Personal Resilience and the Critical Care Climate:

Examining the Relationship between Protective Factors and Burnout among ICU Nurses Working Day or Night Shift

By

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Abstract

Purpose. Intensive Care Unit (ICU) nurses are at great risk for job burnout with rates of burnout consistently around 80%. Resilient characteristics have been shown to protect against some aspects of job burnout among ICU nurses. However, focusing exclusively on the resilience of an ICU nurse removes the responsibility of the workplace to provide a healthy work environment that fosters resilience and allows employees to thrive. In a cross-sectional survey, we sought to examine how internal (individual resilience) and external (critical care climate characteristics) protective factors impacted burnout among ICU nurses.

This study was guided by a multi-factorial framework that included five domains of resilience (well-being, mindfulness, self-strengths, positive response choices, and serendipitous recovery), and three domains of the critical care environment (physical, social, and professional). Other components of the critical care environment that were tested included workplace bullying, shift (day vs. night), and the geographical location of the hospital. Because there is preliminary evidence that increased exposure to workplace bullying, day-shift work, and rural geography may be contributing factors to increased levels of job burnout, these factors were also measured.

Design. Surveys were emailed to 47,510 Oregon licensed nurses from February-May 2020 and included: demographic questions, the Connor-Davidson Resilience Scale, the Practice Environment Scale of the Nursing Work Index, the Maslach Burnout Inventory, the Negative Acts Questionnaire-Revised, and an optional open-ended question. Hierarchical regression modeling was used to address the aims and compare protective factors and burnout among day (n=544) and night (n=349) ICU nurses.

Measurement and Main Results. Overall, 975 of the email surveys were returned for a response rate of 20% (10% of the nurses in the mailing list were considered critical care nurses), and complete data were available on a total of 893 nurses. Eight percent of the ICU nurses were categorized as being highly resilient, 58.4% of the participants had at least one symptom of job burnout, and bullying had occurred to 35% of the nurses. In a hierarchical regression analysis that adjusted for twelve potential confounding variables, internal (resilience) and external (organizational characteristics) protective factors were direct contributors to a lower prevalence of emotional exhaustion, reduced personal accomplishment, and depersonalization among ICU nurses, regardless of shift (emotional exhaustion, $R^2\Delta = 0.345$, $F= 71.1$ (7, 836), $p< .0001$; personal accomplishment, $R^2\Delta = 0.183$, $F= 28.7$ (7, 836), $p< .0001$; depersonalization, $R^2\Delta = 0.165$, $F= 27.62$ (7, 836), $p< .0001$). Bullying was the primary direct contributor to predicting total burnout F (1, 843), $p<.0001$, $\eta_p^2=.159$.

There was a non-significant difference in emotional exhaustion, reduced personal accomplishment, and depersonalization comparing day shift nurses with night shift nurses ($\beta= 0.004 \pm .075$, $t= .05$, $p= .96$; $\beta= -0.078 \pm 0.45$, $t= 0.26$, $p=.79$; $\beta= 0.14 \pm .08$, $t= 1.6$, $p=.11$). Twenty-three percent (n=203) of the participants served in Rural and Frontier counties- whereas 77% (n=692) served in Urban/Metropolitan locations. We found no geographical differences that protected against emotional exhaustion, reduced personal accomplishment, or depersonalization, suggesting that critical care nurses face similar challenges regardless of geographical location.

Conclusions. Internal and external protective factors directly contribute to burnout among ICU nurses working day and night shift. It is therefore imperative to

focus on the improvement of the critical care climate to support employees, listen to their concerns, provide safe staffing ratios, lessen the exposure to workplace bullying, recognize nurses for their accomplishments, create clear nursing models, and foster healthy relationships between colleagues, management, and physicians. The critical care climate and individual resilience are mutually reinforcing. Resilience alone is not enough to moderate an environment that was perceived as unhealthy by nurses; focusing on both the critical care climate and individual nurse resilience will optimize a nurse's ability to thrive within the workplace.

Keywords: critical care, ICU, nurse, burnout, resilience, work environment, bullying, protective factors, CD-RISC, MBI, Negative Acts Questionnaire, Nurse Work Index

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Chapter One

Introduction

Problem and Rationale

Resilience is the human ability to adapt in the event of trauma, adversity, or stress (Southwick et al., 2014), and resiliency experts have found common protective factors that cultivate resilience in individuals. Those protective factors can be separated into five domains: well-being, mindfulness, self-strengths, positive response choices, and serendipitous recovery. Each resilient domain is comprised of resilient behaviors and previous researchers have demonstrated that resilient behaviors can protect against some aspects of job burnout among nurses (Adams et al., 2010; Arrogante, & Aparicio-Zaldivar, 2017; Foureur et al., 2013; Lim, & Mi, 2019; Mealer et al., 2012) However, the evidence is much stronger for the contrasting argument that burnout is a combination of resilient behaviors and a function of a nurse's organization, environment, or climate (Hinderer et al., 2014; Kelly et al., 2015; Khan et al., 2018; Maslach, 2003). Although the prevalence of burnout has been extensively reported in the nursing literature, between 2005-2016, 71% of 535 surveyed hospitals had made no improvements to their work environment (Aiken et al., 2018).

Nurses who are at the greatest risk for burnout are intensive care unit (ICU) nurses, with rates of burnout consistently around 80% (Hinderer et al., 2014; Khan et al., 2018; Marcum et al., 2018; Mealer et al., 2012; Rushton et al., 2015). In a systematic review that examined 585 ICUs, ICU nurse burnout was linked to the quality of the work environment, relationship among colleagues, and traumatic and stressful workplace experiences (Khan et al., 2019). Further, in a national survey, the highest incidence of bullying was found among medical-surgical and ICU nurses (Vessey et al., 2009), often in the form of team members dividing the team (88%), disrespect (77%), abuse of

authority (52%), and verbal abuse (33%; Ganz et al., 2015). In addition to the strain related to the ICU environment, is the pressure directly linked to shift work- with rates of coronary events, dyslipidemia, metabolic syndrome, hypertension, and diabetes statistically higher for nurses working hours other than 8-to-5 (Vyas et al., 2012). Compounding poor health outcomes, shifts lasting longer than 8 hours carry twice the risk of safety accidents and occupational injury (Wagstaff & Lie, 2011) due to a substantial cognitive decline present in night nurses working 12-hour shifts (James et al., 2020).

This dissertation provides clarity on the relationships among resilience, the critical care climate, day and night shift work, and burnout among ICU nurses, as there was no published study that simultaneously examined the influence of internal and external protective factors on burnout.

Overall Purpose

The overall purpose of this dissertation was to examine how resilience, the critical care climate, and day and night shift work impact burnout among nurses. The *long-term goal* of this program of research is to develop a conceptual framework that includes elements of resilience and organizational research to aid in a pragmatic approach to moderate nurse burnout, improve job engagement, and sustain staff's ability to thrive in the workplace. In addition to academic scholarship, I wish to discover clinical solutions that will aid in the achievement of the Institute of Healthcare Improvement's fourth aim of a healthy work environment (Bodenheimer & Sinsky, 2014) and Provision 5 of the American Nurses Association's *Code of Ethics* (2001) for the promotion of personal well-being.

Dissertation Aims

The core focus of this dissertation was to examine the relationship between ICU night and day shift workers' individual resilience and their perception of their critical care climate on burnout. Lack of information about the relationships among these variables was a significant gap in science. Further, this dissertation contributes to knowledge development by connecting research gaps through a comprehensive and critical analysis of the current literature and a dissertation study guided by a revised protective factors framework. This dissertation study focused on the relationship among night and day shift workers' individual resilience, their perception of their critical care climate, and burnout by exploring the following specific aims:

Aim 1 Quantify the unique associations between day vs. night shift work, individual resilience, and the critical care climate on the outcome of burnout after controlling for potential confounders.

Hypothesis: Shift work and protective factors of individual resilience and the critical care climate account for significant variance in burnout, the dependent variable.

Aim 2: Explore the extent to which protective factors (individual nurse resilience and critical care climate) moderate the effects of burnout among shift nurses when controlling for demographic characteristics.

***Hypothesis*:** *The effects of day vs. night shift work on burnout are moderated by the level of resilience that a nurse has and their perceptions of the critical care climate.*

Research Question: How does resilience, the critical care climate, and shift work among ICU nurses impact burnout?

Significance and Implications for Future Science

Nurses face stress in the workplace putting them at high risk for burnout and adverse occupational health outcomes. Furthermore, there is a global need to recruit and retain highly specialized ICU nurses because nearly 80% of ICU nurses meet criteria for burnout (Khan et al., 2018; Mealer et al., 2012). There is epidemiologic evidence that nurses working the night shift are more physically and mentally compromised than day shift workers leading to poor occupational health outcomes like ischemic heart disease, hypertensive disorders, all-cause morbidity and mortality, chronic insomnia, and cognitive decline as nurses age (Gu et al., 2015; James et al., 2020). Resilience is the human ability to adapt in the event of trauma, adversity, or stress (Southwick et al., 2014), and it has the potential to moderate some factors of burnout. Although it is unknown how resilience impacts the physical and psychological burden among nurses working differing shifts, resilience has the potential to prevent re-experiencing symptoms when future traumatic events occur (Mealer et al., 2012; Rushton et al., 2015). Further, to empower a nurse to pursue greater personal resilience is not enough; an organization needs to take responsibility for the impact the organizational climate has on the burden of stress in the workplace. By focusing my dissertation on both individual resilience and the critical care climate, including day vs. night shift work, I was able to quantify the unique associations between protective factors within the ICU to create a protective factors framework that is informed by literature, theory, and research.

This study's sample included nurses from hospitals that are located in rural and frontier counties (in addition to urban and metropolitan areas). Data from Oregon suggest that employers in rural areas are relying on travel nurses, agency nurses, and new

graduates to fill some vacant positions because employers are facing difficulties recruiting, hiring, and retaining highly specialized nurses (Oregon Center for Nursing, 2017). However, in rural communities that are often dependent on agency and traveling staff there can be a detrimental impact on permanent staff's resilience and morale due to better shifts and pay for travelers (Oregon Office of Rural Health, 2017). Publishing on the attributes that sustain the resilience of nurses who work in the rural setting and foster a healthier critical care climate, may serve as a foundation for continued research in sustaining rural critical care staff.

COVID-19

The first US case of COVID-19 (coronavirus disease-2019) was reported January 20, 2020 in the state of Washington. February 29 marked the first coronavirus-related death in Washington state (also the first US death). The death was linked to the epicenter of an outbreak at Evergreen Health in Kirkland, WA. As of July 1, 2020, Washington and Oregon had a total of 40,237 confirmed COVID-19 cases (31,752 and 8,485 respectively) and 1,514 deaths (1,310 and 204 respectively; Oregon Health Authority, 2020; Washington State Department of Health, 2020). In the United States at the same date, there were 2,623,217 confirmed cases with 127,258 coronavirus-related deaths (Johns Hopkins University and Medicine, 2020).

The extraordinary unprecedented timing of the beginning and initial peak of the pandemic coincided with data collection for this dissertation study. Nurses on the front line, particularly ICU nurses, were not only experiencing an increase volume and intensity of their work, they were faced with new challenges related to end-of-life care, personal protective equipment (PPE) shortages, potential stigma as carriers of the virus,

and ethical and moral dilemmas related to hospital protocols. These factors added to the stress, anxiety, and strain of a nursing workforce before the pandemic began. This dissertation study provides insight on the physical and psychological impact among ICU nurses in the context of COVID-19, as it was embedded in the experiences of the nurse participants.

Findings of this dissertation provide new knowledge on how resilience, the critical care climate, and day vs. night shift work impact burnout among nurses. The insight gained on what constitutes a healthy or poor critical care climate could assist in tailored resiliency programs to foster a culture that is genuinely supportive of ICU nurses. Further work in developing a revised protective factors framework could assist in resilience intervention development to combat the detrimental effects of burnout among nurses. This dissertation will serve as novel evidence-informed guidance to address the physical, psychological, and organizational needs of ICU nurses during the COVID-19 pandemic.

Chapter Two

Literature Review and the Theoretical Framework

This chapter includes a comprehensive review and critical analysis of the literature related to ICU nurse resilience, the critical care climate, ICU day vs. night shift work, and ICU nurse burnout. The literature review is structured based on a revised protective factor framework and provides justification for the chosen dissertation aims by conceptualizing the gaps in the current state of science. This chapter also provides a clear picture of the chosen framework, linking the research aims, literature, and methodology of the dissertation. Operational definitions of the chosen variables conclude the second chapter of the dissertation located in *Appendix B*.

