (Benight & Bandura, 2004). A sense of one's capabilities is the foundation of human agency; it is rooted in the epicenter of one's being, that an individual has the power to produce desired effects by their actions (Benight & Bandura, 2004). Self-efficacy beliefs govern human choices through cognitive, motivational, affective, and decisional processes (Benight & Bandura, 2004). These processes affect the way individuals think and how they think, the way individuals pique interest in various subjects, how they follow through in challenging circumstances, their emotional stability, the way individuals deal with stress, and how they rise in the face of adversity (Benight, & Bandura, 2004). HCWs and other individuals with high efficacy have the belief and capability to use strategies to assist them in dealing with highly pressured events in a way that makes them tolerable and manageable in terms of stress levels; doing so eliminates stress and anxiety while allowing the individual to cope (Benight & Bandura, 2004).

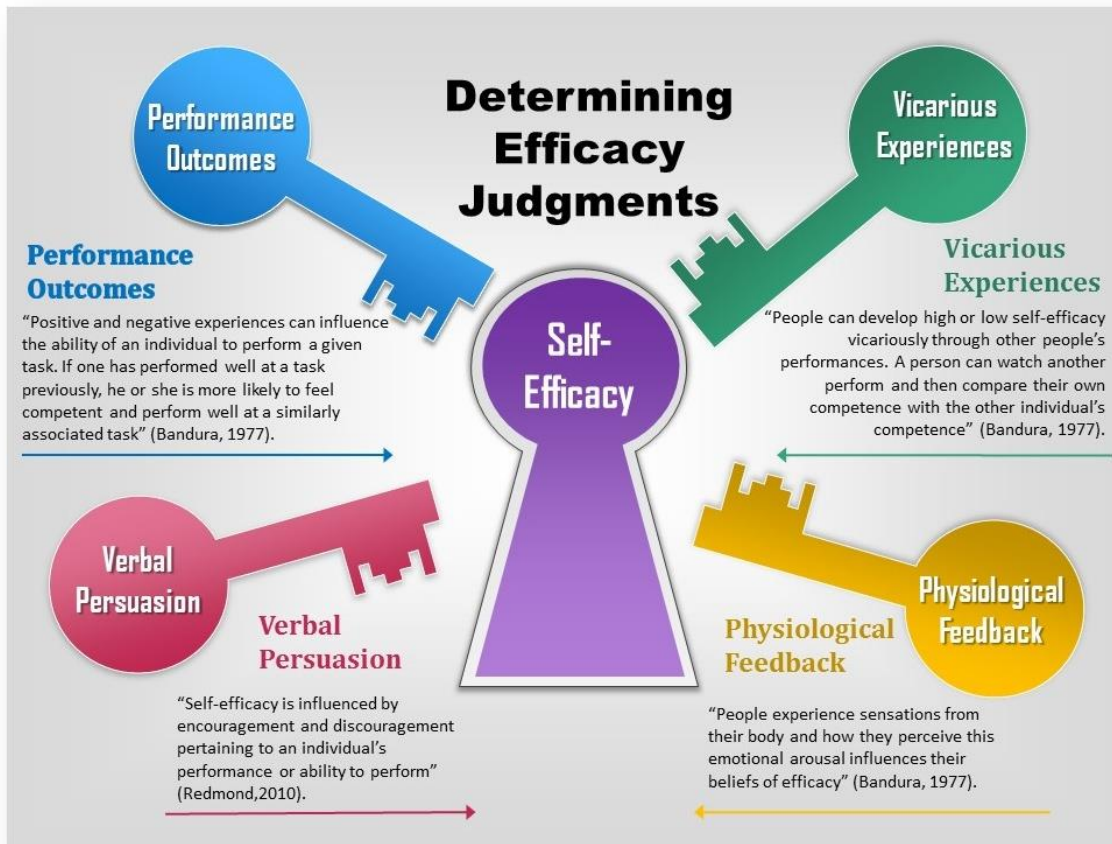
HCWs and individuals with decreased levels of efficacy are at risk of depression, frustration, and disappointment during the pandemic if they do not learn or use tools to assist them in coping with the stress to prevent a drop in life satisfaction (de Vries et al., 2022). Life satisfaction is a psychological factor of well-being, and self-efficacy is a protective factor in preventing a decrease in well-being (deVries et al., 2022). Self-efficacy promotes the promotion and retention of psychosocial health and coping skills that play a role in life satisfaction. HCWs with increased levels of self-efficacy also showed increased life satisfaction and adjustment levels (de Vries et al., 2022). HCWs with PTSD have a negative view of external and internal threats, their environment, and their inability to manage day-to-day functions. Maintaining such a negative view causes the development of PTSD when that specific, traumatic memory creates a sense of immediate threat and constant negative thoughts and emotions about what happened

(Bisson, 2009). HCWs feeling unable to cope with their circumstances may develop low self-efficacy, leading to worsening psychosocial status (Benight & Bandura, 2004; Alexander & Ward, 2018).

In the ongoing stress of the pandemic, five essential elements for mental health recovery guide actions that may prevent worsening situations (Hobfoll et al., 2007; Watson, 2022). The elements are (a) *promoting a psychological sense of safety*, (b) *promoting calming*, (c) *promoting a sense of self-efficacy*, (d) *promoting social connectedness*, and (e) *fostering hope* (Hobfoll et al., 2007; Watson, 2022). Reducing stress, promoting positive cognitive processes, reducing anxiety, and increasing an individual's self-efficacy and capabilities to recover from traumatic experiences while maintaining faith, confidence, and hope can go a long way to preventing mental health decline (Hobfoll et al., 2007; Watson, 2022). Self-efficacy is key to developing sustainable health habits (Wong & Monaghan, 2020). Research has shown that the level of self-efficacy influences behaviors, as shown in Figure 2 (Bandura, 1977; Bandura, 2004; Kelder et al., 2015; Bezner & Held Bradford, 2020), and the depth of persistence in overcoming barriers (Marks, 2001; Marks et al., 2005; Bezner & Held Bradford, 2020). Self-efficacy beliefs denote how a person feels, thinks, motivates, and behaves; maintaining a decreased sense of self-efficacy was strongly related to elevated levels of depression and anxiety (Tahmassian & Jalali Moghadam, 2011).

Figure 2.

Determining Efficacy Judgments.



Note. From "Self-efficacy," Lopez-Garrido, G., 2020, *Simply Psychology*, www.simplypsychology.org/self-efficacy.html.

Health educators and behavioral scientists have employed SCT to develop interventions, procedures, or techniques that interact with the underlying cognitive variables, increasing the likelihood of behavioral change (Mimiaga et al., 2009). People can learn both positive and negative behaviors from observing the actions of others. Maintaining a social support system can provide encouragement, moral support, and accountability. Such support can provide a person with physical and mental health, coping skills, and life satisfaction (Müller et al., 2012).

To fully utilize available tools and coping mechanisms, HCWs should undergo training and educational exercises to practice changes in roles due to the pandemic, changes in work, and increased restrictions during quarantine. Learning to work with limited supplies, developing creative staffing plans to combat shortages, understanding pandemic protocols, and being aware of mental health status changes are helpful. Also significant are the available resources for workers regarding stress management and psychosocial support (National Center for PTSD, 2020).

Research shows that HCWs can be predisposed to depression, anxiety, and stress, all symptoms of PTSD, due to observing the actions, attitudes, and behaviors of others around them and their own experiences during the pandemic. The social cognitive theory explains how continued exposure to COVID-19 and ongoing stress may cause changes in outcome expectations, leading to risky behavior changes and the prolongation of psychosocial issues. Encouraging HCWs to maintain a sound social support system while maintaining a high level of self-efficacy and motivation to achieve their goals can help persons recoup from the traumatic events of the pandemic. Monitoring their levels of self-efficacy periodically and providing resources for mental health treatment can assist HCWs in being more attuned to changes in their mental health status.

Gaps in the Literature

The impact of the events surrounding the COVID-19 pandemic on the mental health of HCWs has been well-studied. Researchers agree that HCWs, particularly those working on the front line during the pandemic (Norhayati et al., 2021), experience mental health changes such as changes in sleep patterns, anxiety, and depression (Muller et al., 2020; Norhayati et al., 2021). Some researchers have proposed that elevated levels of stress have contributed to the

development of PTSD in HCWs (Watson, 2022; Vahratian et al., 2021; Muller et al., 2020; Norhayati et al., 2021; Işik et al., 2021; Serdà et al., 2021; Preti et al., 2020).

Existing studies focus primarily on physicians (Bahadırli & Sagaltici, 2021; Kozu et al., 2022; Vlah Tomičević & Lang, 2021; Saeed et al., 2021; Roberts, Daniels, Hulme, et al., 2021a; Roberts et al., 2021b) and nurses (Chorwe-Sungani, 2021; Ali et al., 2021). There have been fewer studies on other HCWs (Teo et al., 2021; Pazmiño Erazo et al., 2021). Few standalone studies that focus on RTs have been identified. RTs are highly involved in patient care from admission until discharge to monitor respiratory and airway needs; they are also front-line workers represented in the ER, ICU, and medical care floors. This significant gap in the literature can be studied using SCT as a theoretical framework.

Chapter Three

Methodology

This chapter describes the variables of interest and outlines the methodology of the study on the mental health effects and risks associated with respiratory therapists during the pandemic and the use of self-efficacy when facing traumatic experiences. This descriptive, cross-sectional, quantitative survey-based study plan was to collect data from registered respiratory therapists licensed in North Carolina (NC) who have worked during the COVID-19 pandemic and respiratory students studying at UNCC who are advancing their respiratory therapy education. Other RTs included in the survey were therapists credentialed by the National Board of Respiratory Care (NBRC) and licensed by the North Carolina Respiratory Care Board (NCRCB). This study was designed to answer the following research questions:

RQ1: What are the distributional characteristics of the DASS-21 stress subscale for RTs in this sample?

This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of stress as measured by the DASS-21 stress subscale.

RQ2: What are the distributional characteristics of the DASS-21 anxiety subscale for RTs in this sample?

This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of anxiety as measured by the DASS-21 anxiety subscale.

RQ3: What are the distributional characteristics of the DASS-21 depression subscale for RTs in this sample?

This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of depression as measured by the DASS-21 depression subscale.

RQ4: Is there a correlation between an IES-COVID19 score and the DASS-21 depression score?

H4.0: There is no significant correlation between an IES-COVID19 score and the DASS-21 depression subscales.

H4.1: There is a significant correlation between an IES-COVID19 score and the DASS-21 depression subscales.

RQ5: Is there a correlation between an IES-COVID19 score and the DASS-21 anxiety score?

H5.0: There is no significant correlation between an IES-COVID19 score and the DASS-21 anxiety subscales.

H5.1: There is a significant correlation between an IES-COVID19 score and the DASS-21 anxiety subscales.

RQ6: Is there a correlation between an IES-COVID19 score and the DASS-21 stress score?

H6.0: There is no significant correlation between an IES-COVID19 score and the DASS-21 stress subscales.

H6.1: There is a significant correlation between an IES-COVID19 score and the DASS-21 stress subscales.

RQ7: What are the distributional characteristics of RTs in this sample who show a high sense of self-efficacy by scoring high on the New General Self-Efficacy Scale (NGSE) during this phase of the pandemic?

This RQ was analyzed with descriptive statistics. It was anticipated that participants would show a high sense of self-efficacy by scoring high on the NGSE.

RQ8: Is there a relationship between an RT's self-efficacy and depression in this sample?

H8.0: There is no relationship between an RT's self-efficacy and depression.

H8.1 There is a relationship between an RT's self-efficacy and depression.

RQ9: Is there a relationship between an RT's self-efficacy and stress in this sample?

H9.0: There is no relationship between an RT's self-efficacy and stress.

H9.1: There is a relationship between an RT's self-efficacy and stress.

RQ10: Is there a relationship between an RT's self-efficacy and anxiety in this sample?

H10.0: There is no relationship between an RT's self-efficacy and anxiety.

H10.1: There is a relationship between an RT's self-efficacy and anxiety.

RQ11 Is there a correlation between an RT's self-efficacy score and the IES-COVID19?

H11.0: There is no relationship between an RT's self-efficacy score and the IES-COVID19.

H11.1: There is a relationship between an RT's self-efficacy score and the IES-COVID19.

Study Design

A cross-sectional quantitative survey design was utilized. No external co-investigators were involved with this study. The research was partially conducted on the University of North Carolina at Charlotte's (UNCC) campus in Charlotte, North Carolina, and on RTs licensed in the state of North Carolina (NC) by the North Carolina Respiratory Care Board (NCRCB) who meet the requirements of the NBRC. Approval from the Institutional Review Board (IRB) for the study was obtained. No monetary compensation was provided for survey participation. The primary investigator had access to the original data on a password-protected site, and the primary investigator and statistician accessed the de-identified data during analysis. Findings from the study provided insight into the stressors and potential risk factors for depression, stress, and anxiety that may affect the mental health status of RTs. Additionally, exploring the role of self-

efficacy in helping RTs manage and possibly overcome the depression, stress, and anxiety associated with the COVID-19 pandemic can be beneficial for future studies.

Three validated surveys were sent to participants via email during the study. A demographic survey with questions related to sex, age, history of depression, anxiety, stress, and enrollment in a degree program was included. The DASS-21 instrument investigated the subscales of depression, anxiety, and stress; the IES-COVID19 instrument examined the impact the event of COVID-19 had on RTs, and the NGSE instrument, which scores the amount of self-efficacy found in the sample group.