Conducting the Literature Review

This literature review was conducted with the assistance of a professional research librarian and content experts in accordance with the methodological strategies of Machi and McEvoy (2016). A keyword and MESH search of the following four electronic databases was performed: MEDLINE (PubMed), CINAHL, PsychINFO, and Google Scholar with the addition of hand checking references from each data source. I sought to answer, what is the current state of science of resilience, organizational climate, burnout, and shift work among intensive care unit (ICU) nurses? The search terms used were “resilience,” “psychological,” “education,” “hardiness,” “nurse,” “adaptation,” “burnout,” “psychological stress,” “climate,” “environment,” “night shift,” “shift work,” “nurse job satisfaction,” “nurse practice environment,” “nurse staffing,” “bullying” or “workplace.” “Psychological stress” was used because “resilience” was not adopted into the MESH terms until 2009. The initial search included research and classic works from 2000-2020 with a greater emphasis given to recent research literature conducted within the last 6 years because of the peaked interest in resilience around the globe. This

literature review references 49 articles and/or classic works with a focus on resilience, 21 on organizational climate, 21 on burnout, and 7 on shift work.

Because the narrative surrounding the nurse-environment has been largely negative (e.g., burnout, compassion fatigue, turnover, trauma, moral distress) the goal of this literature review was to focus on the protective factors that come from adversity. To appreciate a comprehensive picture of the healthcare system, studies concerning all types of staff working in healthcare settings were included (rather than just one type of unit or specialized nurses) as well as employees in organizations that were rated as great places to work. The critical care climate is described under the umbrella of an organization. Any psychological interventions prospectively designed to develop or enhance resilience among health professionals or improve the work environment, irrespective of the content, method of delivery, or duration, were included.

The primary outcome measures of interest were the effectiveness of resilience interventions in improving resilience outcomes; elements within the organizational climate, critical care climate, healthcare or nurse practice environment (e.g., leadership, co-worker relationships, bullying, management style, staffing, praise, recognition); burnout, nurse job satisfaction, job engagement or other mental health and well-being outcomes used as proxies for burnout; and elements involving shift work (e.g., length, occupational health outcomes, heterogeneity). The inclusion criteria were English-language and published from 2000-2020.

Resilience

General Resilience Literature

The term resilience originates from the Latin word "resiliere," meaning "leap back" or "rebound"; it has been used synonymously with concepts like hardiness, adaptability, agility, and fault-tolerance (Hosseini et al., 2016). The concept of resilience has been adapted by numerous disciplines, professions, and research literature in the last two decades despite the lack of a unified model, conceptual framework, or definition. For example, a recent literature review revealed nearly 150 definitions, four subcategories, and several ways of measuring resilience (Hosseini et al., 2016). The lack of a clear operational definition of resilience is a significant gap that contributes to ambiguity when conceptualizing whether resilience contains intraindividual or interindividual characteristics (or a combination of both).

Despite the absence of a unified definition, resiliency experts have found common protective factors that cultivate resilience in individuals (Connor & Davidson, 2003; Siebert, 2005; Southwick et al., 2014; Yehuda et al., 2006). Those protective factors can be separated into five domains: (a) well-being, (b) mindfulness, (c) self-strengths, (d) positive choices, and (e) serendipitous recovery. For clarity and conceptualization, in the proposed dissertation, "resilience" is defined as the human ability to adapt in the event of trauma, adversity, or stress (Southwick et al., 2014) and resilience will be included under the umbrella of inter and intraindividual factors, called "protective factors" within this dissertation. Refer to *Figure 1* on the next page for a visual representation of the literature terminology.

Figure 1. Flow Chart of Literature Review Terminology

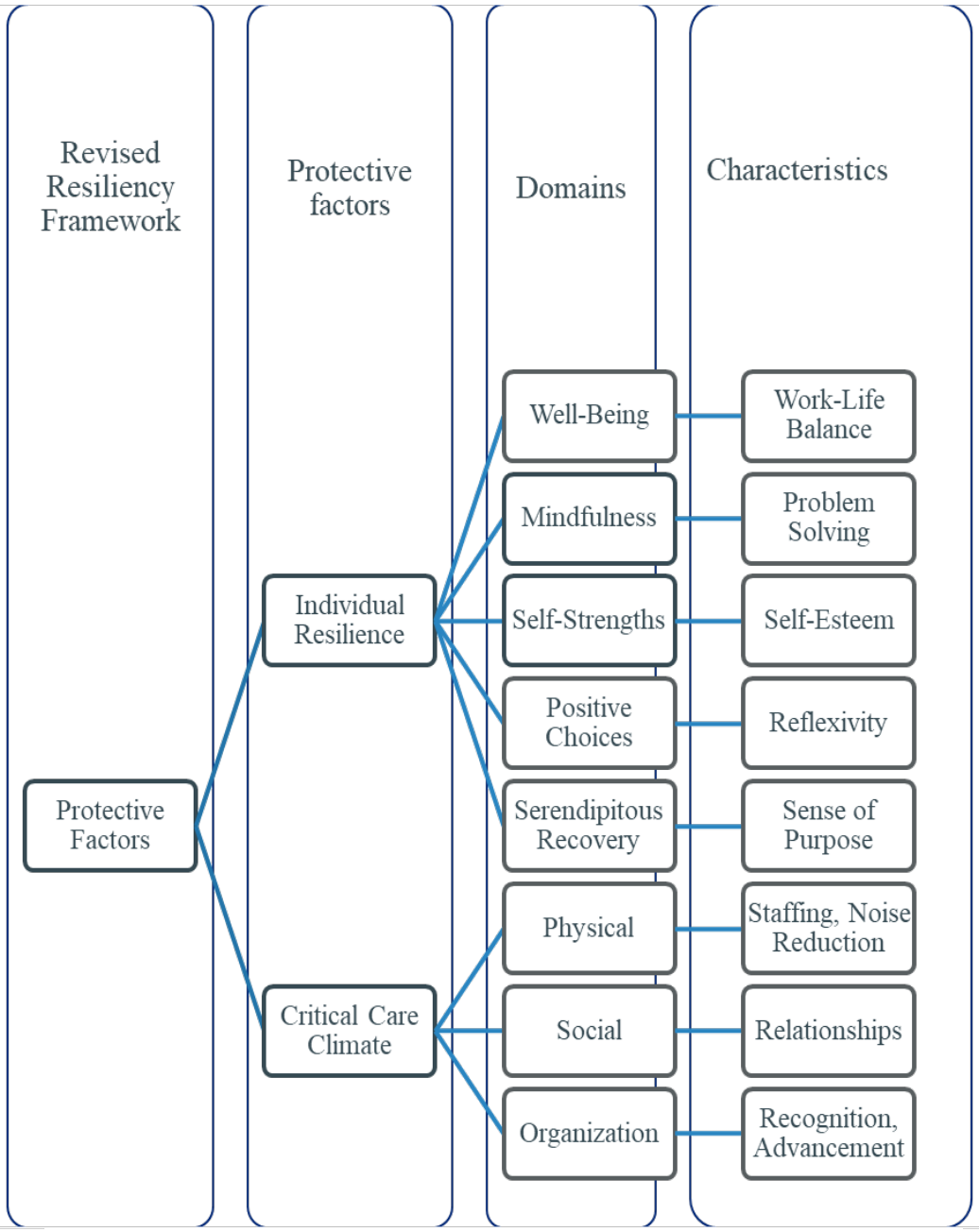


Figure 1. From left to right, the literature will follow this flow chart. For example, work-life balance is a characteristic of well-being, which is a domain of individual resilience, which is a protective factor of the revised protective

Resilience Domains

Well-Being. In the first domain, characteristics of well-being included control over one's physiological needs like exercise, healthy eating, sleep, fatigue, and the ability to recover from cumulative physical, social, and organizational demands (Connor & Davidson, 2003; Siebert, 2005). Work-life balance has been extensively reported in the literature (Bauer-Wu & Fontaine, 2015; McDonald et al., 2012; Richez, 2014) and is dependent not only on enjoyable activities that individuals participate outside of work with friends and families, but also the ability to control one's work schedule (McCann et al., 2013).

Mindfulness. In the second domain, mindfulness is defined as one's "capacity to intentionally bring awareness to present-moment experience" enhancing one's "demeanor and mental focus during unexpected or distressing circumstances" (Bauer-Wu & Fontaine, 2015, p.18). One's capacity to intentionally decrease reactivity, self-regulate through one's awareness, and view challenges through reflective critical thinking and in-the-moment perspectives are preeminent characteristics of mindfulness and the ability to foster resilience (Connor & Davidson, 2003; Siebert, 2005; Southwick et al., 2014).

Self-Strengths. The third domain, self-strengths includes characteristics like self-esteem, self-confidence, self-discipline, and self-efficacy (Charney, 2004; Connor & Davidson, 2003; Siebert, 2005; Southwick et al., 2014). In this domain, resilience comes from seeking self-acceptance through self-compassion and self-kindness rather than acknowledgement from others (Adams et al., 2010; Chan et al., 2012; Foureur et al., 2013; Pidgeon et al., 2014; Potter, Deshields, & Rodriguez, 2013; Waite & Richardson,

2004) and "involves responding to personal shortcomings, failures, and inadequacies with kindness, caring, and a non-judgmental attitude" (Pidgeon et al., 2014, p.356).

Positive Choices. The fourth domain, positive choices include characteristics like habit forming, optimism, positive thinking, emotional stability, gratitude, humor, and help-seeking (Connor & Davidson, 2003; Siebert, 2005; Southwick et al., 2014; Yehuda et al., 2006). Foureur et al. (2013) described the component by which efficacious habits are created through commitment and daily practice. Learned optimism cultivates resilience through promotion in one's ability for self-confidence and motivating behaviors (Chan et al., 2012; Poulsen et al., 2015; Waite & Richardson, 2004), and should not be undervalued- this trait was consistently and heavily regarded as necessary for fostering self-determination and developing self-esteem (Adams et al., 2010; Jarrett, 2008; Lim et al., 2016; McDonald et al., 2012; Waite & Richardson, 2004).

Serendipitous Recovery. Siebert (2005) described the fifth and final domain of individual resilience as a serendipitous recovery in the face of trauma. Even though misfortune happens, an individual can learn from it and have positive growth and hope for the future; an idea that has been supported by Tedeschi and Calhoun's (1996) Posttraumatic Growth Theory. Southwick et al. (2014) described this domain as "what matters to individuals facing adversity is a sense of 'meaning-making'—and what matters to resilience is a sense of hope that life does indeed make sense, despite chaos, brutality, stress, worry, or despair" (p.6).

Healthcare Clinician Resilience Literature

Although resilience lacks a unified model, experts agree that resilience is multifaceted and there are protective characteristics, which when nurtured, will foster

resilient individuals (Connor & Davidson, 2003; Siebert, 2005; Southwick et al., 2014; Yehuda et al., 2006). Because resilience has the potential to decrease the prevalence of burnout among healthcare professionals (Adams et al., 2010; Foureur et al., 2013; Mealer et al., 2012) it is important to examine the state of the science as to which of these characteristics, if any, foster a resilient workforce.

Well-Being. When examining the five domains as applied to the healthcare workforce, similar patterns emerge about what fosters resilient healthcare clinicians. Common themes in the healthcare literature that promote the first domain of well-being included work-life balance (Bauer-Wu & Fontaine, 2015; McDonald et al., 2012; Richez, 2014), exercise and nutrition (Duchemin et al., 2015; Kemper & Khirallah, 2015; Mealer et al., 2014; Richez, 2014), and quality of sleep with the ability to refuel or recover (Richez, 2014; Potter, Deshields, Berger, et al. 2013; Poulsen et al., 2015). For example, exercise and nutrition characteristics were consistently highlighted as necessary to cultivate well-being in individuals, varying from forms of aerobic exercise and resistance training (Mealer et al., 2014) to yoga and meditative techniques (Duchemin et al, 2015; Kemper & Khirallah, 2015; Richez, 2014) with the benefit of good nutrition (Richez, 2014) being explored in several studies. Additionally, the quality of sleep and the ability to refuel and recover were important physiological needs that promoted physical energy and could counteract "elevated stress levels that occur when job demands [were] unrelentingly high" (Poulsen et al., 2015, p.492). McCann et al. (2013), Zwack and Schweitzer (2013) also linked physical activity, leisure time, limiting work hours, boundary setting, a delegation of duties, and family support to higher resilience and improved well-being in physicians.