Target Population

The target population for this study included a multicultural array of RTs between 18 and 69 years of age working in direct patient care during the pandemic who were licensed as RTs by the NCRCB or attended UNCC, a university in Charlotte, North Carolina. HCWs in North Carolina have been heavily affected by reports of increasing depression and anxiety due to the pandemic (Ma & Clasen-Kelly, 2020; Goldner, 2020). The initial population was a convenience sample consisting of working adult RTs seeking an online degree in the Bachelor of Science in Respiratory Therapy (BSRT) and the Master of Science in Respiratory Care (MSRC) programs from the University of North Carolina-Charlotte (UNCC)—approximately 101 total RTs enrolled in both curriculums combined, along with recent graduates. Additional surveys were sent out to practicing respiratory therapists licensed by the state of NC and monitored by the NCRB to increase the response rate. The population of RTs licensed by the NCRCB was a convenience sample, and the researcher purchased a list containing several thousand names of RTs already licensed by the board. The researcher was also licensed as a therapist to work in NC by the Respiratory Care Board of NC.

Inclusion Criteria

RTs included in this study were those 18 to 69 years of age who worked as RTs during the pandemic in the U.S. from March 2020 through October 2023. All UNCC participants were enrolled in a degree program (BSRT or MSRC). All other participants were RTs licensed by the NCRCB to practice respiratory care in North Carolina. All participants had the minimum associate degree or equivalent required to practice as respiratory therapists and were registered by the NBRC. The survey was available to the participants on a voluntary basis.

Exclusion Criteria

RTs excluded from the study are those who have not worked during the pandemic and participants younger than 18 or older than 69 years of age. Five participants had not worked with COVID-positive patients and were excluded from the study. Also excluded were RTs without a minimum of an associate degree or equivalent and those not registered by the NBRC and the NCRCB.

Sample Size

Power Analysis. The first three research questions were descriptive and did not require inferential statistics; thus, no power analysis was necessary. A power analysis was also not required for (RQ7). G*Power was utilized with an $\alpha = .05$ and power = 0.80 to determine the sample size. The power analysis performed for research questions four through six and questions eight through eleven (R4, R5, R6, R8, R9, R10, and R11) were displayed in Figure 3. A total sample size of 84 participants were needed to achieve $\alpha = .05$ and power = 0.80. Pearson Correlations were performed to compare the IES-COVID19 scores to the DASS-21 anxiety, stress, and depression subscales; the correlations also determined if there were a relationship between an RT's self-efficacy and the DASS-21 subscales. Finally, a Pearson Correlation

investigated if there was a relationship between an RT's self-efficacy score and the IES-COVID19.

In summary, a total sample size of 84 participants were required to answer questions four through six and questions eight through eleven to achieve an $\alpha = .05$ and power 0.80. A sample size of 61 participants answered the required questions with an $\alpha = .05$ and a power of 0.66.

Figure 3.

*G*Power for Research Questions R4-R6, and R8-R11 Using Pearson Correlation.*

Exact-Options:	Correlation: Bivariate normal model exact distribution	
Analysis:	A priori: Compute required sample size	
Input:	Tail(s)	= Two
	Correlation ρ H1	= 0.3
	α err prob	= 0.05
	Power (1- β err prob)	= 0.80
	Correlation ρ H0	= 0
Output:	Lower critical r	= -0.2145669
	Upper critical r	= 0.2145669
	Total sample size	= 84
	Actual power	= 0.8003390

Measures and Tools

The data collection instruments used in this study include a demographic questionnaire for baseline information (Appendix B), the Depression Anxiety and Stress Scales (DASS-21; Appendix C), the Impact of Event Scale with Modifications for COVID-19 (IES-COVID19; Appendix D), and the New General Self-Efficacy Scale (NGSE; Appendix E). As described below, the DASS-21, IES-COVID19, and NGSE are validated instruments used in prior studies and found valid and reliable (Coker et al., 2018; Vlah Tomičević & Lang, 2021; Vanaken et al., 2020; Burrell et al., 2018). The participants responded to the surveys solely based on their self-

perception of the questions. It took participants approximately 16 minutes to complete all four instruments.

Demographic Questionnaire

A baseline demographic questionnaire (Appendix B) was distributed for screening information such as age, sex, marital status, and amount of time working during the COVID-19 pandemic. Also, questions related to entry into a degree program, amount of semester hours, and notice of symptoms were used to determine if a specific group relayed increased or worsening symptoms than their counterpart. Acquiring data via survey makes it hard to describe the population affected; the researcher attempted to gather as much information as possible to generalize a meaningful population (Andrade, 2020). A team of experts reviewed demographic questions to establish face validity. Face validity was used when there was a lack of standard measurement for a test; it simply means the questionnaire or test looks like it would measure what it was designed to measure (Johnson, 2013). A test that does look like it would measure what it was intended to measure can be said to have strong face validity.

Depression Anxiety and Stress Scale (DASS-21)

The Depression, Anxiety, and Stress Scale - 21 Items (DASS-21), a shorter version of the 42-item questionnaire created by Lovibond & Lovibond in 1995, has been shown to have the same high accuracy as the extended version and is most often recommended for and used by researchers. The tool is comprised of twenty-one questions associated with psychological trauma, seven of which focus on depression, anxiety, and stress. The DASS-21 is grounded in dimensions and reports degrees of differences between normal behavior and distressing behavior (Lovibond & Lovibond, 1995). The depression scale evaluates the degrees of dysphoria,

hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The anxiety scale evaluates autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The stress scale is sensitive to levels of chronic non-specific arousal and evaluates difficulty relaxing, nervous arousal, being easily upset/agitated, irritable / over-reactive, and impatient (Lovibond & Lovibond, 1995). Per the DASS-21 scoring instructions (Lovibond & Lovibond, 1995), total scoring is achieved by adding all sums and multiplying by two to achieve the full effect of the original 42-item DASS.

The DASS-21 provides recommended severity thresholds, which range from normal depression, anxiety, and stress to extremely severe depression, anxiety, or stress (Table 5). Participant answers to the DASS-21 survey questions are based on a four-point Likert scale ranging from zero (“did not apply to me at all”) to three (“applied to me very much”). Likert scales, developed in 1932 by Rensis Likert, can determine or measure participant perceptions and opinions (Jamieson, (n.d.)). The validated instrument helped by providing insight into the research questions by quantifying the increase or lack thereof of changes in stress, anxiety, and depression.

Table 5.

Dass-21 Scoring Matrix.

	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

Note. From “Manual for the depression anxiety and stress scales,” Lovibond, S.H., & Lovibond, P.F. 1995.

In a study of 240 Nigerian medical students at Lagos State University College of Medicine, the DASS-21 was found to be reliable with Cronbach's alpha values of 0.81, 0.89, and 0.78, respectively, for the subscales of depression, anxiety, and stress (Coker et al., 2018). Coker et al. (2018) also determined the tool had excellent internal consistency, with concurrent discriminative and convergent validities. Pearson's correlation showed the depression and anxiety subscales to be relatively strong and statistically significant. A positive relationship between both domains indicated that participants experienced symptoms of depression, anxiety, and stress (Coker et al., 2018).

Researchers have also deemed the DASS-21 to be valid and reliable. Vlah Tomičević and Lang (2021) found the tool validated for use in Croatia with a high Cronbach's α reliability coefficient for the DASS-21 questionnaire (0.90, 0.82, 0.88). This study included 534 healthcare workers (HCWs) in family practice in Croatia via surveys from May 1 to May 15, 2020. Survey results showed a high incidence of depression (30.7%), anxiety (33.1%), and stress (30.9%; Vlah Tomičević & Lang, 2021). HCWs with young children showed elevated stress levels on the stress subscale of the DASS-21 ($p = 0.043$) compared to other HCWs (Vlah Tomičević & Lang, 2021). At the same time, HCWs (35%) from Zagreb, the victim of a recent quake, indicated that quake stress was not a factor in the participants' DASS-21 scores (all p 's > 0.05 ; Vlah Tomičević & Lang, 2021).

Bahadirli & Sagaltici's (2021) cross-sectional survey using the DASS-21 instrument supports its usefulness in measuring stress-related symptoms. The study aimed to look at 783 physicians and nurses working in emergency departments (ED) who demonstrated signs of post-traumatic stress disorder (PTSD) due to the pandemic. This study did not include RTs, even though they also work in the ED. Results showed that there was no difference between

physicians and nurses in relation to depression, anxiety, and stress, and a probable PTSD rate of (22.9%) in physicians compared to (15.1%) in nurses (Bahadirli & Sagaltici, 2021). These results vary from other studies. Variations in the severity of symptoms among physicians were found with a history of being diagnosed with COVID, elevations in anxiety and depression levels, being of the female sex, and having chronic comorbidity. For nurses, symptom severity varied and included a history of COVID-19, elevated anxiety and depression levels, suffering from chronic comorbidity in addition to decreased wages, working 24-hour shifts, and limited job experience (Bahadirli & Sagaltici, 2021).

In December 2020, Marijanović et al. (2021) used the DASS-21 to obtain data from 175 healthcare workers (nurses, radiation technologists, physicians, and administrators) from five oncology groups in Bosnia and Herzegovina (BiH). They researchers found a statistically significant difference in depression, anxiety, and stress ($P=0.003$, $P=0.011$, and $P=0.022$) among participants with comorbidities compared to those without comorbidities (Marijanović et al., 2021). However, the study did show notable differences in stress levels based on location. There was a positive relationship between levels of depression, anxiety, and stress. Depression and anxiety correlated as ($r=0.448$, $n=175$, $P<0.01$), and depression and stress correlated as ($r=0.536$, $n=175$, $P<0.01$), identifying those participants suffering from elevated levels of anxiety and stress also suffered from elevated levels of depression (Marijanović et al., 2021).

Kirk et al. (2021) successfully used the DASS-21 to determine the level of psychological symptoms in front-line workers of pediatric centers. Responder surveys were acquired from April 28, 2020, to May 5, 2020. Four hundred thirty responders completed the DASS-21 questionnaire with a measured prevalence of mild (10.9%), moderate (17.7%), severe (5.3%), and extremely severe (5.1%) depression. Anxiety scales (47.7%) and stress (247%) were only

reported to be mild cases. This study and previously reported studies show the DASS-21 to be dependable in tracking psychological symptoms and the enormous toll the COVID-19 pandemic has had on the mental health of HCWs, like respiratory therapists.

In this study, the DASS-21 tool (Lovibond & Lovibond, 1995) was used to gather data to quantify results associated with an RT's self-reported changes in stress, anxiety, and depression levels from pandemic stressors. Lovibond & Lovibond (1995) in *Psychology Foundation of Australia* (2018) reported that access to the DASS survey instrument was in the public domain and did not require permission to be used by researchers or clinicians. This measurement tool was valuable in mental health research as it can assist in determining stressors and in indicating issues with depression, anxiety, and stress and allows individuals to report their perceived level of impact for each. A review of the tool shows that it provides specific instructions for individuals to recall their thoughts and feelings over the past few weeks. Participant responses were analyzed to determine if a participant's self-reported feelings of stress, depression, and anxiety increased or decreased during the pandemic.

Impact of Event Scale with Modifications for COVID-19 (IES-COVID19)

The Impact of Event Scale with Modifications for COVID-19 (IES-COVID19) was used to assess traumatic stress symptoms related to the impact of the COVID-19 outbreak (Vanaken et al., 2020). It was created based on the measurement system of Horowitz's Impact of Event Scale [IES] (Horowitz et al., 1979) and updated from the Dutch version of the IES (Brom & Kleber, 1985). The tool assesses the prevalence of stressful, invading thoughts regarding traumatic experiences and their triggers with language adapted to the COVID-19 pandemic. The scale instructions were revised to be read as a declaration or comment surrounding the conditions of COVID-19 (Celik et al., 2021).

Since the IES tool was created, providers have used it to track the mental health changes of a recipient over an extended period from a specific traumatic event. The tool can be repeated multiple times throughout a patient's life concerning that singular, specific event. Thus, any distressing symptoms can be measured and tagged to that event (Horowitz et al., 1979). The IES-COVID19 is a 15-item self-reporting tool designed to evaluate intrusions and avoidance; both dimensions portray the responses to stressors. The device is comprised of seven questions related to the intrusion of thoughts, images, dreams, and ideas and eight questions related to the avoidance of feelings, encounters, and ideas (Vanaken et al., 2020). The tool can assess the amount of distress perceived by the participant over the past week regarding experiences related to COVID-19. The higher the participant scores, the greater their mental health was impacted. The tool is also helpful as a preventative measure to catch early signs of risk for PTSD by monitoring changes in self-reported scores (Vanaken et al., 2020; Eleftheriou et al., 2021).

The IES was scored by calculating the total of all columns and adding them together for the total stress score. The cumulative score can range from zero to seventy-five, with (0-8 indicating no meaningful impact, 9-25 an impact event, 26-43 a powerful impact event, and 44-75 indicating a severe impact event). Scores greater than 26 may indicate that the participant has a 75% chance of having PTSD, partial PTSD, or several symptoms (Horowitz et al., 1979; Reed, 2007). Individuals with higher scores may benefit from psychological evaluation by a mental health professional. After careful examination, no permissions are needed to use the IES tool for research. However, permission to use the IES in this study was requested and granted by Dr. Mardi Horowitz (see Appendix F) via email.

The IES-COVID19 instrument showed acceptable validity and reliability in previous studies. Cronbach's alpha ($\alpha = .75$) indicates acceptable internal consistency of the IES-

COVID19. Pearson's correlations of the IES-COVID19 over time were sufficient, showing $r = .62$ test-retest reliability, which was adequate. Convergent validity was also verified (Vanaken et al., 2020). Vanaken et al.'s (2020) study of 380 university students between March 23 and March 27, 2020, and again from April 22 and April 29, 2020, used the instrument. The IES-COVID19 consistency demonstrates that the items cohesively measure trauma-related stress symptoms. It was also noted that the tool's test-retest reliability during the period of March to April (1 month) was good (Vanaken et al., 2020). The scores correlated symptoms to the amount of time that passed. Participants completing the IES-COVID19 questionnaire reported a higher mental health impact due to COVID-19 in March 2020, $M = 24.84$, $SD = 13.02$, compared to April 2020, $M = 22.02$, $SD = 14.28$, $t(245) = 3.57$, ($p < .001$; Vanaken et al., 2020). Total scores for the IES-COVID19 subscales show a positive relationship to depression, anxiety, and stress for HCWs displaying trauma-related stress symptoms to the COVID-19 outbreak.