There were significant differences when comparing the literature on physicians to the literature on nurses in this domain. Where physicians repeatedly mentioned the ability to delegate, limit work hours, and set boundaries for work-life balance (Zwack & Schweitzer, 2013; McCann et al., 2013), nurses communicated the need for adequate sleep and recovery after a shift, often associating adequate staffing and support on their unit as part of that recovery process (Bauer-Wu & Fontaine, 2015; Richez, 2014).

Resilience Interventions

Of the 22 included studies, 7 were RCTs, 6 were descriptive case studies, 5 were pilot studies, 2 were prospective cohort studies, 3 were quasi-experimental, one was a collective case study, and 1 was a qualitative survey. In three instances, studies were included in two categories (e.g. pilot prospective study). Eleven of 16 prospective studies showed a significant improvement in resilience scores after the intervention, and five (out of seven RCTs) studies reported a significant difference in resilience scores between treatment and control groups. Resilience training may be beneficial to health professionals however not all interventions used standard resilience instruments and studies varied in intervention length and approach. See *Figure 2* for the flow diagram.

Well-Being. In the 22 articles that focused on resilience interventions in the nursing population, 10 focused on the well-being domain. Four interventions involved didactic courses and/or online modules (Kemper & Khirallah, 2015; McDonald et al., 2012; Poulsen A., 2015; Richez, 2014), three used retreats (Bauer-Wu & Fontaine, 2015; Duchemin et al, 2015; Potter, Deshields, & Rodriguez, 2013), and three used workshops (Foureur et al., 2013; Poulsen et al., 2015; Richez, 2014). Although some focused on the educational aspects, others concentrated on interventions with exercise, yoga, healthy

eating, and reflective journaling (Bauer-Wu & Fontaine, 2015; Duchemin et al, 2015). All interventions had a portion aimed at defining basic physiological stressors and strategies for reducing that stress.

Measuring Well-Being. Although interventions addressed the promotion of work-life balance, healthy physiological habits, and improved sleep, measurement instruments were inconsistent throughout the studies. Commonly, stress, anxiety, and mindfulness were used as defining whether the intervention was effective for a particular characteristic within the category.

Figure 2. Flow Diagram of Studies Identified for Resilience Interventions

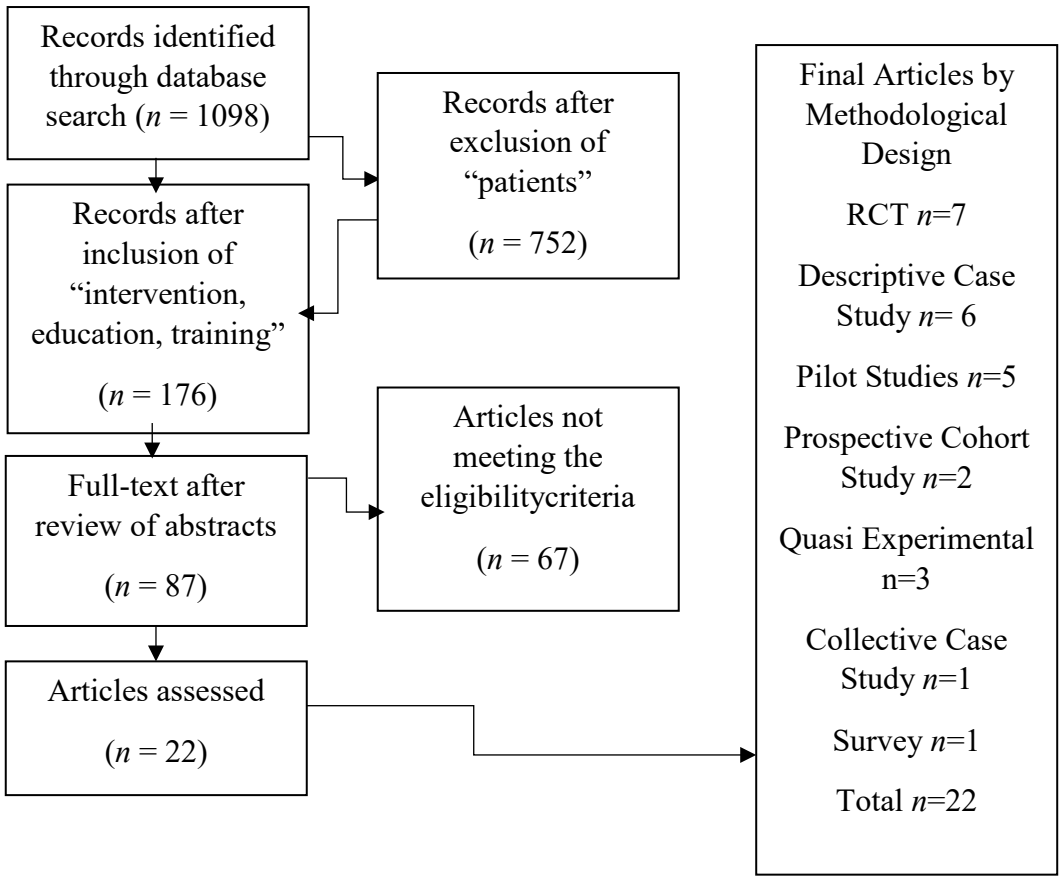


Figure 3. Flow diagram of studies identified, screened, assessed for eligibility, and included. In 3 instances, studies were included in 2 categories (e.g. pilot prospective study)

There were many different scales used to measure well-being. The Perceived Stress Scale (PSS), used by Chesak et al. (2015) and Kemper and Khirallah (2015), measures the degree to which situations are perceived as stressful, but Duchemin et al. (2015) additionally analyzed biological markers of stress through bio-salivary a-amylase samples. Poulsen et al. (2015) used the Recovery Experiences Questionnaire and the Pittsburgh Sleep Quality Index; Foureur et al. (2013) measured sleep disturbed with the aid of the General Health Questionnaire (GHQ-12), which also measured interference with social activities and depression. Although the PSS was used 60% of the time in these five interventional studies, resiliency was only measured in 40% of the cases through either the Connor-Davidson Resiliency Scale (CD-RISC; Babanataj et al., 2019; Chesak et al., 2015; Magtibay et al. 2017) or through a modified version (Kemper & Khirallah, 2015). Future studies would be strengthened if researchers used the best psychometric measures available.

Mindfulness. Interventions involving the second domain of mindfulness have become one of the most popular techniques bridging resilient behaviors to healthcare related work stress reduction. For healthcare clinicians, mindfulness is one's capacity to intentionally decrease reactivity, self-regulate through one's awareness, and view challenges through reflective critical thinking. In several healthcare studies, the ability to intentionally regulate emotions and decrease reactivity was fundamentally linked to resilience (Babanataj et al., 2019; Bauer-Wu & Fontaine, 2015; Duchemin et al, 2015; Foureur et al., 2013; Kemper & Khirallah, 2015; Magtibay et al. 2017; McDonald et al., 2012; Mealer et al., 2014; Pidgeon et al., 2014). Other researchers used similar characteristics of mindfulness like living intentionally and non-reactivity to describe

characteristics of resiliency (Klatt et al., 2015; Lim et al., 2016; Potter, Deshields, Berger et al., 2013; Potter, Deshields, & Rodriguez, 2013; Richez, 2014). Reframing the challenge and using critical thinking skills were additional distinguishing traits of mindfulness that four studies focused on developing interventions (Adams et al., 2010; Chan et al., 2012; McDonald et al., 2012; Richez, 2014).

Measuring Mindfulness. Of the 16 studies that focused on mindfulness in their intervention, 10 modified or paralleled the validated model of Mindfulness-Based Stress Reduction (MBSR; Adams et al., 2010; Chan et al., 2012; Duchemin et al, 2015; Foureur et al., 2014; Kemper & Khirallah, 2015; Klatt et al., 2015; Lim et al., 2016; Mealer et al., 2014; Pidgeon et al., 2013), developed in 1990 by Jon Kabat-Zinn, Ph.D., that is used in numerous stress reduction clinics across the United States (Potter, Deshields, Berger et al., 2013). Previous interventions, retreats, educational courses, workshops, and training were used as modalities for improving mindfulness. Additionally, sessions included education on stressors (including but not limited to compassion fatigue, burnout, anxiety, and posttraumatic stress disorder [PTSD]) which ultimately validated many of the participant's feelings (Babanataj et al., 2019; Duchemin et al, 2015; Foureur et al., 2014; Kemper & Khirallah, 2015; Lim et al., 2016; McDonald et al., 2012; Mealer et al., 2014; Potter, Deshields, & Rodriguez, 2013; Potter, Deshields, Berger et al., 2013; Richez, 2014; Weidlich & Ugarriza, 2015).

As the majority of the studies (18 of 22) had at least one intervention that fell into the mindfulness domain, the exploration of why researchers target mindfulness as a concept of resiliency is of great importance for several reasons. First, if the majority of researchers believe that mindfulness is a key tactic in promoting resilience, then there is a

belief for a strong association between resilience and mindfulness. Secondly, individual and organizational approaches that use mindfulness for reducing occupational stress, should simultaneously promote resiliency. This potentially creates greater opportunities for measuring resiliency in other interventions that have targeted stress reduction rather than the promotion of resilience.

Instruments used within the mindfulness domain do not discriminate between methods that are preventative in nature versus curative. For example, the researchers who used the Maslach Burnout Inventory (MBI), a more reactive approach designed to measure symptoms of exposure to stress, also used or included the CD-RISC to measure resilience, focusing on a proactive approach intentionally designed to prevent stress from occurring in the first place (Chan et al., 2012; Duchemin et al, 2015; Kemper & Khirallah, 2015; Klatt et al., 2015; Mealer et al., 2014; Potter, Deshields, Berger et al., 2013). These researchers did not explicitly delineate between stress reduction or resilience building, the instruments were merely a means to measure some improvement associated with their intervention.

In the one study that compared these measurement methods, the researchers discovered that training interventions targeted to improve burnout did not necessarily increase resilience, meaning burnout and resiliency may be different (Weidlich & Ugarriza, 2015). However, in the studies that targeted improved resilience, the improvement was found through outcomes focused on decreasing burnout and compassion fatigue, rather than improved resilience (Chan et al., 2012; Duchemin et al, 2015; Kemper & Khirallah, 2015; Klatt et al., 2015; Mealer et al., 2014; Potter, Deshields, Berger et al., 2013). This finding could assist in the conceptualization of future

interventions. The promotion of resiliency (a proactive approach addressing problems at the source and preventing stress from happening) may have a more lasting effect than interventions that are designed for coping with stressors (the reactive and curative response to workplace adversity).

Self-Strengths. In the third domain, self-strengths like self-esteem, self-confidence, self-discipline, and self-efficacy have a long history with the healthcare profession and can be linked back to Social Cognitive Theory by Bandura (1989). The Theory of Self- Efficacy (Bandura, 1977), suggests that through reflective thought, an individual can exercise influence over what they do - or put simply, individuals will decide how to behave. Enactive attainment (the personal belief that one can accomplish a task) is the primary direct contributor to self-efficacious behaviors (Bandura, 1989), so characteristics like esteem, confidence, and discipline are recognized as key components to building personal hardiness in the healthcare setting (Adams et al., 2010; Babanataj et al., 2019; Jarrett, 2008; Lim et al., 2016; McDonald et al., 2012; Waite & Richardson, 2004).

Harsh self-judgements (Jarrett, 2008; Pidgeon et al., 2013), associated destructive thoughts and rumination (Foureur et al., 2013), workplace bullying, aggression, and victim shaming (McDonald et al., 2012) are associated risk factors for diminished nurse self-esteem. Internal or external characteristics that directly assault self-esteem, self-confidence, and self-concept (Babanataj et al., 2019; McDonald et al., 2012; Potter, Deshields, Berger et al., 2013) are commonly viewed as contributing to workplace adversity leading to psychosomatic disorders, poor mental health (Chesak et al., 2015; Magtibay et al., 2017), helplessness and unhappiness (Adams et al., 2010). However,

Meseguer-de-Pedro et al., (2019), found a mediating role of resilience between the relationship of workplace bullying and employees' health in a sample of 762 workers.

All 12 studies that focused on self-strengths contained an intervention with a component of positive psychology (Adams et al., 2010; Babanataj et al., 2019; Chan et al., 2012; Chesak et al., 2015; Foureur et al., 2013; Jarrett, 2008; Lim et al., 2016; Magtibay et al, 2017; McDonald et al., 2012; Pidgeon et al., 2013; Potter, Deshields, Berger et al., 2013; Waite & Richardson, 2003). Mind-body techniques that were seen in the mindfulness interventions were commonly used to build skills in restructuring thoughts that empowered an attitude with a positive outlook (Adams et al., 2010) often referred to as learned optimism (Jarrett, 2008; McDonald et al., 2012). Although mindfulness and positive psychology are primarily cognitive in nature, interventions that focused on self-strengths commonly demonstrated an increase in positive emotions that led to enhanced resilient qualities like self-esteem (Adams et al., 2010; Jarrett, 2008; Lim et al., 2016; McDonald, 2012; Waite & Richardson, 2003).

Measuring Self-Strengths. Pidgeon et al. (2013) used the self-compassion scale to assess the metta and cognitive strategies taught during their retreat and Waite and Richardson (2003) used the Rosenberg Self-Esteem Scale to measure global feelings of self-worth in their resiliency educational program. These two studies demonstrate the closest relationship between measuring the characteristic of self to assess the intervention of positive psychology.

Positive Choices. Positive choices, the fourth domain, includes characteristics like optimism, positive thinking, gratitude, and humor (Connor & Davidson, 2003). Seligman (2006), an expert in learned optimism, explained that optimism exists on a

spectrum from deeply pessimistic to highly optimistic where very optimistic employees are the most persistent, never giving up despite rejection or failure; they are immune to helplessness. Pessimism leads to depression and although Seligman (2006) discovered that depressed employees could accurately describe the amount of control they possessed at work, optimistic employees were undeterred when helpless, still judging that they had a great deal of choice in the situation. Similar results were observed in physicians where more perceived control over work hours resulted in higher job gratification and a greater sense of purpose (McCann et al, 2013; Zwack & Schweitzer, 2013).

Adams et al. (2010) explained that developing positive response choices can be learned by reframing the situation, thinking about hidden opportunities, and practicing gratitude. Further, Fredrickson (2009) theorized that positivity broadens the opportunities one can see, enabling individuals to connect ideas and effectively addressing challenges. Finally, sharing laughter and finding humor has been reported in the literature as an outlet for stress, an ability to address fears, and build camaraderie in high-stress units (Mealer et al., 2012; Oczkowski, 2015). Oczkowski (2015) encouraged teaching humor to foster resilient physicians and reminded healthcare workers in high-stress environments of the joy that can come from life - that humor encourages courage, perseverance, and the strength to cope with our fears.

Measuring Positive Choices. Positivity, optimism, and job gratification were measured subjectively and self-reported by those who participated in interventions and training. Pipe and colleagues (2012) evaluated the personal and organizational impact on positive coping among oncologists and healthcare leaders and discovered that “highly optimistic individuals report being more receptive, more creative, making better

decisions, having improved communication, making new connections, experiencing new ways of being and finding new learning opportunities" (para. 13) with repeated experiences building resilience over time. Adams et al. (2010) conducted resiliency training with doctors, nurses, behavioral health providers, and ancillary staff with a focus in developing positive response choices; overall, 96% of the participants reported that they planned on using the techniques learned, and found value in the training provided.

Serendipitous Recovery. Hope, self-reflection, meaning making, posttraumatic growth and a sense of purpose are all characteristics found in resilient healthcare providers in the fifth domain. Posttraumatic growth is the experience of positive change that develops as a result to a very challenging, traumatic, or stressful life experience manifested by an increased appreciation for life, increased personal strength, and changed priorities (Tedeschi & Calhoun, 1996). In a study among 253 Air Force healthcare professionals, the relationship between healthcare stress exposure and posttraumatic growth was examined. Researchers discovered that although providing healthcare in combat was stressful, it yielded positive psychological outcomes (McLean et al., 2013). Military healthcare personnel are dually burdened by healthcare stress and combat exposure, which puts them at risk for posttraumatic stress disorder (PTSD), but McLean and colleagues (2013) discovered that the "sense of moral purpose inherent in the role of providing care, healing, and protection" (p. 66) increased posttraumatic growth. Although several studies support the idea that posttraumatic growth, hope, and meaning-making do not act as mediators for burnout and trauma, researchers still recognize the importance of those characteristics fostering resilient behaviors. Finally, McCann et al. (2013) observed that when clinicians are actively engaged in challenges, this process fostered a sense of

purpose and personal meaning with their careers, which in turn increased resilience. It is unclear, however, whether a sense of purpose drives resilient behavior or arises as a consequence of resilient behavior.

Feelings of decreased personal accomplishment, role ambiguity (Chesak et al., 2015; Magtibay et al., 2017), and career stagnation (Poulsen et al., 2015) all create unique challenges for achieving a sense of purpose and higher meaning in healthcare workers. Finding purpose in life can be viewed as a very personal and intimate process requiring existential growth that may take time, unique self-reflection, and a constant state of betterment.

McDonald et al. (2012) used goal setting and creativity to assist nurses in planning for the future. Creative approaches used varied expressive mediums throughout the studies including drawing, painting, collage, photography (McDonald et al., 2012), creative writing and reflective journaling (Bauer-Wu & Fontaine, 2015; Duchemin et al., 2015; McDonald et al., 2012). Although other researchers identified the benefit of journaling or expressive writing, McDonald et al. (2012) uniquely connected creativity to achieving higher meaning.

Measuring Serendipitous-Recovery. Only one study demonstrated an intrinsic relationship between intervention and aim within this category. Waite and Richardson (2003) used the Purpose in Life Test to measure the "degree to which a person has acquired purposeful direction in life" (p.180). Interestingly, although resiliency was a common aim for four studies, only two studies used resiliency instruments to measure the effectiveness of interventions on resiliency (Chesak et al., 2015; Waite & Richardson, 2003).

It is evident that the multi-modal concept of resilience is found in the character of healthcare professionals, as they possess varying resilient behaviors within each domain that foster resilience. Healthcare professionals are exposed to high-stress environments, which are not limited to the direct care provision, and by adopting effective resilient behaviors, professionals can optimize positive protective factors that enable them to recover quickly from stressors and potential stressors.

ICU Nurse Resilience Literature

ICU nurses have repetitive exposure to traumatic experiences, build bonds with their patients and families, and may hold specialized critical care qualifications and experience that make their needs different from other types of nurses and physicians (Khan et al., 2019). With approximately 20% of deaths in the US occurring in or shortly after an ICU admission (range 4% to 44% in a systematic review of 902,551 patients; Galloway et al., 2018), ICU nurses are in the unique position to help navigate a patient through quality end-of-life care, often driving communication through clinicians, patients, and families to enhance the quality of dying (Ramos et al., 2016). For reasons like these, resilient ICU nurses are characterized as autonomous, empowered, and highly specialized (Khan et al., 2019). Furthermore, ICU nurses regard their professional development, experience, and the quality of the working relationships with colleagues, management, physicians, and patients and their families as imperative in sustaining their resilience (Khan et al., 2019).

One study that examined the critical climate from the perspective of 200 nurses found that the department, professional title, frequency of night shift, exposure to workplace violence, and psychological resilience accounted for a significant amount of

explained variance in the quality of work life (Hu et al., 2020). Although autonomy, empowerment, and specialized skill sets are characteristics of resilient ICU nurses, it is important to explore how these nurses use protective factors to foster their resilience; this will be explored in the next section.

Well-Being. In a systematic review of 16,794 ICU nurses from 585 ICUs in 12 countries, having enough time to recover from their shift and flexible rotations were significant in sustaining the staff's well-being (Khan et al., 2019). Part of the recovery process was the need for adequate staffing and lower nurse to patient ratio (Khan et al., 2019; Mealer et al., 2012). For physicians, well-being in the healthcare workforce was focused on work-life balance and the need for physicians to be able to delegate and control their work hours to fully enjoy their rest and relaxation while at home (McCann et al., 2013). For ICU nurses, however, patient ratios and staffing were a primary concern for well-being because of the physical and emotional demand required in the critical care environment (Khan et al., 2019). Family support, social support, and physical health were protective factors for ICU nurses, where social support partially mediated trauma, in one study that examined 717 ICU nurses (Zhang et al., 2020).

Mindfulness. In the domain of mindfulness, the ability to problem solve and self-regulate during stressful situations are common characteristics associated with ICU nurses. Khan and colleagues (2019) reported that of the surveyed ICU nurses, feeling enabled to discuss their concerns openly with physicians regarding patient care and plans allowed them to feel empowered and respected in their positions. Further, communication, interprofessional relationships, and collaborative problem solving within the ICU have established significant correlations to improved patient care, and nurse and

physician satisfaction (Baggs et al., 1999; Baggs et al., 2007). Institutional efforts to improve mindfulness should not be undervalued; Klatt and colleagues (2015) implemented an onsite mindfulness program to improve the resilience in ICU nurses, and although resiliency improved after 8 weeks, it was unclear whether improved resilience was a result of social desirability bias, institutional support, or the intervention. In any case, institutional buy-in is a key component in improving the resilience of nurses, possibly regardless of the intervention implemented.

Self-Strengths. In the third domain of resilience, self-confidence in ICU nurses comes from holding specialized critical care qualifications, gaining experience, and their access to resources (Khan et al., 2019; Ramos et al., 2016). It is clinically appropriate that for those reasons, ICU nurses valued professional development and the ability to advance their career to sustain their resilience and moderate feelings of stagnation (Khan et al., 2019; Ramos et al., 2016). Bandura (1977) suggested that self-confidence reflected control over one's own motivation, behavior, and environment. However, many ICU nurses are unique in their desires for empowerment, development, and seeking advanced qualifications (Khan et al., 2019). As seen in other organizational literature, the behaviors of others, or more specifically the behavior of managers, can impact the resilience of employees. In one literature review of 19 studies, nurse unit manager behaviors were highly correlated with and played a vital role in the wellbeing of ICU nurses (Adams et al., 2019). The professional relationship, the way managers lead the nurse team, and following through on concerns and requests were major themes the researchers discovered in their literature review (Adams et al., 2019).

Positive Choices. In the domain of positive choices; positive thinking, humor, gratitude, and optimism can assist in fostering resilient behaviors. Oczkowski (2015) specifically spoke to the high-stress environment of an ICU, that humor is a "respite" from the "darkest" and most "draining" places to work. Humor can cultivate the virtues of humility, compassion, temperance, and self-reflection (Oczkowski, 2015). Although there is a paucity of medical literature on virtuous humor, future researchers would benefit from exploring its significance as a protective factor and learned behavior in high-stress environments (Mealer et al., 2012; Southwick et al., 2008). Gratitude is a polemical concept when applied to the ICU, often because a patient's stay may end in death or the struggle of maintaining independence vs. quality of life with declining health. Although gratitude in the medical literature is often described from the patient perspective (e.g., expression of gratitude from the family to the nurse for the care of the patient), once again, future researchers would benefit from exploring how gratitude of the nurse improves the nurse's experience, resilience, and overall psychological profile in high-stress situations. Further, it has been postulated that in ICU nurses, gratitude is inversely correlated with burnout and positively correlated with job satisfaction; there are indications that higher levels of gratitude and hope can assist in finding personal meaning in patient care (Rodriguez-Ray et al., 2017; Rushton et al., 2015; Rushton et al., 2018). Gratitude is inherently linked to meaning-making, the fifth domain of resilience, and another relationship that future researchers would benefit in exploring. Because it is unclear whether gratitude is a foundation for attaining personal meaning or an outcome of professional satisfaction.

Serendipitous Recovery. Finally, posttraumatic growth may have a protective role in the resilience and long-term outcomes of professional satisfaction and quality of life among ICU nurses (Rodriguez-Ray et al., 2017; Rushton et al., 2015). In a study that examined the association between resilience and the domains of professional quality of life among 200 ICU nurses, compassion fatigue was inversely correlated to resilience (Nejad et al., 2019). However, in high-intensity environments where increased stress, moral distress, and burnout are present, there is a greater opportunity for the cultivation of resilient behaviors to assist one's achievement in meaning, value, and purpose in life, even if life is lived in strenuous adversity (Rushton et al., 2015; Rushton et al., 2018). Further, Rushton et al. (2015) reported that despite high measures of ICU nurse burnout, nurses still felt personal accomplishment related to their work, and the ability to draw upon their spirituality and optimism resulted in higher scores of meaning-making and protection against burnout.

ICU nurses are a distinctive group within the healthcare organization because of their exposure to physical, emotional, and spiritual demands in their work environment. However, this puts them at a unique position to vicariously learn, self-reflect, gain insight, and make meaning from those experiences and hardships to achieve job satisfaction and personal accomplishment. Although the protective factors of resilience have potential to moderate adversity in high-intensity environments like the ICU, a deeper exploration into characteristics that make up protective factors (e.g., gratitude, humor) might prove beneficial in future research.