A cross-sectional study of 613 family physicians from November 30, 2020, to January 15, 2021, was conducted by Vilovic et al. (2021) using the IES-COVID19 questionnaire. Results show that there was a prevalence of moderate/severe trauma-related symptoms (45.2%), borderline/abnormal anxiety levels (60.4%), and borderline/abnormal (52.4%) depression levels. The IES-COVID19 scale used in this sample of family physicians had a Cronbach's alpha coefficient of 0.92 and excellent reliability (Vilovic et al., 2021), demonstrating that it was a valid way to categorize the progress made in therapy from before the event and afterward. Any event that produces trauma with resulting panic attacks and phobias can be used with the scale (Reed, 2007).

An Ecuadorian study of 1028 participants, 14 of whom were respiratory therapists, was performed by Pazmiño Erazo et al. (2021) from various provinces from March 30, 2020, to April

22, 2020, using a survey. Results obtained from an IES questionnaire noted that 27.3% of participants displayed symptoms of depression, 39.2% with symptoms of anxiety, 16.3% with insomnia, and 43.8% with symptoms of PTSD ranging from moderate to severe in intensity. Risk factors affecting symptoms included being female, feelings of improper protective equipment, working in a highly affected area, and being a postgraduate doctor (Pazmiño Erazo et al., 2021). Analysis shows the study to have a 95% confidence interval (95% CI).

The IES-COVID19 measurement tool was used to collect data for categorizing the degree of traumatic stress symptoms suffered by RTs during the pandemic. Participant responses were analyzed to determine if their self-reported feelings of anxiety related to COVID-19 increased or decreased during the pandemic. This tool was valuable in tracking the minute changes related to one event that may occur over the years. Participants could retake this self-questionnaire in six months to one year to track personal changes in their mental health.

New General Self-Efficacy Scale

Self-efficacy is needed to combat psychological stress and plays a role in future success (Riopel, 2019a). The General Self-Efficacy (GSE) was generated by Sherer et al. (1982) to gauge self-efficacy in clinical, educational, and organizational settings to determine a participant's personal, self-perceived feeling of self-efficacy brought about when dealing with difficult, traumatic life events and how participants coped with those feelings (Schwarzer & Jerusalem, n.d.; Sahranavard, & Isfahani, 2020). Self-efficacy promotes rallying back from demanding situations, forming new goals, and steadfastness in overcoming barriers (Schwarzer & Jerusalem, n.d.).

The self-efficacy scale may help determine the quality of life after dramatic lifestyle changes and can be applied to multiple groups, cultures, and situations (Schwarzer & Jerusalem,

n.d.). In a study of surgical patients, the scale was found to be unidimensional with negative coefficients for stress, burnout, depression, and anxiety, with supporting Cronbach alpha scores from .76 to .90 (Schwarzer & Jerusalem, n.d.). The New General Self-Efficacy Scale (NGSE) is a shortened eight-item measurement tool that allows for self-perceived levels of self-efficacy to be assessed and monitored (Stanford University, n.d.). It was created by Chen, Gully & Eden (2001), and designed to monitor adult levels in under three minutes, and was easy to understand (written at the middle school level). Studies in two countries found that the NGSE scale has higher construct validity than the SGSE scale. Although shorter than the GSE scale, the NGSE scale demonstrated high reliability, predicted specific self-efficacy (SSE) for a variety of tasks in various contexts, and moderated the influence of previous performance on subsequent SSE formation (Chen et al., 2001).

A five-point rating scale is used from strongly disagree to strongly agree. Scores are calculated by averaging the responses [adding the answers and dividing by eight]; the more elevated the score, the higher the sense of self-efficacy of all the responses (Chen et al., 2001). A person with a lower sense of self-efficacy, despite the ability, would not make use of their skills (Sahranavard & Isfahani, 2020). A higher score indicates greater self-efficacy (Stanford University, n.d.; Riopel, 2019a). The Burrell et al. (2018) study showed the NGSE to produce eight out of eight measures of self-efficacy, two of eight measuring motivation, and six of eight showed discriminant content validity of the scales and measures of self-efficacy. Studies performed by Scherbaum et al. (2006), Roman et al. (2009), Bushnell et al. (2013), and Garza et al. (2014) in multiple settings, socio-economic groups, and cultures promote the NGSE as being more reliable and valid compared to similar scales (Burrell et al., 2018). The NGSE scale was supported to be valid and beneficial in research.

Chen et al. (2001) studied 323 psychology undergraduates from a mid-Atlantic university. A measurement tool was sent out two weeks before their exam, including GSE, self-esteem, and occupational SSE measures. All participants were invited to complete another tool two days post receiving their exam score and 20 days after the initial survey. Two hundred sixty-one undergraduates completed the second survey, measuring GSE and exam SSE. Study results showed the NGSE to have high internal consistency and reliability ($\alpha = .86$ and $.90$) with stable test-retest coefficients ($r = .67$; Chen et al., 2001).

Suryanovika (2022) performed another example of the validity and use of the NGSE on the self-efficacy of 34 Pontianak students in their fifth semester during the switch to online learning due to the pandemic. The NGSE scale questionnaire showed the mean was 29, 3, while the standard deviation was 5, 1. The first variable had the highest average and showed that the Pontianak students had a heightened sense of self-efficacy as measured by the scale in being successful with online learning during the pandemic (Suryanovika, 2022). The NGSE tool has been shown to be valid, consistent, stable, unidimensional, and theory-based (Chen et al., 2001). This tool was beneficial in measuring the reported self-efficacy of HCWs during the pandemic and helpful in determining the ongoing success in overcoming barriers to depression, anxiety, and stress.

Data Collection

An IRB application was completed and submitted to gain permission to conduct the study. Qualtrics, a survey software, was used to create the survey, and a survey link was generated. Data collection began with each RT verified to be in the BSRT or MSRC program at UNCC. Each RT was sent the demographic and survey instruments via their student UNCC email, thus requiring internet use. Due to the online survey used in the research project, the

Cover Letter for Internet Research was adapted for use. Once Radford IRB approval was obtained, the program director of the UNCC MSRC program volunteered to share the recruitment message, including a survey link, to all 101 students, eliminating the need for the researcher to obtain additional IRB approval. This method also accelerated the time in getting the survey out to participants. A collaboration agreement between UNCC and Radford University was obtained. The recruitment email explained the purpose of the study, including step-by-step instructions on completing the questionnaire and the time (17 minutes) expected to complete the surveys. A link to the surveys was also included. Participants who accessed the link to the questionnaire and survey instruments indicated their explicit consent to proceed with the study. An explanation of how the collected data would be maintained and kept confidential was provided in the email to students. The researcher used the Anonymize Response feature in Qualtrics to de-identify participant data and not record their email or IP address for privacy. Information was kept securely on a centralized database with security protection, with only the primary researcher having access to the data. No passwords were written down or given to any other person. Minimal risk was expected and was no more than would be encountered in everyday life.

The survey for UNCC students was open from September 20, 2023, and closed on October 21, 2023. One and a half weeks after confirmation that the survey had been sent to all 101 UNCC recipients, a reminder email was sent with a request to complete the survey. Another request was sent out to acquire any remaining uncompleted surveys within a two-to-three-week period. Data retrieved from the Qualtrics survey was exported to Statistical Package for the Social Sciences (SPSS) version 29, an IBM statistical software program (IBM Corp., Armonk, NY, USA) for data analysis.

On October 6, 2023, an IRB Amendment was filed for a modification of the study methodology and a change in recruitment methods due to the low response rate of surveys received from UNCC students. The IRB amendment was approved on October 9, 2023, after review. The list of participant emails was obtained by contacting the executive director of the NCRCB and making a request to purchase a list of recipient emails for survey. All recipients were registered by the NBRC and licensed to work in NC by the NCRCB. The transaction was completed, and the list of names was sent to the researcher by the director after the purchase price was paid. Two hundred thirty-seven individual emails were subsequently sent out to RTs licensed by the NCRCB, along with a Qualtrics survey link and research cover letter to expand the reach and increase the survey response. The survey opened October 16, 2023 for NCRCB RTs, and closed on October 31, 2023. Adding the second source of survey participants increased the survey response rate from 7% to 18%.

Data Analysis

The researcher identified independent and dependent variables (Table 6; Table 7) for the research questions and codebook for data analysis. IBM SPSS version 29 software conducted the appropriate analytics and multivariate analyses needed for definitive data. Independent and dependent variables for analysis and coding are provided in Tables 6 and 7, along with the statistical tests used.

Descriptive Analysis

Descriptive analysis was conducted based on the percentage of surveys completed and returned for analysis. Demographic information consisted of participants' age, gender, educational background, years working as a respiratory therapist, and experience dealing with physical symptoms of depression, anxiety, and stress. The descriptive statistics provided

background information on the study population. Research questions one through three and question seven (R1, R2, R3, and R7) were analyzed using descriptive statistics.

Inferential Statistical Analysis

The questionnaire responses were coded using the IBM SPSS version 29 statistical software package. As described in Table 6, Spearman's rho was used to analyze data for research questions four through six and questions eight through eleven (R4, R5, R6, and R8, R9, R10, R11). Pearson Correlation, a parametric measure, indicates the strength and linear direction of a relationship between continuous variables and can indicate if there was a relationship between depression, anxiety, and stress with self-efficacy (Kent State University, 2023).

Table 6.

Research Questions and Hypotheses Table with Variable Types.

RQ1: What are the distributional characteristics of the DASS-21 stress subscale for RTs in this sample?						
#	Hypotheses	IV(s)	IV(s) Data	DV(s)	DV Data	Statistical test
	This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of stress as measured by the DASS-21 stress subscale.	DASS-21 SCORE		STRESS LVL		Descriptive

RQ2: What are the distributional characteristics of the DASS-21 anxiety subscale for RTs in this sample?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
	This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of anxiety as measured by the DASS-21 anxiety subscale.	DASS-21 SCORE		ANXTY LVL		Descriptive

RQ3: What are the distributional characteristics of the DASS-21 depression subscale for RTs in this sample?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
	This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of depression as measured by the DASS-21 depression subscale.	DASS-21 SCORE		DEPRESS LVL		Descriptive

RQ4: Is there a correlation between an IES-COVID19 score and the DASS-21 depression score?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
H4.0	There is no significant correlation between an IES-COVID19 score and the DASS-21 depression subscales.	IES-COVID19 SCORE	Continuous	DEPRESS LVL	Continuous	Spearman's Correlation

RQ5: Is there a correlation between an IES-COVID19 score and the DASS-21 anxiety score?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
H5.0	There is no significant correlation between an IES-COVID19 score and the DASS-21 anxiety subscale.	IES-COVID19 SCORE	Continuous	ANXTY LVL	Continuous	Spearman's Correlation

RQ6: Is there a correlation between an IES-COVID19 score and the DASS-21 stress score?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
H6.0	There is no significant correlation between an IES-COVID19 score and the DASS-21 stress subscale.	IES-COVID19 SCORE	Continuous	STRESS LVL	Continuous	Spearman's Correlation

RQ7: What are the distributional characteristics of RTs in this sample who show a high sense of self-efficacy by scoring high on the New General Self-Efficacy Scale (NGSE) during this phase of the pandemic?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
	This RQ was analyzed with descriptive statistics. It was anticipated that participants would show a high sense of self-efficacy by scoring high on the NGSE.	NGSE SCORE		SELF EFFICACY		Descriptive

RQ8: Is there a relationship between an RT's self-efficacy and depression in this sample?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
H8.0	There is no relationship between an RT's self-efficacy and depression.	DEPRESS LVL	Continuous	SELF EFFICACY	Continuous	Spearman's Correlation

RQ9: Is there a relationship between an RT's self-efficacy and stress in this sample?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
H9.0	There is no relationship between an RT's self-efficacy and stress.	STRESS	Continuous	SELF EFFICACY	Continuous	Spearman's Correlation

RQ10: Is there a relationship between an RT's self-efficacy and anxiety in this sample?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
H10.0	There is no relationship between an RT's self-efficacy and anxiety.	ANXTY	Continuous	SELF EFFICACY	Continuous	Spearman's Correlation

RQ11: Is there a correlation between an RT's self-efficacy score and the IES-COVID19?						
#	<i>Hypotheses</i>	<i>IV(s)</i>	<i>IV(s) Data</i>	<i>DV(s)</i>	<i>DV Data</i>	<i>Statistical test</i>
H11.0	There is no relationship between an RT's self-efficacy score and the IES-COVID19.	IES-COVID19 SCORE	Continuous	SELF EFFICACY	Continuous	Spearman's Correlation

Table 7.

Instrument Variables and Coding.