Final Resilience Considerations

There are common domains among the general population, healthcare workers, and critical care nurses when comparing how individuals utilize their resilience. The five domains of resilience contain protective characteristics that when applied to any population can foster resilient behaviors. However, it appears that even within similar career backgrounds like healthcare such as physicians, acute care nurses, and critical care nurses, interventions focused on the individual are most successful at achieving higher resilience. It is unlikely that a one size fits all intervention to promote resilience would be successful; an element of one-on-one training and support based on individual needs would be wise when developing interventions (Babanataj et al., 2019; Azoulay et al., 2017; McDonald et al., 2012). It is unclear why some resilience interventions work better for some people compared to others, and future researchers could explore whether this is because of personal preference, upbringing, or even biologic underpinnings and genetic traits (Yehuda et al., 2013).

Despite the inability to make generalizations about the current state of science of resilience, there are some common themes in the literature. Resilient physicians were characterized by high self-directedness (Zwack et al., 2013) requiring the ability to control working hours, schedule, and leisure time to achieve personal reflexivity and job gratification (McMann et al., 2013). Physicians, they viewed their ability to set boundaries, delegate, and have more control over workload as necessary to sustain their resilience (McMann et al., 2013). Resilient acute care nurses were characterized by their "interactive interpersonal processes" (Delgado et al., 2017, p.72) between colleagues, physicians, and management and the need to be heard and validated (Richez et al., 2014).

This was true for ICU nurses as well, but at a higher level; the nature and quality of the working relationships was a direct contributor to sustaining ICU nurses' resilience with the additional need for autonomy, empowerment, and self-development (Khan et al., 2019). The ability for collaboration and feeling enabled to share and discuss their opinions and concerns openly was unique to ICU nurses but once again appropriate for the critical care setting, in which ICU nurses are expected to work with physicians to solve problems (Baggs et al., 1999; Khan et al., 2018).

Although personal protective characteristics assist in sustaining one's resilience in a stressful workplace, putting all responsibility to prevent burnout on an individual removes the responsibility of the organization for creating a healthier place to work. It is important to avoid using resilience as a buzzword and monolithic solution when the organizational climate contains the potential for mitigating and protecting individuals in those high-stress roles. In the next section, the characteristics of an organization related to its impact on sustaining workers' well-being, resilience, and job-satisfaction will be explored.

Organizational Climate

General Organizational Climate Literature

What makes a company one of Fortune 100's Great Places to Work? The workforce study analyzes questionnaire data from over 4 million employees each year and characteristics within the workplace like trust, company values, opportunities for advancement, leadership, and collaboration are assessed relative to the organization's size, industry, region, and demographics (Great Places to Work Institute, 2019).

Social. When employees of the top 10% of the great places to work are interviewed about why they believe their company is deserving of the honor, they use phrases like “the company invests in me and my team,” “they care about empowering employees,” “endless opportunities to learn and grow,” “you are recognized for your hard work,” “culture is focused on doing what is right,” and “we have the opportunity to truly impact people’s live for the better” (Great Places to Work Institute, 2019, para.1). Thousands of management, business, and leadership books have been written on the characteristics that make organizations thrive, and often they repeat the same common social themes: teamwork, effective leadership styles, meaningful recognition, autonomy and respect, listening and responding to concerns, and encouraging pathways for growth (Abrashoff, 2007; Collins, 2001; Sinek, 2009).

Organization. Organizational climate is measured by individuals who live and work in the environment, and ultimately influences the motivation, behavior, and performance of those individuals (Montoya & Tostes, 2017). Organizational climate is made up of nine dimensions: structure (policies and procedures), responsibility (one’s perceived autonomy level), reward (perception of promotional processes), challenge (perceptions of task difficulty), relationships (between coworkers and management), cooperation (among peers and management), performance standards (perception of company performance), conflicts (resolution and confrontation), and identity (sense of belonging within the work team; Montoya & Tostes, 2017). Understanding the makeup of an organization’s climate is important because, unlike resilience, aspects within the climate have a mediating role on job satisfaction, organizational commitment, and job performance (Fu & Deshpande, 2014). The strongest and most significant relationships

between the organizational climate and job performance are “warmth”, “organizational structure”, and “support” (Montoya & Tostes, 2017). In addition, there is empirical evidence that the ethical organizational climate can indirectly influence the intent to leave a company through job satisfaction and organizational commitment (Valentine & Barnett, 2003).

Acute Care Nurse Organizational Climate

Although examining the organizational climate from a broader point of view is an effective place to start, healthcare organizations differ from non-healthcare organizations because of the high-intensity and high-stakes environment that comes with life and death decision making. Like resilience, it is important to investigate whether the same characteristics that prove vital for typical organizations are just as vital for healthcare organizations.

Social. Evidence within healthcare organizations has shown that social aspects like coworker relationships (Delgado et al., 2017; Hinderer et al., 2014), meaningful recognition (Kelly et al., 2015), and management style (Hunsaker et al., 2015) are strongly associated with workplace satisfaction and decreased burnout. In a study that sought to examine the differences between millennial and baby boomer generation nurses, meaningful recognition was the primary direct contributor to workplace satisfaction and commitment for both groups (Kelly et al., 2015). Meaningful recognition has been cited in other studies (Hunsaker et al., 2015) as well as management style, specifically high levels of manager support, contributing to compassion satisfaction and improved working conditions for nurses (Kelly et al., 2015).

Other researchers have found similar results; supportive nurse practice environments are dependent on nurse-physician relationships, nurse management at the unit level, hospital management, and the physical environment including staffing and nurse-reported workload (Koy et al., 2017; Pierce, 2018). Perceived organizational support is defined as the employee's perception of whether an organization values their contributions and cares about their well-being. In healthcare, supportive environments come in the form of an individual's ability to carry out ones' job effectively and manage stressful situations (Hall et al., 2007).

Five studies found two factors associated with workplace relationships: interpersonal conflicts (Bauer-Wu & Fontaine, 2015; Chesak et al., 2015; Mealer et al, 2014) and critical incidents (Chan et al., 2012; Smith et al., 2012). Interpersonal conflicts in relationships with coworkers, colleagues, physicians, and supervisors were associated with lack of support, bureaucratic constraints, criticism, and disrespect (Bauer-Wu & Fontaine, 2015; Chan et al., 2012; Chesak et al., 2015; Mealer et al, 2014; Smith et al., 2012). Additionally, Chan et al. (2012) discovered that more than 40% of participants reported personal crises such as family or marital relationships. This important finding suggests that interventions tailored to collaboration should focus on relationships in all areas of a healthcare professional's life including relationships outside of work.

Four interventions focused on nurturing relationships within the healthcare organization did so through mentoring partnerships (Bauer-Wu & Fontaine, 2015; McDonald et al., 2012; Poulsen A., 2015; Richez, 2014). Not only was it important to find a mentor who enveloped the persona of resilience (Richez, 2014), but some researchers designed ambassadors and role models to champion resiliency and act as

catalysts for future cohorts (Bauer-Wu & Fontaine, 2015; McDonald et al., 2012). Group participation with role-playing (Lim et al., 2016; Richez, 2014; Smith et al., 2012), debriefing (Foureur et al., 2013; Potter, Deschields, Berger et al., 2013; Smith et al., 2012), and crucial conversations on ethical situations (Bauer-Wu & Fontaine, 2015; McDonald et al., 2012) were practiced in eight of the healthcare studies examined.

Physical. Smith et al. (2012) defined critical incident stress as "any incident that evokes fear and/or hopelessness that involves a perceived threat to one's physical being or the physical well-being of someone else" (p.12). Aggressive or violent crimes against the person in the workplace (Chan et al., 2012; Smith et al., 2012), sudden or unexpected patient death (Mealer et al, 2014; Smith et al., 2012), and poor work structures like understaffing (Mealer et al, 2014) and high turnover (Smith et al., 2012) were examples of common events that triggered traumatic stress that required intervention within the organization.

Measuring the Organization. In the healthcare studies examined, we found no consistent measure for assessing characteristics of an organization related to resilience. Different measurement methods included participant evaluation (McDonald et al., 2012; Potter, Deschields, & Rodriguez, 2013; Smith et al., 2012) assessing satisfaction with the intervention (Potter et al., 2013; Smith et al., 2012), morale, retention, engagement, freedom of expression, and the availability of management to talk and listen (Smith et al., 2012). Most indicators reflected improvement after resilience interventions but it was recognized in Potter, Deschields, and Rodriguez (2013) that "the post survey may be more representative of a biased group that valued the program more highly" (p.330) possibly because "offering a program, in and of itself, validates the lived experience of

staff members doing the difficult work of patient care" (p.331). This influential characteristic of validation is both a potential catalyst for resilience and an impetus towards social desirability bias. Future resilience studies would be strengthened by a consistent and validated measurement tool for the organization, nurse practice environment, or climate.

Critical Care Climate

The critical care climate is unique in its high exposure to traumatic events compared to other acute care environments (Khan et al., 2019; Mealer et al., 2017; Rodriguez-Ray et al., 2017). Epp (2012) examined contributors to the critical care environment and discovered the most damaging to nurses were the high acuity of patients leading to demands for complex care, the need to care for both patient and family, the responsibility to execute final decisions made by the physicians and family, and the conflict between professional and personal beliefs leading to moral dilemmas (Epp, 2012). The critical care climate can be divided into three domains: physical, social, and organizational (Khan et al., 2019).

Physical. In ICU nurses, noise reduction, adequate staffing, and lower nurse to patient ratios were strongly associated with positive physical aspects of the work environment (Khan et al., 2019; Mealer et al., 2017; Mealer et al., 2012; Milliken et al., 2007; Pierce, 2018). Noise reduction may come in the form of implementing quiet hours or changing alarms to decrease alarm fatigue.

Social. The social domain of the ICU includes ICU nurses who were enabled to share and discuss their concerns openly, often in the form of shared governance with managers and administration (Clifton & Harter, 2019). The facilitation of patient care

between a physician and the treatment team also improved social communication and collaboration within the ICU (Lim et al., 2019; Marcum et al., 2018; Ramos et al., 2016; Rushton et al., 2015). ICU nurses reporting flexible shift rotations, a social support system, and feeling empowered in their positions, assessed the social aspect of their work environment positively (Khan et al., 2019).

Organization. The organizational aspect of the job was regarded as positive when ICU nurses had competent teams; professional development pathways; collaboration; quality relationships among coworkers, managers, and physicians; held specialized qualifications; and received meaningful recognition for their jobs (Khan et al., 2019; Lim et al., 2019; Marcum et al., 2018; Ramos et al., 2016; Rushton et al., 2015). Regardless of the workplace, there are consistent characteristics within an organization's climate that enable employees to thrive. Fostering positive features within the organizational climate is important in mitigating burnout, and aspects within the climate have a mediating role on job satisfaction, organizational commitment, and job performance which in turn may sustain individual resilience (Fu & Deshpande, 2014).

Final Organizational Climate Considerations

Organizational climate includes the role of workplace culture, managerial behavior, positive reinforcement, and a supportive and responsive administration in sustaining staffs' resilience and preventing burnout within their organization. Despite the overwhelming evidence and frequent dialogue surrounding how a positive work environment has a measurable impact on reducing burnout among nurses, Aiken and colleagues (2018) recently demonstrated that only 21% of 535 surveyed-hospitals substantially improved their clinical work environments between 2005-2016. In fact, 71%

made no improvements, and 7% had deteriorating work environments (Aiken et al., 2018). A critical analysis of the literature suggests that the organization shares a greater role than the individual in nurse burnout and has the ability to alter burnout through changes like adequate staff and support services, supportive supervisory staff, staff development programs, good working relationships with colleagues, and praise and recognition for a job well done (Calabro et al., 2019). By providing a supportive social network through listening to employees, validating their concerns, and cultivating an environment of praise rather than punishment, it is probable that the prevalence of burnout in a workplace will decline. Also, because the role of the critical care climate is vital in the mitigation and prevention of burnout in ICU nurses, it is included under the umbrella of "protective factors" in this dissertation.

Although there has been an emphasis on personal responsibility and personal resilience to improve nurse outcomes, to have a reduction in ICU nurse burnout, a focus should also be on the critical care climate. Additional research that emphasizes the nurses' workplace, specifically the relationship between the administration and employees, should include the role that different practice settings and shifts play into how burnout is processed. In this next section, I examine the heterogeneity in how burnout is processed among populations.

Burnout

Job Burnout

Job burnout is a psychological syndrome defined by the three dimensions of prolonged response to stressors in the workplace: emotional exhaustion, depersonalization, and lack of personal accomplishment (Maslach, 2003; Maslach &

Leiter, 2016; Maslach et al., 2001). Each dimension of burnout is related to the workplace in a different way. Emotional exhaustion and depersonalization arise from work overload and interpersonal conflict whereas the lack of personal accomplishment emerges from insufficient resources (e.g., time, staff) to get the job done (Maslach, 2003). As a result, individuals experience various types of burnout depending on the types of problems in their own work environment (Maslach, 2003).

Interventions focused on mitigating burnout have historically targeted individuals rather than the workplace. However, research findings have been incongruent on the intervention's impact to moderate burnout by strengthening workers' internal resources or resilience (Koy et al., 2017, Marcum et al., 2018). Rather, people's attempt to "cope" or "distance themselves from aspects of their jobs" can be viewed as high levels of cynicism and doing the bare minimum instead of their best (Maslach, 2003). Researchers have shown that the organization is a greater contributor to burnout than individual characteristics, and often individual strategies for improvement are ineffective because individuals have inadequate control over key domains of work life (Maslach et al., 1996). Knowledge about the ability to operationalize the concept of burnout is a significant research gap because interventions often target individuals, rather than workplace features where problems may arise. For example, high-intensity job demands, an imbalance between high-intensity job demands and inadequate staffing, and the presence of interpersonal conflict are consistently found in organizations that report burnout (Koy et al., 2017; Marcum et al., 2018; Maslach, 2003; Maslach & Leiter, 2016).

Healthcare and Nurse Burnout

Healthcare demographic analyses consistently show that burnout tends to be higher for younger, female employees and those who work longer hours, work during the week, and have more years of experience (Calabro et al., 2019; Maslach et al., 1996; Maslach, 2003;). Additionally, female practitioners score higher in emotional exhaustion compared to male colleagues, which is often attributed to the additional role of home and family responsibilities (McCann et al., 2013). In nurses, burnout is highly correlated to increased turnover (Vahey et al., 2004), adverse nurse health outcomes (Maslach et al., 1996; Milliken et al., 2007), and moral distress (Rushton et al., 2015). Personal nurse characteristics linked to burnout involved self-reflection, worry, and fatigue (Calabro et al., 2019). For example, when nurses have time to reflect on their work and career, burnout is significantly less. Conversely, not engaging in a reflective practice increases burnout (Calabro et al., 2019). Additionally, severe fatigue, poor general health, and poor Quality of Life (QoL) is linked to higher reports of burnout (Calabro et al., 2019).

Systematic reviews have revealed conflicting evidence as to whether education level, age, and nurse specialty contribute to compassion fatigue and burnout, but organizational climate has consistently been shown to directly contribute to or moderate burnout across nurse disciplines, so the case is stronger for burnout as a function of the organizational climate rather than personal characteristics of an individual (Costa & Pinto, 2017; Koy et al., 2017; Marcum et al., 2018). For example, in an analysis of 3,164 nurses in 10 practice settings, organizational climate was the greatest predictor for burnout; whereas adequate staff and support services, supportive supervisory staff, mentorship, and staff development programs, good working relationships with

colleagues, an appreciation for differing perspectives, praise and recognition for a job well done, and listening and responding to employee concerns were the top characteristics linked to workplace burnout (Calabro et al., 2019).

ICU Nurse Burnout

Nurses in ICUs report the highest levels of burnout, which is linked to ICU nurse turnover (Hinderer et al., 2014; Khan et al., 2014; Marcum et al., 2018; Mealer et al., 2012; Rushton et al., 2015). Turnover rates of ICU nurses range from 15% to 44%, and a single turnover can cost more than $64000 per ICU nurse in the US with similar rates reported globally (Duffield et al., 2014; Epp, 2012; Khan et al., 2018). ICU nurses are especially vulnerable to recruitment and retention in part because high levels of job burnout may provoke a 20% annual attrition rate and a 65% dissatisfaction rate among those who remain in their jobs (Mealer et al., 2012).

In a recent literature review that examined 25 studies on ICU nurse burnout, burnout was positively correlated with substance abuse, anxiety, depression, PTSD, and suicidal thoughts (Burke et al., 2019). Physical ailments included headaches, hypertension, sleep disorders, gastrointestinal problems, and musculoskeletal disorders (Burke et al., 2019). One study found that 100% of the ICU nurses surveyed (n=27), tested positive for symptoms of anxiety and 77% tested positive for symptoms of depression, emotional exhaustion, and depersonalization (Mealer et al., 2014). In another survey of 744 ICU nurses, 61% were positive for emotional exhaustion, 44% for depersonalization, and 50% for lack of personal accomplishment (Mealer et al, 2012). Other reports of burnout in ICU nurses have consistently been near to or greater than

80% (Khan et al., 2018; Hinderer et al., 2014; Marcum et al., 2018; Mealer et al., 2012; Rushton, 2015).

Measuring nurse burnout is most frequently done with the Maslach Burnout Inventory; which includes 22-items in three subscales and is written in the form of personal statements (i.e. "I feel…"; Maslach et al., 1996). Burnout can be analyzed as total burnout and also stratified into its three domains (emotional exhaustion, depersonalization, and personal accomplishment). Stratifying the domains allows examination of each domain separately to assess whether there is support for the burnout phenomenon where multiple burnout profiles correlate with organization characteristics (Leiter & Maslach, 2016, 2003). Recently, researchers have proposed that emotional exhaustion has the greatest predictive validity for burnout, as a result of morally distressing and challenging situations that lead to "empathetically overaroused" nurses (Rushton, 2015, p.417).

Rushton (2015) reported strategies such as mindfulness, emotional reflexivity, and physical and spiritual well-being as potential processes to aid in mitigating emotional exhaustion in high-intensity environments. Individually oriented interventions may help alleviate emotional exhaustion (Maslach, 2003), but other interventions should focus on organizational strategies. For instance, in the systematic review by Khan et al., (2019), the authors found that the quality of the work environment, the relationship between colleagues, and traumatic and stressful workplace experiences were direct contributors influencing nurses' intent to leave the ICU specialty. In an ICU that had 679 nurse clinicians, low burnout was highly correlated to having lower chaos, less stress, and very high teamwork as well as an alignment of core values between administration, leadership,

and physicians (LeClaire et al., 2019). In another study (*n*=29), the highest levels of burnout were associated with workload and conflicts with other health professionals (Cotrău et al., 2019). Consistent with the larger organizational context of burnout in people's response to their organizational climate, a shift from individual responsibility and interpersonal dynamics to organizational characteristics shows potential for solutions to address organizational problems and burnout.

Final Burnout Considerations

The solution to burnout may exist in job engagement, which is the opposite of burnout (Maslach et al., 2001). Job engagement is conceptualized as a positive and persistent motivational state of fulfillment in employees, it can be characterized by energy and vigor, involvement and dedication, and self-efficacious behaviors (Maslach et al., 2001; Maslach, 2003). Although past researchers have undertaken studies and interventions to moderate burnout, future interventions may be more effective if framed in a positive narrative like building job engagement (Bailey et al., 2017). Regardless of the narrative, it is imperative that the shift be made from only an individual's impact on burnout to include the organization. Although there is an emphasis on personal responsibility and personal characteristics to improve nurse outcomes, to reduce nurse burnout, it is necessary to include a focus on workplace organizational characteristics. Finally, within the workplace, it is important to consider the role that different practice settings and shift plays into outcomes, as will be examined in the next section.

Shift Work

General Shift Work

Although definitions vary slightly, shift work is any work schedule that is not a consistent 0900 to 1700 work schedule (e.g., rotating shifts, night shift, 12-hour shifts, 24-hour shifts, on-call; Vyas et al., 2012). We define day shift nurses as those working approximately the hours of 0700-1900 and night shift working 1900-0700. Nurses who work a rotating shift, work a combination of day and night shift, and nurses working evening shifts work the hours of 1500-2300. Nearly 15 million Americans are considered shift workers and 19% of them work 48 hours or more per week (Centers for Disease Control and Prevention [CDC], 2018). However, there is substantial evidence that shift work disrupts the circadian rhythm, sleep, and work-life balance of individuals causing nocturnal melatonin metabolism suppression (Kamdar et al., 2013). Although the process is poorly understood, researchers have found that shift work is associated with a statistically higher risk of myocardial infarction, ischemic stroke, coronary events, dyslipidemia, metabolic syndrome, hypertension, and diabetes (Vyas et al., 2012). In addition to poor health outcomes, shifts lasting longer than 8 hours carry twice the risk of accidents and occupational injury (Wagstaff & Lie, 2011).

Because there are many types of shift work, evidence pertaining to the effects of shift work is controversial, conflicting, and inconsistent. For example, the International Agency for Research on Cancer reported that nightshift work was possibly carcinogenic and had a strong association with breast cancer (Humans, 2010). However, in a more recent systematic review, there was weak evidence supporting any association of shift work and breast cancer risk (Kamdar et al., 2013). Given substantial heterogeneity

between populations, shift schedules, and measurement tools, it is important to adjust for heterogeneity when making generalizations about risks related to shift work.

There are few published studies that examine psychological outcomes associated with shift work. I found nine that compared the differences between day and night shift with nurse's resilience. Of those nine studies, five used a validated resilience measure, the Dispositional Resilience Hardiness Scale (Hystad et al., 2010), and the rest used coping measures or interviews. Of the five studies using validated resilience measures, four found that resilience was associated with better tolerance to shift work (Saksvik-Lehouillier et al., 2012; Saksvik-Lehouillier, 2015; Saksvik-Lehouillier et al., 2016; Storemark et al., 2013). Nurses in the Saksvik-Lehouillier et al. (2012, 2013, 2015, 2016) and Storemark et al. (2013) studies had worked as a nurse from less than a year to 35 years with a mean of 3.9 year, however, data were not collected on unit or healthcare setting these nurses worked in.

In one longitudinal study, resilience predicted shift work tolerance over a 2-year period among Norwegian nurses working both night and day shift, however aspects within the healthcare environment like social support, role conflict, and fair leadership moderated the relationship between resilience and shift work tolerance (Saksvik-Lehouillier, 2016). Saksvik-Lehouillier (2013) found no differences between resilience and tolerance to night shift when comparing new nurses to experienced nurses. Although three studies compared shift workers to non-shift workers, I could not find any that compared day shift nurses to night shift nurses with outcomes focused on resilience.

Most studies published on resilience and shift work predictors had surprisingly negative psychological outcomes, often focusing on work and family conflict, poor

mental health, job dissatisfaction, and burnout (Tahghighi et al., 2017). Further impeding any generalization was the lack of consistent measures used. Consistency often came from Saksvik-Lehouillier's continued research on the subject (2016). More consistent measurement methods would improve the comparison of study outcomes.

Night Shift

Night shift work suppresses melatonin production and interrupts the circadian system, causing a substantial increase in negative health conditions including cancer, cardiovascular disease, and all-cause mortality (Gu et al., 2015). A single overnight shift is enough to increase blood pressure and cause heart irregularities (Vyas et al., 2012). Evidence from the US Nurses' Health Study (*N*= 74,862) for the potentially detrimental effect of night shift work on health and longevity suggested a concern for the continued trends of negative occupational health outcomes (Gu et al., 2015). Although previous findings in a large cross-sectional study (*N*=31,627) demonstrated that nurses prefer 12-hour shifts compared to 8 or 6-hour shifts, those who work 12- hour shifts are more likely to experience high levels of burnout (Dall'Ora et al., 2015). However, when comparing night shift nurses to their day shift counterparts, night shift nurses reported significantly lower levels of burnout (Calabro et al., 2019). Because of this, there is believed to be a level of "protection" against consistent night shift work, possibly due to resynchronization of the circadian rhythm and organizational climate characteristics (Wagstaff & Lie, 2011, p.173; Calabro et al., 2019).