Variable	Question on Instrument	Item Score	Variable Type	Data Analysis
Demographic	Q1 (18-65 years of age)	0 = not answered 1 = yes 2 = no	Numerical	Descriptive Statistics
Demographic	Q2 (work COVID-19 pandemic)	0 = not answered 1 = no 2 = yes	Categorical Ordinal	Descriptive Statistics
Demographic	Q3 (enrolled in degree program)	0 = not answered 1 = No 2 = Bachelors 3 = Masters	Independent Categorical Nominal	Descriptive Statistics
Demographic	Q5 (gender)	0 = not answered 1 = male 2 = female 3 = nonbinary	Independent Categorical Nominal	Descriptive Statistics
Demographic	Q6 (age group)	0 = not answered 1 = age	Independent Categorical Ordinal	Descriptive Statistics
Demographic	Q7 (hours worked weekly)	0 = not answered 1 = work hours	Independent Categorical Interval	Descriptive Statistics
Demographic	Q8 (years working)	0 = not answered 1 = years of work	Independent Categorical Ordinal	Descriptive Statistics
Demographic	Q9 (class hours per semester)	0 = not answered 1 = semester hours	Independent Categorical Ordinal	Descriptive Statistics
Demographic	Q10a (pre-pandemic suffer (a) depression, (b) anxiety, (c) stress)	0 = not answered 1 = no 2 = yes	Independent Categorical Ordinal	Descriptive Statistics
Demographic	Q10b if yes- (pre-pandemic suffer (a) depression, (b) anxiety, (c) stress)	1a = none 2a = Occasionally 3a = Weekly 4a = Daily 1b = none 2b = Occasionally 3b = Weekly 4b = Daily 1c = none 2c = Occasionally	Independent Categorical Ordinal	Descriptive Statistics

		3c= Weekly 4c= Daily		
Demographic	Q11a (during pandemic suffer depression, anxiety, stress)	0 = not answered 1 = no 2 = yes	Independent Categorical Ordinal	Descriptive Statistics
Demographic	Q11b if yes- (during pandemic suffer depression, anxiety, stress)	1a = none 2a = Occasionally 3a= Weekly 4a= Daily 1b = none 2b = Occasionally 3b= Weekly 4b= Daily 1c = none 2c = Occasionally 3c= Weekly 4c= Daily	Independent Categorical Ordinal	Descriptive Statistics
Demographic	Q12 (work/life balance)	0 = not answered 2= Better 3 = Worse	Independent Categorical Ordinal	Descriptive Statistics
Demographic	Q13 (job-related stress)	0 = not answered 1= More 2 = Less 3= Same	Independent Categorical Ordinal	Descriptive Statistics
Demographic	Q14 (how often have experience symptoms) a. Fatigue (Tired) b. Headache c. Nausea d. Acid indigestion e. Diarrhea f. Cold/Flu symptoms g. Shortness of breath h. Backache i. Loss of appetite j. Stomach cramps k. Dizziness l. Chest pain	0 = not answered 1a = None 2a = Occasionally 3a = Weekly 4a = Daily 1b = None 2b = Occasionally 3b = Weekly 4b = Daily 1c = None 2c = Occasionally 3c = Weekly 4c = Daily 1d = None 2d = Occasionally 3d = Weekly 4d = Daily 1e = None 2e = Occasionally 3e = Weekly 4e = Daily	Dependent Categorical	Descriptive and Inferential Statistic

		<p>1f = None 2f = Occasionally 3f = Weekly 4f = Daily 1g = None 2g = Occasionally 3g = Weekly 4g = Daily 1h = None 2h = Occasionally 3h = Weekly 4h = Daily 1i = None 2i = Occasionally 3i = Weekly 4i = Daily 1j = None 2j = Occasionally 3j = Weekly 4j = Daily 1k = None 2k = Occasionally 3k = Weekly 4k = Daily 1L = None 2L = Occasionally 3L = Weekly 4L = Daily</p>		
DASS-21	Q1-Q21: 4 per question	<p>Excluded = not answered or not applicable 0 = Did not apply to me at all 1 = Applied to me to some degree, or some of the time 2 = Applied to me to a considerable degree or a good part of time 3 = Applied to me very much or most of the time</p>	Dependent Continuous	Descriptive and Inferential Statistic
IES-COVID19	Q1-Q15: 4 per question	<p>Excluded = not answered or not applicable 0 = not at all</p>	Dependent Continuous	Descriptive and Inferential Statistic

		1 = seldom 2 = sometimes 3 = Often		
NGSE	Q1-Q8: 5 per question	Excluded = not answered or not applicable 1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree	Dependent Continuous	Descriptive and Inferential Statistic

Study Considerations

Limitations

The survey research hinges on the number of participant responses. Limitations include a small convenience sample from two sources: students in a respiratory degree program currently working as RTs and other working RTs licensed in NC by the NCRCB. Additionally, there are limitations to self-reporting by participants. Other limitations include the potential for inaccurate reporting by participants in the survey. Data was determined by response rate, which the number of surveys received can limit. Results obtained may also not be typical for all groups of RTs.

A limitation of the study was the scope and size of the project and the time allowed for data collection for the NCRCB participants. The sample group was based on convenience as UNCC was the alma mater of the researcher, and the researcher currently practices in NC and was already licensed by the NCRCB before purchasing a survey list. Survey emails were sent to less than 400 total participants concentrated in the state of NC. Consequently, the study was small in scope and concentrated in one area; other areas could have had different responses. The use of multiple instruments might have contributed to survey fatigue, as evidenced by the number of participants completing all four instruments.

Delimitations

This study was limited to RTs who worked with COVID-19 patients during the pandemic. Delimitations may include students in a respiratory degree program and their internet access to complete the survey online, as well as RTs licensed by the NCRCB. The online survey included the demographics questionnaire, the DASS-21, IES-COVID19, and NGSE instruments. Delimitations of this research study include only contacting RTs through their university emails or their personal email left for use by the NCRCB instead of contacting therapists via various hospital facilities. Additionally, the use of only the DASS-21 (Lovibond & Lovibond, 1995), IES-COVID19 (Vanaken et al., 2020), and NGSE (Chen et al., 2001) validated instruments apart from a demographic questionnaire was intentional for scoring.

Chapter Four

Results

This study examined the effects of COVID-19 on the mental health status of RTs at this stage of the pandemic in October 2023. The Radford University IRB approved the initial study on June 20th, 2023, and the amendment to send surveys to licensed NC RTs was approved on October 9th, 2023. The Qualtrics survey link was emailed out to 101 (fifty-one currently enrolled students and fifty recent graduates) respiratory therapy students enrolled or previously enrolled in degree programs at UNCC and 237 NC RTs licensed by the NCRCB.

Sample

The “*RT Stress and the COVID-19 Pandemic*” survey, which included a demographic/history questionnaire along with three validated instruments, the DASS-21, IES-COVID19, and NGSE tools, were sent to two survey populations. The initial survey was disseminated to RT program students at UNCC, and they were given one month to respond. Due to a low response rate of 7%, a secondary survey was disseminated to NCRCB-licensed RTs, who were given two weeks to respond. Of the 338 emailed surveys, completed surveys were received with a response rate of 18%, less than the a priori computed sample size of 84 needed for an alpha of 0.05 and a power of 80%. Seventy-seven participants responded to the survey invite; however, of the 77 who started or viewed the survey, 70 completed the demographic /history/symptoms questionnaire, 64 completed the demographic questionnaire along with the first two instruments, and 61(number of fully completed surveys) completed the questionnaire and all three validated instruments. The sample size of 61 was at an alpha of 0.05 and a power of 66%.

Recruitment Strategies

Participants recruited for the initial survey were RT students at UNCC. A cover letter and email were forwarded on the researcher's behalf by the UNCC RT Program Director (Appendix G) in collaboration with Radford University on September 20th, 2023, with a survey reminder sent on October 2nd, 2023, and a final reminder on October 17th, 2023, the survey closed on Saturday, October 21, 2023. Due to the low response rate, the researcher purchased a list of RTs licensed by the NCRCB for survey distribution; 237 were personally emailed the survey link on October 16th, 2023. The survey window closed on Friday, October 31, 2023.

Demographics

Results of the demographic questionnaire showed that 70 participants responded to the survey, with 90% falling into the age range of 18 to 65. Sixty-five, or 92.9%, were involved in the direct care of patients during the COVID-19 pandemic. Participants enrolled in a RT bachelor's program were 18.6%, and 11.4% were enrolled in a RT master's program; the remaining 70% of licensed NCRCB RTs were not currently enrolled in a RT degree program. Forty-eight or 68.6% of participants were female, while 22 or 31.4% were male. The average age of respondents was 45 years, who worked 36 hours per week over the last year and had been working as an RT for an average of 17 years.

Demographic results for both the DASS-21 and IES-COVID19 instruments were identical in data as the same 64 participants completed both surveys. Data showed 61 or 95.3% of participants worked with COVID-19-positive patients during the pandemic. Twelve, or 18.8%, of RTs were enrolled in a bachelor's program; eight, or 12.5%, in a master's program, with average class hours of 5 per semester; forty-three, or 67.2%, were not included in a program. Twenty-one, or 32.8%, of the participants were men, and 43, or 70.5%, were women. The

average age of respondents was 46.2 years, and they reported they worked 38.2 hours per week. The majority had 16.6 years of work experience.

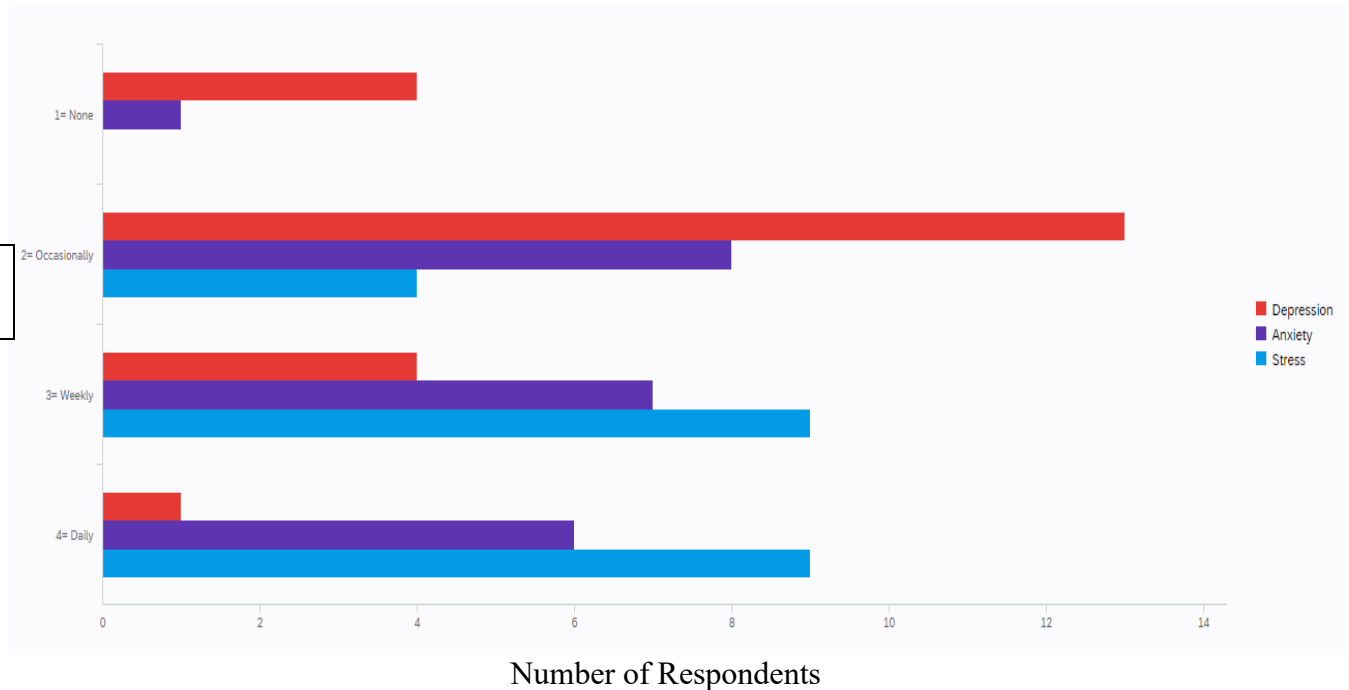
The last survey instrument used was the NGSE, which was started by the same 64 participants and fully completed by 61; these were the participants who completed all three validated surveys. Sixty-one participants completed the demographic questionnaire and all three surveys. Data showed that 59 or 96.7% of participants worked with COVID-19 patients. Eleven, or 18% of participants, were enrolled in a bachelor's program; eight, or 13.1%, enrolled in a master's program with average class hours of 4 per semester; and forty-two, or 68.9%, were not in a degree program. Participants included 16 or 26.2% males and 45 or 73.8% females. The respondents' average age was 45.7 years, who worked 37.1 hours per week with an average of 17.3 years on the job.

Descriptive Analysis

In the history section of the demographic survey (Appendix B), participants answered questions regarding their prior (before COVID-19) and current (after COVID-19) experiences with depression, anxiety, stress, work/life balance, and job stress. Sixty-seven percent (47) responded they did not suffer from ailments associated with depression, anxiety, and stress *prior to* the pandemic, while nearly 33% (23) had experienced some symptoms. Of those 33% who reported symptoms *prior to* the pandemic (Figure 4), symptoms of depression were reported occasionally at a rate of 59.1%, anxiety occasionally at a rate of 36.4%, and stress at a rate of 40.9% on both a weekly and daily basis.

Figure 4.

Participants' Reports of Depression, Anxiety, and Stress Prior to COVID-19.

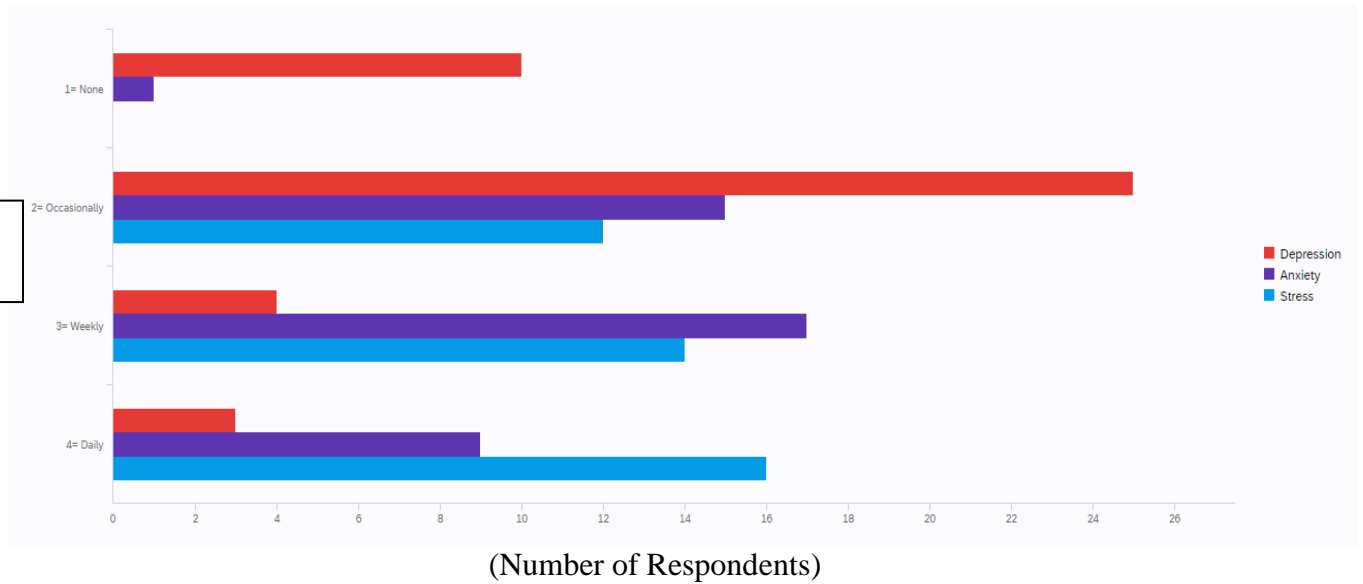


Note. Graph of group's prior pandemic symptoms.