Final Shift Work Considerations

There are conflicting conclusions surrounding shift work because of heterogeneity when reporting data, not ascertaining night shift schedules, or inadequately adjusting for

other risk factors and covariates such as work setting, health history, and protective factors. Despite this, there is substantial support for the detrimental effects that most shift work has on poor health outcomes and occupational safety of healthcare professionals (Wagstaff & Lie, 2011; Vyas et al., 2012; Kamdar et al., 2013). The National Institute for Occupational Safety and Health research agenda includes the reduction of risks associated with shift work and long work hours (CDC, 2018). However, there is a paucity of evidence on outcomes pertaining to nurses working the night shift. Most relevant evidence pertains to the length of shift, this work has concluded that the impact of shift work on job satisfaction, burnout, and resilience is dependent on numerous contextual and individual components (Tahghighi et al., 2017). Future researchers would benefit in directly comparing nursing shifts (e.g., day shift, night shift, rotating shift), using consistent outcome measures (e.g., burnout, fatigue, blood pressure), while also considering different work settings (e.g., ICU, hospital, geographical location) and protective factors (e.g., level of resilience, critical care climate).

Bullying

Workplace bullying refers to psychological or aggressive behaviors that occur at work with the effect of humiliating, intimidating, frightening, or punishing the target (Einarsen et al., 2009). Bullying in the workplace is often in the form of team members dividing the team (88%), disrespect (77%), abuse of authority (52%), and verbal abuse (33%; Ganz et al., 2015). Lateral violence and bullying are found worldwide and nurse prevalence ranges from 1%-87% with victims often considering leaving the nursing profession (Bambi et al., 2019). Nurse managers play a crucial role in preventing bullying (Bambi et al., 2019), but it is not well understood how often bullying occurs between

managers and nursing staff. One frequently used measure to assess exposure to bullying in the workplace is the Negative Acts Questionnaire- Revised (NAQ-R). The NAQ-R is an instrument designed to measure the exposure to bullying in the workplace (Einarsen et al., 2009; Nam et al., 2010). The measure emphasizes the frequency and duration of escalating hostile workplace relationships (Einarsen et al., 2009).

COVID-19: Stressors and Challenges of ICU Nurses During a Pandemic

The novelty, associated mortality, and unknown trajectory of the COVID-19 pandemic has added substantial stress to the healthcare system that critical care nurses are facing. The contextual factors surrounding this pandemic; such as new end-of-life scenarios; lack of adequate personal protective equipment (PPE), staffing shortages, as well as bed and mechanical ventilator shortages; the ease of transmission; the increased workload due to high acuity patients; and ethical and moral dilemmas because of decisions related to rationing of care place heightened strain on an already struggling healthcare system (Alharbi et al., 2020; Jackson et al., 2020; Maben & Bridges, 2020). ICU nurses working during COVID-19 are particularly vulnerable to developing compassion fatigue due to the witnessing of patient suffering and death more frequently (Alharbi et al., 2020). As critical care nurses adapt to their "new normal" (Maben & Bridges, 2020), it is imperative to address those physical and psychological stressors impacting ICU nurses in context to COVID-19, as it is imbedded in the experiences of the nurse participants.

End-of-Life Care

It is estimated that 5%-10% of those infected with COVID-19 will require ICU level care, with 3%-5% not surviving (Alharbi et al., 2020). Not only do nurses

experience patient suffering and death more frequently, but end-of-life (EOL) scenarios are vastly different because of the infectious nature of the disease. Many hospitals have limited or prohibited all family members and friends from visiting to control the spread of the virus. Often, this means that patients are dying alone, or with nurses as their only companions. EOL communication is further hindered by the full PPE that nurses wear; nurses often not hearing patients and patients struggling to see nurses' faces. Additionally, because nurses are confronted with large number of patients whose outcomes are dire, the risk for compassion fatigue and burnout are higher where nurses believe their actions will not make a difference (Alharbi et al., 2020).

Risk of Infection

Another stressor nurses are facing is the risk of infection. COVID-19 is a highly contagious disease. Scientists estimate that 15% of patients who are diagnosed will develop severe health complications (Alharbi et al., 2020). Healthcare professionals are particularly vulnerable to contracting the disease with more than 3,000 medical workers becoming infected in the Hubei Province in the initial outbreak (Mo et al., 2020). Nurses have always played an important role in public health emergencies, but the stress of possible infection is real. For example, in 2003, one third of all fatalities during the SARS outbreak were healthcare professionals (Mo et al., 2020). According to Wu et al. (2020) nurses are most worried about themselves or a family member becoming infected from COVID-19. Of course, this is compounded when necessary PPE such as masks, gloves, and gowns are in short supply or non-existent (Jackson et al., 2020), and there is conflict between nurses' responsibility to care for the sick and their right to protect themselves from a potentially lethal virus (Maben & Bridges, 2020).

Increased Workload

Nurses are reporting "crippling tiredness" with "sore faces" after long shifts wearing PPE (Maben & Bridges, 2020). In the UK, staff-patient ratios of one-to-one have increased to one nurse to six patients to meet demand (Maben & Bridges, 2020). The fatigue due to increased patient loads is compounded by the high acuity of COVID-19 patients and the physiological demands when wearing PPE in isolation areas. Nurses frequently go through complicated procedures of donning and doffing isolation gear and often miss breaks to decrease medical resource consumption and risk of contamination (Huang et al., 2020). Although the trajectory of this pandemic is unclear, hospitals have the capability of reducing the physiological stress that nurses are experiencing. One hospital in the Guangdong Province in China maintained a "zero nurse infection" rate while battling SARS in 2003 (Huang et al., 2020). The hospital implemented strict protocols; provided education and training for nurses; established shorter, reasonable shift schedules; provided psychological counseling; established infection control systems to monitor potential contamination; and listened to the feedback nurses provided about the systems in place (Huang et al., 2020).

Ethical and Moral Dilemmas

The lack of medical supplies means that treatment decisions are affected. Protocols and increasingly stringent rules about who is allowed a ventilator or dialysis makes nurses more likely to experience moral distress and emotional exhaustion (Maben & Bridges, 2020). Previous research has shown that emotional exhaustion has the greatest predictive validity for burnout (Rushton, 2015), yet one study that compared burnout between physicians and nurses on the frontline to those not working with

COVID-19 patients discovered lower frequency of burnout in those working with COVID-19 patients (13% vs 39%; *p<.0001;* Wu et al., 2020). These unexpected findings may provide insight into the nature of burnout and the impact the organization has in mitigating factors that lead to burnout in nurses.

Final COVID-19 Considerations.

It is unknown what lasting physical and psychological toll this pandemic will take on healthcare professionals, however, there are consistent media reports describing the harrowing yet courageous experiences of front-line nurses. Wu et al. (2020) gained unexpected insight on burnout, as the first empirical evidence of the impact of this disease begins to emerge. Yet a failure to provide a safe and supported work environment is causing anger and frustration among many nurses (Maben & Bridges, 2020). When nurses are not supported, when complaints and requests are ignored, and when an overemphasis on nurses being resilient "lets organizations off the hook" (Maben & Bridges, 2020), not only will nurses burn out, they may leave the profession. During this unprecedented time when nurses are particularly vulnerable, it is imperative to give special attention to nurses faced with the additional stressors and challenges that are encased with COVID-19.

Literature Review Summary

Nursing is the single largest healthcare profession in the United States (US) with 2.9 million registered nurses employed in healthcare organizations in 2017 and 3.8 million projected by 2030, (Bureau of Labor Statistics [BLS], 2018). One of the greatest healthcare threats in the past several decades was the looming nurse shortage, where nearly one in two nurses reported dissatisfaction within their positions and a quarter

planned on leaving the profession within the next year ((Buerhaus et al., 2000). These numbers were catalysts for system-wide responses that educated and employed over half a million new nurses to healthcare workplaces within the US (BLS, 2018). There is no longer the threat of a global nursing shortage, the threat of job burnout is still prevalent in the healthcare setting with ICU nurses especially vulnerable (BLS, 2018). Although the case has been made that resilience behaviors protect against some aspects of job burnout, but the argument that burnout is more a function of a nurse's organization and climate than of the nurse should be a focus for researchers in the near future (Hinderer et al., 2014; Kelly et al., 2015; Khan et al., 2018; Maslach, 2003). Additionally, the stress directly linked to shift work and shifts lasting longer than 8 hours carry higher risks of poor health outcomes and injury to nurses, respectively, but the role of night vs. day shift has not been examined in different work settings or with outcome measures (Vyas et al., 2012; Wagstaff & Lie, 2011). Because I found no studies that examine the impact of resilience, the critical care climate, and day vs. night shift work on burnout among ICU nurses, this dissertation study provides clarity on those relationships. Moreover, this dissertation study presents a novel examination of the resilience of critical care nurses working on the frontlines during the unprecedented health crisis of the Corona-Virus 2019 Pandemic.

Theoretical Frameworks

This dissertation includes models and theory about individual resilience and organizational climate as a foundation for my revised protective factors framework. In the following section, I discuss an overview of the Siebert Resiliency Model and Positive

Organizational Behavior Theory and the rationale for using a revision of this framework for this dissertation.

Personal Resilience: The Siebert Resiliency Model

The Siebert Resiliency Model suggests that resiliency can be achieved through a hierarchical process of developing five characteristics where each level builds upon the next (e.g., the ability to achieve optimal self-esteem is possible only when one's ability to problem solve effectively and their optimal health has been realized; McAllister & McKinnon, 2009; Siebert, 2005, 2006). Resilient individuals who possess those five characteristics (optimal health and well-being, mindfulness, self-strengths, positive response choices, and individual fulfillment) will then have the greatest ability to overcome adversity (McAllister & McKinnon, 2009; Siebert, 2005, 2006).

Although resiliency experts, Denz-Penhey and Murdoch (2008), Charney (2004), and Yehuda et al. (2006) identified similar hierarchical characteristics of resilient individuals, the case is much stronger for a non-hierarchical model. Because resilience is a dynamic process, different situations may require various protective characteristics of resilience, supporting the argument that resilience is a process rather than a trait. For instance, one problematic job situation for nurses might involve difficult working relationships with coworkers and physicians (leading to exhaustion and cynicism) requiring mindfulness stress reduction to protect against burnout (Rushton, 2018; Maslach, 2003). In another case, the job might involve increased exposure to death and dying leading to exhaustion and cynicism, which would require more time for self-reflection, meaning making, and personal insight to protect against burnout (Maslach, 2003; Calabro et al., 2019; Panter-Brick & Eggerman, 2012). Therefore, because of the

multi-modal and dynamic nature of resilience, I developed a revised protective factors framework, using supportive evidence gathered from the leading resiliency experts (Denz-Penhey & Murdoch, 2008; Charney, 2004; Siebert, 2005; Yehuda et al., 2006). Further, because the argument has been made for the inclusion of organizational climate, the revised framework includes elements from positive organizational behavior theory.

Organizational Climate: Positive Organizational Behavior Theory

Researchers have recognized the importance of healthy work environments leading to the emergence of positive organizational behavior theory (American Nurses Association, 2001; Bodenheimer & Sinsky, 2014; Youssef & Luthans, 2007). Youssef and Luthans (2007) considered the role of organizational climate, workplace culture and managerial behavior in sustaining staffs' resilience and capacity to thrive through their research. Constructs in organizational climate include positive reinforcement, job satisfaction, supportive and responsive administration, mentorship programs, and positive affectivity (Johnston & Paton, 2003; Lengnick-Hall et al., 2011; McAllister & McKinnon, 2009; Vogus & Sutcliffe, 2007; Youssef & Luthans, 2007).

In 2016, an official call for action by the Critical Care Societies Collaborative was issued to raise awareness on the impact of the critical care climate on burnout as well as potential interventions to prevent and treat burnout (Moss et al., 2016). To drive the overarching construct referred to as "quality of work life," my revised protective factors framework includes critical care climate characteristics as well as individual resilience characteristics to address the aims of this dissertation (MacDavitt et al., 2007; Stone et al., 2006).