After working *during* the pandemic, 61% (42) of participants reported suffering from ailments related to depression, anxiety, and stress, with 39.1% (27) reporting no disorders connected with anxiety, depression, or stress (Figure 5). Depression was reported to be experienced occasionally by participants at a rate of 59.5%, anxiety was experienced weekly at a rate of 40.5%, and stress was experienced weekly at a rate of 33.3% and daily at a rate of 38.1%. Fifty-one percent reported their work/life balance as worse due to the pandemic, while 49% reported it as better. Job-related stress was reported to be worsened by 14.9% of participants, the same by 34.3%, and less by 50.8% now that the pandemic has subsided.

Figure 5.

Participants' Reports of Depression, Anxiety, and Stress Working During COVID-19.



Note. Graph of the group's symptoms during the pandemic.

Recent symptoms reported by the participants over the past few (two) weeks are included in Table 8. Symptoms associated with depression, anxiety, and stress were reported as fatigue occasionally at a rate of 32.8%, weekly at 24.6% and daily at 32.8%. Headaches were reported occasionally by 38.8% of participants, weekly by 17.9%, and daily by 1.5%. Nausea was experienced by 19.4% of participants occasionally and 3% weekly. Other symptoms related to depression, stress, and anxiety and their frequencies included daily backaches (23.9%), acid indigestion (10.5%), and occasional dizziness (23.9%).

Table 8.*Frequency of Ailments Associated with Depression, Anxiety, and Stress.*

Symptom	None	Occasionally	Weekly	Daily
Fatigue (Tired)	11.94%	31.34%	23.88%	32.84%
Headache	41.79%	38.81%	17.91%	1.49%
Nausea	76.12%	19.40%	2.99%	1.49%
Acid indigestion	61.19%	20.90%	7.46%	10.45%
Diarrhea	77.61%	19.40%	1.49%	1.49%
Cold/Flu symptoms	58.21%	40.30%	1.49%	0.00%
Shortness of Breath	77.61%	17.91%	4.48%	0.00%
Backache	28.36%	26.87%	20.90%	23.88%
Loss of appetite	73.13%	23.88%	2.99%	0.00%
Stomach cramps	73.13%	19.40%	5.97%	1.49%
Dizziness	71.64%	23.88%	4.48%	0.00%
Chest Pain	80.60%	14.93%	2.99%	1.49%

Note. Percentage of frequency participants reported symptoms and ailments working during the pandemic.

DASS-21 Results

The shortened DASS-21 validated survey by Lovibond & Lovibond (1995) has often been adapted for research use to distinguish individuals who may be more at risk of developing psychopathologies linked to depression, anxiety, and stress in non-clinical and clinical atmospheres (Ali et al., 2021). The instrument consists of three subscales measuring depression, anxiety, and stress. Results of the DASS-21 demonstrated that 41% of participants reported it was hard to wind down at times, 48% found it difficult to work up the initiative to get things done at times, 45% noticed they were agitated to some degree, and 42% were not able to be happy about anything at times.

For RQ1-RQ3, the group's subscales were calculated for stress, anxiety, and depression using questions 1, 6, 8,11,12,14, and 18 from the DASS-21 instrument for stress, questions 2, 4, 7, 9, 15, 19, and 20 for anxiety, and questions 3, 5, 10, 13, 16 17, and 21 for depression. Frequencies and a case processing table were performed to ensure the data was valid and no data was missing. A histogram and quantile-quantile (Q-Q) plot were obtained for each subscale. A Spearman's rho correlation was performed to determine the significance of the group's determined subscales as the plots were abnormal compared to a standard bell curve plotted by Q-Q, so the nonparametric correlations were used instead of Pearson Correlation.

RQ1: What are the distributional characteristics of the DASS-21 stress subscale for RTs in this sample? Data for this question was based on a sample of n=64 participant responses. The results for stress showed a mean of 13.8 (95% CI), with a minimum score of 7, a maximum score of 28, and a SD of 5.15, as shown in Table 9. Per the DASS-21 scoring matrix in Table 5, the minimum score for stress was within the normal range of (0-14), the mean score was on the

high end of normal, and the maximum score was in the severe (26-33) category (Lovibond & Lovibond, 1995). The Q-Q plot also showed other stress scores outside of the normal range.

Table 9.

Descriptives for DASS-21 Stress Results.

Descriptive			Statistic	Std. Error
Stress	Mean		13.8438	.64404
	95% Confidence Interval for Mean	Lower Bound Upper Bound	12.5567 15.1308	
	5% Trimmed Mean		13.5660	
	Median		13.0000	
	Variance		26.547	
	Std. Deviation		5.15234	
	Minimum		7.00	
	Maximum		28.00	
	Range		21.00	

Note. DASS-21 stress descriptives.

This RQ was analyzed with descriptive statistics. It was anticipated that participants would report high levels of stress as measured by the DASS-21 stress subscale; however, based on these results for RQ1, the RTs who participated in this study reported stress on the high end of the normal range.

RQ2: What are the distributional characteristics of the DASS-21 anxiety subscale for RTs in this sample? The data for this question was based on a sample of n=64 participant responses. Participant characteristics for anxiety showed a mean of 10.73 (95% CI) with a minimum score of 7, a maximum of 21, and a SD of 3.69, as shown in Table 10. Per the DASS-21 scoring matrix in Table 5, the minimum score for anxiety was within the normal range of (0-7), the mean score was in the moderate category of (10-14), and the maximum score was in the

extremely severe (20+) category (Lovibond & Lovibond, 1995). The Q-Q plot also showed other anxiety scores outside of the normal range.

Table 10.

Descriptives for DASS-21 Anxiety Results.

Descriptive			Statistic	Std. Error
Anxiety	Mean		10.7344	.46197
	95% Confidence Interval for Mean	Lower Bound Upper Bound	9.8112 11.6575	
	5% Trimmed Mean		10.4514	
	Median		10.0000	
	Variance		13.658	
	Std. Deviation		3.69574	
	Minimum		7.00	
	Maximum		21.00	
	Range		14.00	

Note. DASS-21 anxiety descriptives.

This RQ was analyzed with descriptive statistics. Results supported the anticipated outcome; based on these results for RQ2, the RTs who participated in this study reported moderate levels of anxiety.

RQ3: What are the distributional characteristics of the DASS-21 depression subscale for RTs in this sample? Data for this question was based on a sample of n=64 participant responses. Attributes for the participants showed a mean of 11.46 on the depression subscale (95% CI) with a low score of 7, a high score of 27, and a SD of 4.7, as shown in Table 11. Per the DASS-21 scoring matrix in Table 5 (p. 95), the minimum score for depression was within the normal range of (0-7), the mean score was in the mild category of (10-13), and the maximum score was in the high end of the severe (21-27) category (Lovibond & Lovibond, 1995). The Q-Q plot also showed other scores for depression that were outside of the normal range.

Table 11.*Descriptive for DASS-21 Depression Results.*

Descriptives			Statistic	Std. Error
Depression	Mean		11.468	.59008
	95% Confidence Interval for Mean	Lower Bound Upper Bound	10.2896 12.6479	
	5% Trimmed Mean		11.0833	
	Median		10.0000	
	Variance		22.285	
	Std. Deviation		4.72067	
	Minimum		7.00	
	Maximum		27.00	
	Range		20.00	

Note. DASS-21 depression descriptives.

This RQ was analyzed with descriptive statistics. Results supported the anticipated outcome; for RQ3, the RTs in this study reported mild levels of depression.

In Table 12, Spearman's rho correlation was significant when correlating depression to anxiety ($r_s([62]) = [.69]$, $p = [< .001]$) and stress ($r_s([62]) = [.81]$, $p = [< .001]$). Anxiety related to depression at a coefficient of ($r_s([62]) = [.69]$, $p = [< .001]$) and stress at ($r_s([62]) = [.75]$, $p = [< .001]$). Stress correlated to depression at a coefficient of ($r_s([62]) = [.81]$, $p = [< .001]$), and anxiety with a value of ($r_s([62]) = [.75]$, $p = [< .001]$). Information carried over from the demographic questionnaire and plots of the DASS-21 subscale scores shows there are significant scores for stress, anxiety, and depression for many of the RTs surveyed. A normality test was performed to ensure further the correlations' significance, which agreed with the significant p values shown in Table 12.

Table 12.*Correlations for DASS-21 Subscales.*

Correlations			Depression	Anxiety	Stress
Spearman's rho	Depression	Correlation Coefficient	1.000	.691**	.806**
		Sig. (2-tailed)	.	<.001	<.001
		N	64	64	64
	Anxiety	Correlation Coefficient	.691**	1.000	.751**
		Sig. (2-tailed)	<.001	.	<.001
		N	64	64	64
	Stress	Correlation Coefficient	.806**	.751**	1.000
		Sig. (2-tailed)	<.001	<.001	.
		N	64	64	64

Note. DASS-21 depression, anxiety, and stress subscale correlations. **. Correlation is significant at $p < 0.01$ (2-tailed).

IES-COVID19 Results

The IES-COVID19 is based on two subscales: avoidance and intrusion. Participants reported on the IES-COVID19 instrument that 35% worked to avoid letting themselves get upset sometimes when they thought about or were reminded of COVID-19 over the past two weeks, 25% of participants sometimes consciously stayed away from things that made them think about it at times, 18% reported they often were aware they had a lot of feeling about COVID but did not deal with them, and 23% reported their feeling about it were sometimes numb.

Analysis of the results for RQ4-RQ6 began with calculating the group's subscales of avoidance and intrusion for the IES-COVID19. The avoidance subscale was calculated using questions 2, 3, 7, 8, 9, 12, 13, and 15, while the intrusion subscale was determined using questions 1, 4, 5, 6, 10, 11, and 14. A histogram and Q-Q plot were done to determine if the line was normal or abnormal. Again, the group's results were shown to deviate from normal, so a nonparametric correlation or Spearman's rho was used instead of a Pearson correlation.

The IES-COVID19 intrusion subscale mean score was 14.31 (95% CI), with seven as the minimum score and 28 as the maximum score, as shown in Table 13. For the avoidance subscale, as shown in Table 14, the mean was 15.91 (95% CI), with eight as the minimum score, 29 as the maximum, and a range of 21 points between each. Scores are cumulative from 0 to 75; the group's total IES-COVID19 score was 30.22, which may indicate a powerful impact from the COVID-19 pandemic (26-43 represents a powerful impact event; Horowitz et al., 1979; Reed, 2007; Vanaken et al., 2020).

Table 13.

Descriptives for IES-COVID19 Intrusion Subscale.

Descriptives			Statistic	Std. Error
Intrusion	Mean		14.3125	.77788
	95% Confidence Interval for Mean	Lower Bound Upper Bound	12.7580 15.8670	
	5% Trimmed Mean		13.9792	
	Median		13.5000	
	Variance		38.726	
	Std. Deviation		6.22304	
	Minimum		7.00	
	Maximum		28.00	
	Range		21.00	

Note. IES-COVID19 descriptives for intrusion subscale.

Table 14.*Descriptives for IES-COVID19 Avoidance Subscale.*

Descriptives			Statistic	Std. Error
Avoidance	Mean		15.9531	.78504
	95% Confidence Interval for Mean	Lower Bound Upper Bound	14.3844 17.5219	
	5% Trimmed Mean		15.7118	
	Median		15.0000	
	Variance		39.442	
	Std. Deviation		6.28030	
	Minimum		8.00	
	Maximum		29.00	
	Range		21.00	

Note. IES-COVID19 descriptives for avoidance subscale.

RQ4: Is there a correlation between an IES-COVID19 score and the DASS-21 depression score? The data for this question was based on a sample of n=64 participant responses. Frequencies and a case processing table were performed to ensure the data was valid and no data was missing. Further supporting the significance of the impact COVID made on RTs attending UNCC and those licensed throughout NC, the Spearman's rho correlation indicated a significant correlation between intrusion and avoidance ($r_s([62]) = [.78], p = [< .001]$), and avoidance and intrusion at the same coefficient (Table 15). When comparing these significant factors with the DASS-21 results of mild depression with a mean score of 11.5, it was expected there may be some correlation between depression and the impact of COVID-19. Correlations comparing the DASS-21 depression subscale to the IES-COVID19 results were shown to be significant. Depression correlated to the IES-COVID19 intrusion subscale at a coefficient of ($r_s([62]) = [.50], p = [< .001]$) and to the IES-COVID19 avoidance subscale at a coefficient of ($r_s([62]) = [.51], p = [< .001]$).

Table 15.

IES-COVID19 & DASS-21 Depression Correlation.

Correlations			Intrusion	Avoidance	Depression
Spearman's rho	Intrusion	Correlation Coefficient	1.000	.776**	.503**
		Sig. (2-tailed)	.	<.001	<.001
		N	64	64	64
	Avoidance	Correlation Coefficient	.776**	1.000	.527**
		Sig. (2-tailed)	<.001	.	<.001
		N	64	64	64
	Depression	Correlation Coefficient	.503**	.527**	1.000
		Sig. (2-tailed)	<.001	<.001	.
		N	64	64	64

Note. DASS-21 depression correlation to IES-COVID19. **. Correlation is significant at $p < 0.01$ (2-tailed).

Based on these results for RQ4, the following null hypothesis was rejected: H4.0: There was no significant correlation between an IES-COVID19 score and the DASS-21 depression subscales. The study results showed a significant correlation between depression and intrusion and avoidance.

RQ5: Is there a correlation between an IES-COVID19 score and the DASS-21 anxiety score? Data for this question was based on a sample of $n=64$ participant responses. As shown in Table 13&14, the mean of the two subscales for the group's IES-COVID19 was 30.22, suggesting avoidance and intrusion had a potent effect. Also, participants scored in the mild anxiety range with a mean of 10.73, as mentioned previously. A Spearman's rho correlation of the IES-COVID19 with the DASS-21 anxiety subscale score showed a significant result for anxiety of ($r_s([62]) = [.53], p = [< .001]$) for the IES-COVID19 intrusion subscale, and a coefficient of ($r_s([62]) = [.50], p = [< .001]$) for the IES-COVID19 avoidance subscale as shown in Table 16.

Table 16.

IES-COVID19 & DASS-21 Anxiety Correlation.

Correlations			Intrusion	Avoidance	Anxiety
Spearman's rho	Intrusion	Correlation Coefficient	1.000	.776**	.532**
		Sig. (2-tailed)	.	<.001	<.001
		N	64	64	64
	Avoidance	Correlation Coefficient	.776**	1.000	.500**
		Sig. (2-tailed)	<.001	.	<.001
		N	64	64	64
	Anxiety	Correlation Coefficient	.532**	.500**	1.000
		Sig. (2-tailed)	<.001	<.001	.
		N	64	64	64

Note. DASS-21 anxiety correlation to IES-COVID19. **. Correlation is significant at $p < 0.01$ (2-tailed).

Based on these results for RQ5, the following null hypothesis was rejected: H5.0: No significant correlation exists between an IES-COVID19 score and the DASS-21 anxiety subscales. For the RTs who participated in this study, both their intrusion and avoidance subscales correlated significantly to their DASS-21 anxiety subscales.

RQ6: Is there a correlation between an IES-COVID19 score and the DASS-21 stress score? The data for this question was based on a sample of $n=64$ participant responses. The IES-COVID19 mean score for the sample group was elevated, while the group's mean DASS-21 subscale scores for stress were in the normal range, although on the high end. A Spearman's rho correlation showed results were significant with stress correlating to an IES-COVID19 coefficient of ($r_s([62]) = [.57], p = [< .001]$) for intrusion, and also to an IES-COVID19 coefficient of ($r_s([62]) = [.52], p = [< .001]$) for avoidance as shown in Table 17.

Table 17.***IES-COVID19 & DASS-21 Stress Correlation.***

Correlations			Intrusion	Avoidance	Stress
Spearman's rho	Intrusion	Correlation Coefficient	1.000	.776**	.568**
		Sig. (2-tailed)	.	<.001	<.001
		N	64	64	64
	Avoidance	Correlation Coefficient	.776**	1.000	.516**
		Sig. (2-tailed)	<.001	.	<.001
		N	64	64	64
	Stress	Correlation Coefficient	.568**	.516**	1.000
		Sig. (2-tailed)	<.001	<.001	.
		N	64	64	64

Note. DASS-21 stress correlation to IES-COVID19. **. Correlation is significant at $p < 0.01$ (2-tailed).

Based on these results for RQ6, the following null hypothesis was rejected: H6.0: No significant correlation exists between an IES-COVID19 score and the DASS-21 stress subscales. For the RTs who participated in this study, their IES-COVID19 scales significantly correlated to their DASS-21 stress subscale.

New General Self-Efficacy Results

RTs with high self-efficacy better cope with and bounce back from stressful situations. Developing self-efficacy allows individuals to change their outlook and mindset in overwhelming situations that push them to progress despite the odds (Schwarzer & Jerusalem, n.d.). The NGSE measurement tool created by Chen, Gully & Eden (2001) allows self-reported levels of self-efficacy to be assessed and monitored (Stanford University, n.d.).

RQ7: What are the distributional characteristics of RTs in this sample who show a high sense of self-efficacy by scoring high on the New General Self-Efficacy Scale (NGSE)

during this phase of the pandemic? The data for this question was based on a sample of n=61 participant responses. A case processing summary was prepared, and it was determined that no entered results were missing from the calculations. Descriptive analysis showed the sample group's mean self-efficacy score to be 33.21 (95% CI, SD 5.31; Table 18), with a minimum score of 8 and a maximum of 40. There was no minimum or maximum score for this instrument, and it is believed that the higher the score, the higher the sense of self-efficacy (Chen et al., 2001; Riopel, 2019a; Sahranavard & Isfahani, 2020). Scoring was via a Likert scale from 1 (strongly disagree) to 5 (strongly agree), ranging from 8 to 40. A score of 33/40 was high, showing many RTs reported having a high level of self-efficacy, although the minimum score of 8 indicates others reported having a very low level of self-efficacy.

Table 18.

Descriptives for NGSE Results.

Descriptives			Statistic	Std. Error
Self-Efficacy	Mean		33.2131	.67997
	95% Confidence Interval for Mean	Lower Bound Upper Bound	31.8530 34.5733	
	5% Trimmed Mean		33.6393	
	Median		33.0000	
	Variance		28.204	
	Std. Deviation		5.31073	
	Minimum		8.00	
	Maximum		40.00	
	Range		32.00	

Note. NGSE descriptives.

This RQ was analyzed with descriptive statistics. Based on these results for RQ7, results supported the anticipated outcome, the RTs who participated in this study reported a high level of self-efficacy.

RQ8: Is there a relationship between an RT's self-efficacy and depression in this sample? Data for this question was based on a sample of n=61 participant responses. The group's mean self-efficacy score of 33 was high, as discussed previously. A correlation between self-efficacy and depression was performed, and results showed an inverse or negative correlation of depression to self-efficacy ($r_s([59]) = [-.34], p = [.007]$; Table 19). The relationship between self-efficacy and depression flows in opposite directions and are opposite of each other, creating an inverse relationship (Investopedia team, 2023). As one variable elevates, the corresponding variable decelerates.

Table 19.

Self-Efficacy & DASS-21 Depression Subscale Correlation.

Correlations			Self-Efficacy	Depression
Spearman's rho	Self-Efficacy	Correlation Coefficient	1.000	-.342**
		Sig. (2-tailed)	.	.007
		N	61	61
	Depression	Correlation Coefficient	-.342**	1.000
		Sig. (2-tailed)	.007	.
		N	61	64

Note. DASS-21 depression correlation to self-efficacy. **. Correlation is significant at $p < 0.01$ (2-tailed).

Based on these results for RQ8, the following null hypothesis was rejected: H8.0: There was no relationship between RT's self-efficacy and depression. The RTs who participated in this study reported a significant correlation between self-efficacy and depression.

RQ9: Is there a relationship between an RT's self-efficacy and stress in this sample?

The data for this question was based on a sample of n=61 participant responses. The group's results for stress were within the normal range for those surveyed, while self-efficacy was reported as high. A Spearman's rho correlation comparing self-efficacy and stress was

performed, and an inverse correlation coefficient of ($r_s([59]) = [-.25], p = [.057]$) was found, however, the correlation was not significant ($p=0.057$), as shown in Table 20.

Table 20.

Self-Efficacy & DASS-21 Stress Subscale Correlation.

Correlations			Self-Efficacy	Stress
Spearman's rho	Self-Efficacy	Correlation Coefficient	1.000	-.245
		Sig. (2-tailed)	.	.057
		N	61	61
	Stress	Correlation Coefficient	-.245	1.000
		Sig. (2-tailed)	.057	.
		N	61	64

Note. DASS-21 stress correlation to self-efficacy.

Based on these results for RQ9, the following null hypothesis was accepted: H9.0: There was no relationship between RT's self-efficacy level and stress.

RQ10: Is there a relationship between an RT's self-efficacy and anxiety in this sample? Data for this question was based on a sample of n=61 participant responses.

Participants had a mean anxiety score in the moderate range with a high self-efficacy score. A Spearman's rho correlation was performed ($r_s([59]) = [-.10], p = [.456]$) and produced an inverse correlation coefficient that was not significant ($p= -.097$), as shown in Table 21.

Table 21.

Self-Efficacy & DASS-21 Anxiety Subscale Correlation.

Correlations			Self-Efficacy	Anxiety
Spearman's rho	Self-Efficacy	Correlation Coefficient	1.000	-.097
		Sig. (2-tailed)	.	.456
		N	61	61
	Anxiety	Correlation Coefficient	-.097	1.000
		Sig. (2-tailed)	.456	.
		N	61	64

Note. DASS-21 anxiety correlation to self-efficacy.

Based on these results for RQ10, the following null hypothesis was accepted: H10.0: There was no relationship between RT's self-efficacy and anxiety.

RQ11: Is there a correlation between an RT's self-efficacy score and the IES-COVID19? Data for this question was based on a sample of n=61 participant responses. A Spearman's rho correlation was performed to determine if a correlation existed between the participant's self-efficacy scores and IES-COVID19 score. Results showed that no correlation existed between self-efficacy and the IES-COVID19 intrusion subscale ($r_s([59]) = [.08]$, $p = [.559]$), nor between self-efficacy and the IES-COVID19 avoidance subscale ($r_s([59]) = [-.03]$, $p = [.848]$).

Table 22.

Self-efficacy & IES-COVID19 Correlation.

Correlations			Self-Efficacy	Intrusion	Avoidance
Spearman's rho	Self-Efficacy	Correlation Coefficient	1.000	.076	-.025
		Sig. (2-tailed)	.	.559	.848
		N	61	61	61
	Intrusion	Correlation Coefficient	.076	1.000	.776**
		Sig. (2-tailed)	.559	.	<.001
		N	61	64	64
	Avoidance	Correlation Coefficient	-.025	.776**	1.000
		Sig. (2-tailed)	.848	<.001	.
		N	61	64	64

Note. IES-COVID19 correlation to self-efficacy. **. Correlation is significant at $p < 0.01$ (2-tailed).

Based on these results for RQ11, the following null hypothesis was accepted: H11.0: No relationship exists between an RT's self-efficacy score and the IES-COVID19.

In summary, a significant correlation was found between depression and anxiety ($p = .001$) and depression and stress ($p < 0.001$) among participants. The IES-COVID19 mean score of 30 was also significant and suggested a powerful impact on RTs from the COVID-19 pandemic. Results concluded that the DASS-21 anxiety and stress subscales correlated significantly with the IES-COVID19 ($p < .001$). There was no relationship between a self-efficacy score and the IES-COVID19 scores among the sample group, with the exception of self-efficacy and depression.

Chapter Five

Discussion

This research examined the effects of the COVID-19 pandemic on the mental health of RTs now that the pandemic's peak has slowed. The findings suggest that following exposure to the COVID-19 pandemic, a larger number of RTs experienced symptoms related to depression, anxiety, and stress than RTs of the same sample group who reported no issues related to stress, depression, or anxiety (Figure 5). Additionally, noted among participants was a moderate level of anxiety, with some RTs reporting experiencing severe anxiety, mild depression, and mean stress levels on the high end of normal, as well as some participant levels reported as seriously elevated.

Results suggest a significant prevalence for an increase in mental health challenges, specifically for RTs, related to working during the COVID-19 pandemic. The natural stress of a job in healthcare was exacerbated by the stress of working with contagious patients, fear of contracting the disease, fear for family, being understaffed, surviving the loss of patients, friends, and family members, and being overworked (Magnavita et al., 2020; Roberts et al., 2022; Preti et al., 2020; Pfefferbaum & North, 2020). Such conditions over time may have contributed to the increase in depression, anxiety, and stress, leading to other related symptoms reported by participants, such as backache, headache, cold/flu symptoms, fatigue, and dizziness. These results are similar to the results from the HERO registry of HCWs, of which 1262 were from NC, which showed that participants reported feeling fatigued a majority of the time, stress, worry, and physical pain during the pandemic (Forrestt et al., 2021).

Impact of COVID-19

Stress has created mental health issues in HCWs related to the pandemic (Xing et

al., 2020; Gómez-Salgado et al., 2021) based on their role in healthcare (Bahadirli & Sagaltici, 2021; Pazmiño Erazo et al., 2021). According to the CDC, the COVID-19 pandemic was responsible for many of the mental health issues faced by HCWs (Viswanathan, 2023). Those in healthcare careers face unique workplace challenges, leading to unique mental health challenges compared to other professions (Viswanathan, 2023). Ninety-five percent of the RTs in this study worked during the pandemic in front-line job roles, which may have contributed to the amount of adverse mental health challenges reported due to the inherent stress involved in those roles. Results from the HERO registry noted that the negative effects of distress decreased over the length of the study period (Forrestt et al., 2021), suggesting a decline in the severity of symptom levels over time. This connection may be responsible for the stress levels reported in this study as RTs. RTs reported stress levels on the high end of the normal range. However, this study was completed in October of 2023, representing their current levels compared to the potentially higher levels that may have been noted in 2020.

The term compassion fatigue was created to express the feelings associated with those who, either as their profession or as part of the family, participate in caring for someone seriously ill, which induces trauma despite them not directly experiencing the incident (Holcombe, 2023). Compassion fatigue can extend to irritability, extreme fatigue, and an eventual decrease in empathy (Holcombe, 2023). RTs may have been affected by this trauma subsequent to the COVID-19 pandemic and may still suffer from some physical/mental ailments. RTs participating in this study reported a change in mental health symptoms *prior to* compared to *after* the start of the pandemic. *Prior to* the pandemic, 47 RTs reported no history of ailments associated with depression, stress, and anxiety; *after* the pandemic's start, the number reduced to 27 RTs reporting no history of

ailments related to depression, anxiety, and stress. Stepping back and promoting self-care is vital for the mental health of RTs.

The elevated IES-COVID19 score indicated the pandemic strongly impacted the mental health of RTs with a mean IES-COVID19 score of 30.2. For the RTs who participated in this study, both their intrusion and avoidance subscales significantly correlated to their DASS-21 anxiety subscales. The IES-COVID19 score was significant and showed that the RTs in this study reported issues related to intrusion and avoidance, suggestive of traumatic thoughts or post-traumatic stress disorder in relation to the COVID-19 pandemic. The trauma of the COVID-19 pandemic may have influenced the moderate level of anxiety in this group of RTs.

Relationship of the Findings to Prior Research

This study demonstrated an increase in anxiety, depression, stress, and post-traumatic stress among RTs, as noted in prior literature by other studies (Marvaldi et al., 2021; Chen et al., 2021; Pfefferbaum & North, 2020). Reports of somatic symptoms among RTs were present in the literature that described many experiencing issues with appetite, acid indigestion, and fatigue (Muller et al., 2020; Shen et al., 2020). This study also showed that RTs reported a prevalence of somatic symptoms that worsened after working during COVID-19, such as headaches, diarrhea, loss of appetite, and fatigue (Table 8).

Fatigue and stress were found to exacerbate anxiety, depression, and irritability, leading to behavioral disturbances (Huang et al., 2013; Chen et al., 2021). This study supported these findings as the DASS-21 results showed that 45% of participants noticed they were agitated to some degree, and 42% were not able to be happy about anything at times. The IES-COVID19 results also showed that 35% of the group worked to avoid letting themselves get upset sometimes when they thought about or were reminded of COVID-19 over the past two weeks, 25% of participants

sometimes consciously stayed away from things that made them think about it at times, 18% reported they often were aware they had a lot of feeling about COVID but did not deal with them.

According to Pfefferbaum & North (2020), HCWs with prior psychiatric issues face elevated risks for negative psychosocial outcomes related to emotional distress. This study found that of the 33% of RTs who reported preexisting symptoms prior to the pandemic, depression, stress, and anxiety were reported occasionally after the pandemic began, with an increased number of participants reporting suffering from ailments related to depression, anxiety, and stress. The rate of prevalence of depression, stress, and anxiety was also found to be increased.

The pressure of working in healthcare during a pandemic created disturbances that caused some RTs to feel overwhelmed and inadequately supported (Kebede et al., 2021). This may have been due to a lack of acknowledgment, comradery, and support from leadership, teammates, and social isolation. Females reported higher rates of depression and burnout than males (Ali et al., 2021) while also reporting higher instances of fatigue, mental challenges, and worsening levels of depression. Consistent with these findings, this study reported a moderate level of anxiety and mild depression among female RTs; however, a higher number of females than males participated in this study, which may have contributed to these findings.

SCT has been used in health behavior to explain psychological issues after exposure to disasters (Alexander & Ward, 2018) concerning the internal and external determinants (Baranowski et al., 2002; Mimiaga et al., 2009) that affect and influence one's behavior. One construct of SCT, self-efficacy, was tested in this study. Self-efficacy is the belief that an individual can manage their life circumstances while maintaining functionality despite being surrounded by traumatic stressors associated with the pandemic (Benight & Bandura, 2004). Despite the self-efficacy score being high in this group of RTs, this study did not find that high self-efficacy

decreased the negative effects of depression, anxiety, and stress. There were no significant relationships found between self-efficacy and the DASS-21 stress or anxiety subscales in this study; however, the study reported a significant inverse correlation between self-efficacy and the DASS-21 depression subscale. The RTs in this study reported mild depressive symptoms; the higher the self-efficacy, the lower the levels of depression. Potential reasons why there were no relationships between self-efficacy and anxiety or stress could be that high self-efficacy has been found to be interconnected with lessening symptoms of anxiety and depression (Brown et al., 2014) and may also serve as a buffer amongst stressful situations and adverse effects (Fürtjes et al., 2023). There may also be a connection between self-perceived stress, adverse effects, and avoidant behavior (Fürtjes et al., 2023). The Social Cognitive Theory (SCT) explains how continued exposure to COVID-19-positive patients and the constant stress that accompanies it may lead to behavior changes and the furtherment of psychological issues. The framework of SCT provides the basis as to why a RT's past experiences, private behaviors, and the influences of others produce an affect on mental outlook (Bandura, 1986; Luszczynska & Schwarzer, 2015). Primary constructs in SCT that modify or influence behavior include personal factors, environmental factors, and aspects of the behavior itself.

Recommendations for Further Research

One suggestion for future research studies would be to reevaluate RTs again in one year with the same validated instruments to determine if the levels of depression, anxiety, and stress are improving or worsening. An additional suggestion could be to survey a larger population of RTs for a more substantial strength of power. A larger sample size can more effectively estimate the prevalence and impact of the COVID-19 pandemic among RTs (Evans, 2021). Various areas of the country may have different results due to the severity of illness, admissions, or deaths in

their localities. Comparisons of the subtleties among RTs working in high-traffic areas compared to those who were not could also be examined to note differences in mental health among two similar populations (Evans, 2021). Additionally, analyzing data across regional areas could consider socio-demographic needs that may assist in providing better-constructed and adapted programs that meet the needs of each area's HCW (Cénat et al., 2021).

RTs may continue to face challenges and need support for some time due to the pandemic to prevent worsening mental health outcomes. Mental health interventions needed by HCWs during pandemics can be broken into the categories of supportive information, such as preventative factors, instrumental support, organizational support, and psychological/emotional support (Zaçe et al., 2021). Providing the right support helps to reduce the adverse effects of stress, isolation, and loneliness (Zaçe et al., 2021), all of which worsen mental health effects. The Cai et al. (2020) study demonstrated a link between job experience, training, resilience, good social support, and mental health performance. Worse outcomes related to anxiety were seen in HCWs who were inexperienced and new on the job when working during a health crisis such as the COVID-19 pandemic. In this study, the average RTs' job experience was 17 years. While this study did show a moderate level of anxiety among RTs, it may have been worsened if the years of experience were reduced to 5 years or less. However, this study did not have specific questions regarding the levels of social support each RT had during the pandemic, so it cannot be determined if social support levels played a role in the anxiety reported. Also, while this study noted mild depression in the group of RTs, the demographic/history questionnaire did not specify or list causes or contributors that may have led to the depressive symptoms. Participants were also not able to specify differences in the levels of depression noted among the group.

Implications for Future Practice

The examined literature suggests that RTs would benefit from a psychological support system, regardless of their full-time department (Kebede et al., 2021; Bahadirli & Sagaltici, 2021), based on the job characteristics of their roles, the intimacy in which they work with respiratory patients, and their roles in ICUs and EDs. Forty-one percent of participants in this study reported it was hard to wind down at times, 48% found it difficult to work up the initiative to get things done, and 23% reported their feelings about COVID-19 were sometimes numb. A social support system may be necessary to elevate mood and provide encouragement, accountability, and moral support (Müller et al., 2012).

The uncertainties of the pandemic call for multiple approaches to the way care is relayed to RTs who were exposed to the pandemic and their resulting mental health issues (Ahmed et al., 2020). Various service modalities should be offered to RTs and other HCWs to meet the needs of the majority of RTs. Both cognitive and psychiatric services may be beneficial, as well as a requirement for both in-person and online access to mental health services. Special groups for women may be in order, as the literature shows that women had higher levels of depression in group surveys (Ahmed et al., 2020; Brennan et al., 2021). Such support can bolster a person's physical and mental health coping skills and increase life satisfaction (Müller et al., 2012).

Enacting policies and protocols implemented during a pandemic to protect HCWs' physical and mental health is critical, along with ensuring appropriate PPE to work adequately and safely, which is mandatory to ease stress. Ensuring appropriate staffing, workloads, and breaks are also needed to enable staff to mentally recharge after taxing shifts and high-stress situations. At the pandemic's inception, PPE materials shortage, changing workplace policies, and inadequate staffing created high-stress situations for many HCWs. The uncertainty of not

having what you needed to perform your job role may have led to increased anxiety as well as depression. ALGhasab et al. (2021) noted that when HCWs felt their facility did not measure up to standard, there was a higher prevalence of depression compared to the mild depression noted in other participants. Cag et al. (2021) indicated that front-line HCWs who feel unprotected were found to be anxious. Consistent with these studies, RTs in this study were also found to have moderate anxiety and mild depression due to their experience during the COVID-19 pandemic.

Conclusions

This study identified a prevalence of moderate levels of anxiety, mild depression, and mean stress levels on the elevated boundary of normal in RTs following the COVID-19 pandemic, which showed that mental health support is needed. Past experiences have shown that psychosomatic symptoms can last for up to three years after exposure to an epidemic, as in the case of SARS, where 10-40% of HCWs reported levels of moderate depression up to three years later (Liu et al., 2012; Preti et al., 2020). Encouraging RTs to maintain a sound social support system while maintaining a high level of self-efficacy and motivation to achieve their goals may help them recoup from the traumatic events of the pandemic. RTs may have been affected by trauma subsequent to the COVID-19 pandemic and may still suffer from some physical/mental ailments. Strategies for self-care should be explored (Holcombe, 2023). More research on beneficial interventions for front-line workers during epidemics that decrease the risks of post-traumatic stress disorder and other mental health challenges is needed.

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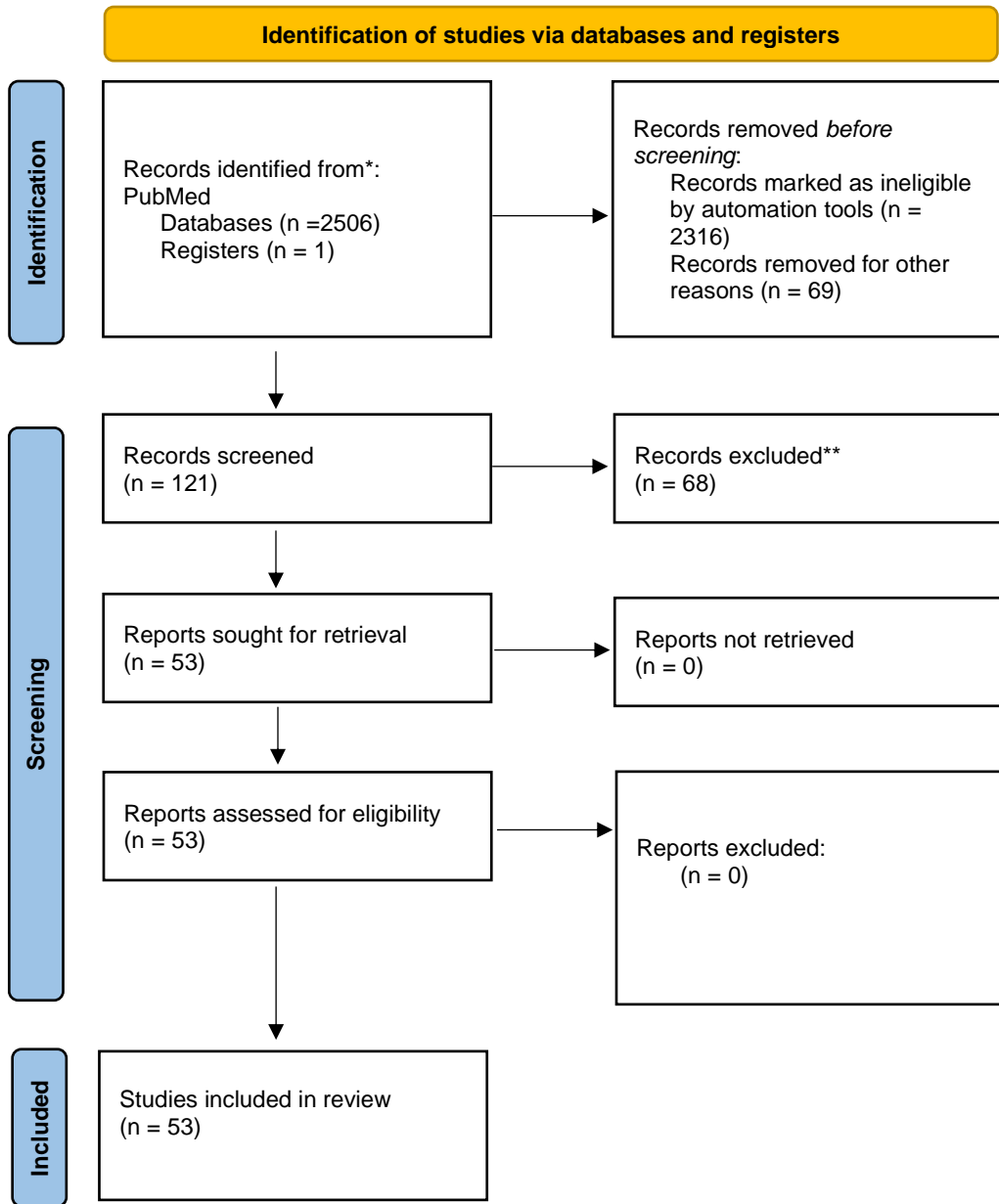
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Appendix A: PRISMA Diagram

PRISMA 2020 Flow Diagram



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

Appendix B: Demographic Questionnaire

RT Stress and the COVID-19 Pandemic

Screen

1. Are you 18-65 years of age?

1. Yes

2. No

2. Have you worked in the direct care of patients positive for COVID-19 during the pandemic as a respiratory therapist?

1. Yes

2. No

3. Are you currently/recently (within the past 18 months) enrolled in a degree program? If yes, select one.

1. No

2. Bachelors

3. Masters

4. Omitted/Missing

5. Please select your gender

1. Male

2. Female

3. Nonbinary

6. Please state your age -----

7. Hours (routinely worked over the past year) per week -----

8. How many years have you been working as an RT? -----

9. Number of class hours per semester in degree program -----

History

10a. Prior to the pandemic, did you suffer from ailments associated with depression, anxiety, or stress? If yes, which one(s)/frequency?

1. No.

2. Yes

10b. If yes-please select 1 = None, 2 = Occasionally, 3 = Weekly, 4 = Daily.

a. depression

b. anxiety

c. stress

11a. Do you now suffer from ailments associated with depression, anxiety, or stress? If so, which one(s)/frequency?

1. No

2. Yes

11b. If yes- please select 1 = None, 2 = Occasionally, 3 = Weekly, 4 = Daily.

a. depression

b. anxiety

c. stress

Work/Life balance

12. Is your work/life balance better or worse due to the pandemic?

1. Better

2. Worse

13. Do you experience more or less job-related stress now that the pandemic is subsiding?

1. More
2. Less
3. Same

Symptoms

14. Over the past few weeks, how often have you experienced each of the following symptoms? 1 = None, 2 = Occasionally, 3 = Weekly, 4 = Daily.

- a. Fatigue (Tired)
- b. Headache
- c. Nausea
- d. Acid indigestion
- e. Diarrhea
- f. Cold/Flu symptoms
- g. Shortness of breath
- h. Backache
- i. Loss of appetite
- j. Stomach cramps
- k. Dizziness
- l. Chest pain

Appendix C: DASS-21 Questionnaire

DASS21		Name:	Date:			
Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.						
The rating scale is as follows:						
0	Did not apply to me at all					
1	Applied to me to some degree, or some of the time					
2	Applied to me to a considerable degree or a good part of time					
3	Applied to me very much or most of the time					
1 (s)	I found it hard to wind down	0	1	2	3	
2 (a)	I was aware of dryness of my mouth	0	1	2	3	
3 (d)	I couldn't seem to experience any positive feeling at all	0	1	2	3	
4 (a)	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3	
5 (d)	I found it difficult to work up the initiative to do things	0	1	2	3	
6 (s)	I tended to over-react to situations	0	1	2	3	
7 (a)	I experienced trembling (e.g. in the hands)	0	1	2	3	
8 (s)	I felt that I was using a lot of nervous energy	0	1	2	3	
9 (a)	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3	
10 (d)	I felt that I had nothing to look forward to	0	1	2	3	
11 (s)	I found myself getting agitated	0	1	2	3	
12 (s)	I found it difficult to relax	0	1	2	3	
13 (d)	I felt down-hearted and blue	0	1	2	3	
14 (s)	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3	
15 (a)	I felt I was close to panic	0	1	2	3	
16 (d)	I was unable to become enthusiastic about anything	0	1	2	3	
17 (d)	I felt I wasn't worth much as a person	0	1	2	3	
18 (s)	I felt that I was rather touchy	0	1	2	3	
19 (a)	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3	
20 (a)	I felt scared without any good reason	0	1	2	3	
21 (d)	I felt that life was meaningless	0	1	2	3	

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Appendix D: IES-COVID19 Questionnaire

The Impact of Event Scale with modifications for COVID-19 (IES-COVID19)

Naam:

Datum:

Please find below a list of statements regarding the situation related to the corona virus (COVID-19). Read each statement carefully and indicate to what extent it was applicable to you during the last seven days. If it did not occur, you can choose 0, which corresponds to 'not at all'.

	Not at all	Seldom	Sometimes	Often
1. I thought about it when I didn't mean to.	0	1	3	5
2. I avoided letting myself get upset when I thought about it or was reminded of it.	0	1	3	5
3. I tried to remove it from my thoughts.	0	1	3	5
4. I had trouble falling asleep or staying asleep because of pictures and thoughts about it that came into my mind.	0	1	3	5
5. I had waves of strong feelings about it.	0	1	3	5
6. I had dreams about it.	0	1	3	5
7. I stayed away from things that made me think about it.	0	1	3	5
8. I felt as if it hadn't happened or wasn't real.	0	1	3	5
9. I tried not to talk about it.	0	1	3	5
10. Pictures about it popped into my mind.	0	1	3	5
11. Other things kept making me think about it.	0	1	3	5
12. I was aware that I had a lot of feelings about it, but I didn't deal with them.	0	1	3	5
13. I tried not to think about it.	0	1	3	5
14. Every thought about it brought back the feelings about it.	0	1	3	5
15. My feelings about it were kind of numb	0	1	3	5

Highlighted in yellow: changes compared to the original IES (Horowitz et al., 1979).

Vanaken et al. (2020). <https://doi.org/10.3389/fpsy.2020.00738>.

Appendix E: New General Self-Efficacy Scale

New General Self-Efficacy Scale

Instructions: Participants are told that (a) general self-efficacy relates to “one’s estimate of one’s overall ability to perform successfully in a wide variety of achievement situations, or to how confident one is that she or he can perform effectively across different tasks and situations,” and (b) self-esteem relates to “the overall affective evaluation of one’s own worth, value, or importance, or to how one feels about oneself as a person.”

Instructions: Please circle your answer below.

1. I will be able to achieve most of the goals that I set for myself.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
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2. When facing difficult tasks, I am certain that I will accomplish them.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
----------------------	----------	-------------------------------	-------	----------------

3. In general, I think that I can obtain outcomes that are important to me.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
----------------------	----------	-------------------------------	-------	----------------

4. I believe I can succeed at most any endeavor to which I set my mind.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
----------------------	----------	-------------------------------	-------	----------------

5. I will be able to successfully overcome many challenges.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
----------------------	----------	-------------------------------	-------	----------------

6. I am confident that I can perform effectively on many different tasks.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
----------------------	----------	-------------------------------	-------	----------------

7. Compared to other people, I can do most tasks very well.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
----------------------	----------	-------------------------------	-------	----------------

8. Even when things are tough, I can perform quite well.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
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Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational research methods, 4*(1), 62-83.

Appendix F

Permission to Use IES

Equan, Tammy

Mardi.Horowitz@ucsf.edu

Dr. Horowitz,

My name is Tammy. I have read your article on post-traumatic stress and the IES tool created in 1979. I have been a respiratory therapist for 23 years and am enrolled in a doctoral program at Radford University. I am interested in determining similar symptoms in respiratory therapists for my capstone project. My current plan is to use the DASS-21 and IES-COVID19 instruments. However, I could not find specific information on permission to use the IES-COVID19 instrument adapted by Drs. Vanaken & Scheveneels from your original tool.

Please, I am seeking permission to use this tool in my doctoral research project.

Kind regards,

Tammy Equan

Horowitz, Mardi <Mardi.Horowitz@ucsf.edu>

Equan, Tammy

NOTICE: This email originated externally. It is not from a Radford University account. Use caution responding, opening attachments, or clicking links.

Hi, OK with me to use IES.

Mardi Horowitz, M.D.

Distinguished Professor of Psychiatry

UCSF

mardi.horowitz@ucsf.edu

415-476-7612

Appendix G

UNC Charlotte Study Participation Agreement

UNC Charlotte Study Participation Agreement**Kim Clark <Kimberly.Clark@uncc.edu>****To Equan, Tammy <tequan@radford.edu>**

NOTICE: This email originated externally. It is not from a Radford University account. Use caution responding, opening attachments, or clicking links.

Dear Ms. Equan

Thank you for reaching out requesting our participation in your research study as part of your requirements to complete the Doctor of Health Sciences at Radford University.

We have 78 BSRT and 17 MSRC students enrolled in our programs. I will be happy to take your recruitment message and survey link and distribute it to all of our enrolled BSRT and MSRC students, which does not require IRB approval at UNC Charlotte. I will need the following information to be able to distribute the survey instrument:

Radford University IRB Determination/Approval Letter
Recruitment message including survey link

If you have any questions or need additional information, please do not hesitate to contact me.

Best regards,
Dr. Clark

--

Kimberly Clark, EdD, RRT, FAARC
Clinical Associate Professor | BSRT/MSRC Program Director
University of North Carolina at Charlotte
Department of Applied Physiology, Health, and Clinical Sciences
9201 University City Blvd. | Charlotte, NC 28223
Phone: [704-687-0706](tel:704-687-0706) | Email: kmclark1@uncc.edu

Appendix H

**Radford University Cover Letter for Internet Research**

You are invited to participate in a research survey, entitled “RT Stress and the COVID-19 Pandemic”. The study is being conducted by a research student in the Doctor of Health Sciences Program at Radford University; Tammy Equan, MSRC, RRT-ACCS, PDE, RRT of Radford University Carilion located at 101 Elm Street, SE Roanoke, VA 24013. tequan@radford.edu, 704-930-6585.

The purpose of this study is to examine the effects the COVID-19 pandemic has had on the mental health status and potential risk factors of front-line workers, specifically RTs. Your participation in the survey will contribute to a better understanding on the levels of PTSD and self-efficacy in RTs at this stage of the pandemic. We estimate that it will take about 20 minutes of your time to complete the questionnaire. You are free to contact the investigator at the above address and phone number to discuss the survey.

This study has no more risk than you may find in daily life. You may refuse to answer any of the questions, take a break or stop your participation in this study at any time. The research team will work to protect your data to the extent permitted by technology. It is possible, although unlikely, that an unauthorized individual could gain access to your responses because you are responding online. This risk is similar to your everyday use of the internet. The risk is minimized as Qualtrics is a cloud-based software application and uses de-identification and coding of gathered data. IP addresses and email addresses will not be recorded. A limited number of researchers (2) will have access to the coded data during data collection. All identifying information will be stripped from the final dataset.

Your participation in this survey is voluntary. You may decline to answer any question and you have the right to withdraw from participation at any time without penalty. If you wish to withdraw from the study or have any questions, contact the investigator listed above. If you choose not to participate or decide to withdraw, there will be no impact to you in any way. You may exit the survey at any time.

To complete the survey, click on the link below:

https://radford.co1.qualtrics.com/jfe/form/SV_03pkj5y9NKRDTGC

This study was approved by the Radford University Committee for the Review of Human Subjects Research. If you have questions or concerns about your rights as a research subject or have complaints about this study, you should contact Dr. Jeanne Mekolichick, Institutional Official and Associate Provost for Research, Faculty Success, and Strategic Initiatives, jmekolic@radford.edu, 540.831.6504.

If you agree to participate, please **press the arrow button at the bottom right of the screen**. Otherwise use the X at the upper right corner to close this window and disconnect.

Thank you,
Tammy Equan MSRC, RRT-ACCS, PDE, RRT
Research Student, Doctor of Health Sciences Program
Department of Public Health and Healthcare Leadership
Radford University Carilion

Appendix I



Institutional Animal Care and Use Committee / Institutional Review Board

June 26, 2023

TO: Kim Baskette
RE: Exemption Determination
STUDY TITLE: Examining the Effects of the COVID-19 Pandemic on the Mental Health Status of Respiratory Therapists
IRB REFERENCE #: 2023-072
SUBMISSION TYPE: IRB Initial Submission
ACTION: Determination of Exempt IRB Review
DECISION DATE: June 26, 2023
THREE-YEAR CHECK-IN: June 25, 2026

The above-referenced study has been determined by Radford University's Institutional Review Board (IRB) to be exempt from review. Your study has been determined to be exempt under Exempt Category 2: Educational tests, surveys, interviews, or observation of public behavior with limited IRB review. Detailed explanations of the exempt review categories are available on the Research Compliance Office webpage.

You are approved for the enrollment of 84 human subject participants.

Note: The number approved is the number of study participants is defined as the number who enroll in the project and NOT the number of subjects with usable data for analysis. If this should change, you must submit an amendment to increase the number of human subjects.

While your project does not "expire," the Radford University IRB asks that you submit an "IRB Three-year Check-in: Continuation of Expedited and Exempt Approved Protocols" to let the IRB know your project remains active.

Should you need to make changes in your protocol, you must submit a request for amendment for review to determine if the application remains in an Exempt review category before implementing the changes. Amendments must be submitted via the IRBManager system. Please contact our office for assistance, if needed.

As the principal investigator for this project, you are ultimately responsible for ensuring that your study is conducted in an ethical manner. You are also responsible for filing all reports related to this project.

If you have any questions, please contact the Research Compliance Office at 540.831.5290 or irb-iacuc@radford.edu. Please include your study title and reference number in all correspondence with this office.

Good luck with this project!

Radford University Institutional Review Board (IRB)
Research Compliance Office
540.831.5290
irb-iacuc@radford.edu
<https://www.radford.edu/content/research-compliance/home.html>

Radford University IRB
Approval Date: June 26, 2023

Appendix J



Institutional Animal Care and Use Committee / Institutional Review Board

October 09, 2023

TO: Kim Baskette
STUDY TITLE: Examining the Effects of the COVID-19 Pandemic on the Mental Health Status of Respiratory Therapists
IRB REFERENCE #: 2023-072
SUBMISSION TYPE: IRB Amendment #1
ACTION: Amendment Approval
APPROVAL DATE: October 09, 2023

The amendment to the above-referenced study adding North Carolina Respiratory Care Board (NCRCB) as a new source of recruitment for the project has been reviewed by Radford University's Institutional Review Board (IRB) and determined the project remains approved under Exempt Category 2: Educational tests, surveys, interviews, or observation of public behavior..

Please note that if your research includes stamped materials, they will be provided with this letter and must be used when conducting your research. A copy of your approved IRB protocol is available for your records in IRBManager under your dashboard of active protocols.

Should you need to make changes in your protocol, you must submit a request for amendment for review to determine if the application remains in an Exempt review category before implementing the changes. Amendments must be submitted via the IRBManager system. Please contact our office for assistance, if needed.

As the principal investigator for this project, you are ultimately responsible for ensuring that your study is conducted in an ethical manner. You are also responsible for filing all reports related to this project.

If you have any questions, please contact the Research Compliance Office at 540.831.5290 or irb-iacuc@radford.edu. Please include your study title and reference number in all correspondence with this office.

Good luck with this project!

Radford University Institutional Review Board (IRB)
Research Compliance Office
540.831.5290
irb-iacuc@radford.edu
<https://www.radford.edu/research-compliance>

Radford University IRB
Approval Date: October 09, 2023