Revised Protective Factors Framework

Figure 3. Revised Protective Factors Framework

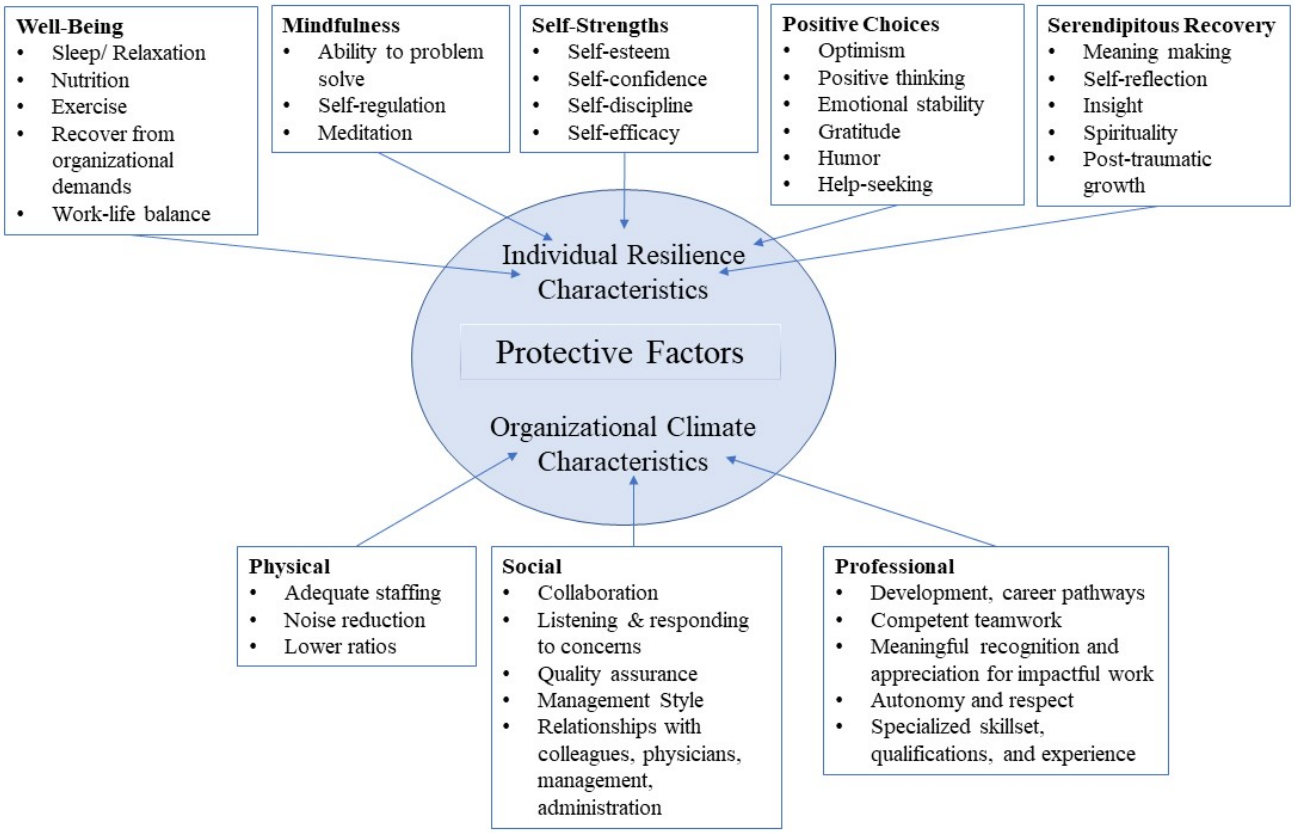


Figure 3. Protective factors can be separated into eight groups: (a) well-being, (b) mindfulness, (c) self-strengths, (d) positive choices, (e) serendipitous recovery, (f) physical climate characteristics, (g) social climate characteristics, and (h) professional climate characteristics. There are characteristics within each group that describes the operational definition of that group (e.g., a person's work-life balance and ability to recover from organizational demands; their quality of life, sleep, nutrition, and exercise describe well-being).

In the following chapters, the revised protective factors framework will be examined and tested. *Figure 3* is the proposed revised protective factors framework, using characteristics from Connor and Davidson (2003), Siebert (2005), Charney (2004), Southwick et al. (2014), Yehuda et al. (2006) and Positive Organizational Behavior

Theory (Youssef & Luthans, 2007) as its foundation. This framework was tested and modified in the dissertation study will be briefly discussed in the final chapter. This dissertation serves as a foundation for the development of new knowledge of protective factors that assist in mitigating burnout among ICU day vs. night shift workers.

Chapter Three

Research Design and Methods

This chapter includes a description of the dissertation's research design and methods. The rationale for study design, setting, participants, data collection methods, and procedures are detailed. Additionally, the validity (including any threats related to internal and external validity), reliability, and measurement tools are described including efforts made to control for error and bias. Provision for the protection of human subjects concludes the chapter.

Research Design and Methods

The overall purpose of this study was to examine how resilience, the critical care environment, and day vs. night shift work impact burnout among nurses. Previous researchers have demonstrated that resilient behaviors can protect against some aspects of job burnout among nurses (Adams et al., 2010; Arrogante & Aparicio-Zaldivar, 2017; Foureur et al., 2013; Lim, & Mi, 2019; Mealer et al., 2012), although, the evidence is much stronger for the contrasting argument that burnout is more a function of a nurse's organization than of the nurse (Hinderer et al., 2014; Kelly et al., 2015; Khan et al., 2018; Maslach, 2003). Nurses who are at the greatest risk for burnout are intensive care unit (ICU) nurses, with rates of burnout consistently around 80% (Hinderer et al., 2014; Khan et al., 2018; Marcum et al., 2018; Mealer et al., 2012; Rushton et al., 2015).

In ICU nurses, burnout is related to the critical care climate and may be compounded by the stress linked to night shift work (Vyas et al., 2012). However, internal protective factors like resilience and external protective factors like the critical care climate have not been studied simultaneously on ICU nurses working day or night shift. For example, one component of the critical care climate is the working relationships among nurse colleagues, mangers, and physicians where the highest incidence of bullying

can be found, often in the form of disrespect (77%), abuse of authority (52%), and verbal abuse (33%; Ganz et al., 2015). However, the relationships between bullying, resilience, and burnout is not well understood. Another component of the critical care climate that is not well studied, is the geographical location of the hospital in which the ICU is located. Data suggests that employers are relying on agency and travel staff to fill vacancies in rural and frontier counties in Oregon (Oregon Office of Rural Health, 2017). There is some evidence that when communities are often dependent on agency and traveling staff, there can be a detrimental impact on permanent staff's resilience and moral due to better shifts and pay for travelers. A final component of burnout that is not well understood, is the relationship of day vs. night shift work on and nurse burnout and resilience. By examining multiple internal and external protective factors on ICU nurses, we differentiated factors that were correlated to varying degrees of burnout.

This study is significant because it serves as a foundation for the development of new knowledge of protective factors that assist in moderating burnout among ICU shift nurses. The aims of this dissertation were to

1. Quantify the unique associations between day vs. night shift work, individual resilience, and the critical care climate on the outcome of burnout after controlling for potential confounders

2. Explore the extent to which protective factors (individual nurse resilience and critical care climate) moderate the effects of burnout between shift nurses when controlling for demographic characteristics.

The revised protective factors framework guided the proposed study and is briefly discussed in the final chapter. The proposed revised protective factors framework, which

was described in Chapter 2, used characteristics from Connor and Davidson (2003), Siebert (2005), Charney (2004), Southwick et al., (2014), Yehuda et al., (2006) and Positive Organizational Behavior Theory (Youssef & Luthans, 2007) as its foundation.

We used the model in *Figure 4*, based on the revised protective factors framework, to explore the extent to which protective factors of individual resilience and the critical care climate moderate the effects of burnout for ICU nurses working day vs. night shift. To the best of our knowledge, we are the first to quantify the unique relationship between protective factors and burnout among ICU nurses working day vs. night shift. Knowledge about the protective factors that aid in mitigating ICU nurse burnout will assist in informing future interventions seeking to improve resilience, decrease the prevalence of burnout, improve job engagement, and address critical care climate concerns unique to this population and their environment.

Figure 4. Hypotheses of the Relationships between Day vs. Night Shift Work, Resilience, the Critical Care Climate and Burnout

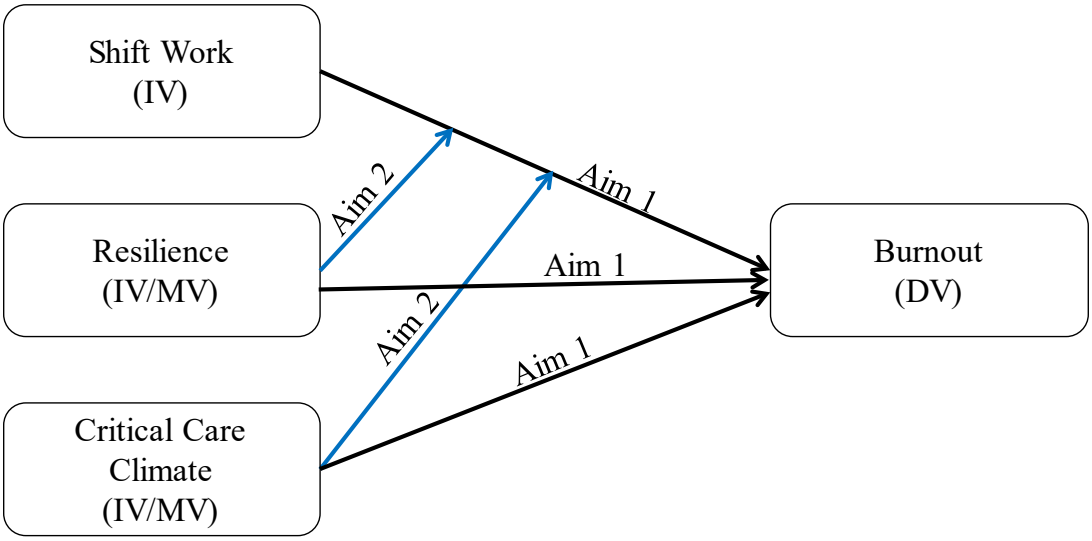


Figure 4. In Aim 1 we tested the unique relationships with the IVs on burnout. In Aim 2 we explored whether individual resilience and the critical care climate moderate the relationship between shift work and burnout.

Innovation

The proposed cross-sectional study was innovative in several ways. We challenged current thinking about protective factors that moderate burnout in ICU nurses by adding interactions in the analysis of day vs. night shift work, resilience, and the critical care environment (MacCallum & Austin, 2000; Munro, 2005). We delineated key protective factors and predictor variables by examining their relative importance (strength) on burnout. Additionally, as far as we know, we are the first to test the moderating effects of protective factors between shifts in ICU nurses (Cheung & Lau, 2008; Tahghighi et al., 2017). By testing the combined interactions of protective factors, we determine whether the revised protective factors framework works equally well for explaining the data in each shift (Munro, 2005).

Methods

Research Design

A cross-sectional research design was used to explore the aims of this study focused on examining the relationships among the variables of interest. The cross-sectional design allowed us to identify diverse nurses' exposure to variables affecting individual resilience. Our overall data collection method involved recruiting a random sample of critical care nurses from the Oregon State Board of Nursing registry, and administering an online survey. Descriptive statistics were used to evaluate the study aims.

Setting and Study Population

In 2017, there were 41,105 active-practicing registered and 51,926 total registered nurses in the state of Oregon (Oregon Center for Nursing [OCN], 2017). The majority (88.5%) of Oregon nurses are White compared to the national population (78.5%) and work in the hospital setting (55%; OCN, 2017). Nurses reporting that they work in a critical care setting accounted for 10.7% (*n*=4,400) of the practicing Oregon nurse workforce (OCN, 2017).

Data suggest that employers rely on travel nurses and new graduates to fill some vacant positions because employers in rural Oregon face difficulties recruiting, hiring, and retaining highly specialized nurses (OCN, 2017). These tactics assist in stabilizing the nursing workforce in larger metropolitan hospitals, but rural communities across the state continue to face shortages, failing to fill current nurse vacancies (Oregon Office of Rural Health [ORH], 2017). In Oregon, 34.9% of the population lives in rural and frontier communities (ORH, 2017). Rural communities are any geographic area that is 10 or more

miles from a greater population of at least 40,000 people; frontier counties are those with six or fewer people per square mile (ORH, 2017). Ten out of 36 counties (27.7%) are considered frontier in Oregon, and the most common nurse retention challenges cited by employers included practice sustainability, workforce shortages, housing, and behavioral health services (ORH, 2017). There are significant gaps in access to behavioral health and addiction services, and a lack of funding for the necessary staff needed to sustain them (ORH, 2017).

Employers reported that critical/intensive care nurses were the one of the most difficult positions to fill. Contract labor, which was used in more than 90% of hospitals, is a tactic that assists in stabilizing the nursing workforce in larger metropolitan hospitals but rural communities across the state face shortages, failing to fill current vacancies of critical care nurses, despite a stable national workforce (OCN, 2017).

Increasing this study's sample to include hospitals that treat citizens of rural and frontier is a foundation for continued research in sustaining rural critical care staff. When communities are often dependent on agency and traveling staff, that can have a detrimental impact on the resilience and morale of permanent staff due to better shifts and pay for travelers (ORH, 2017). Publishing on the attributes that sustain the resilience of nurses who work in the rural setting and foster a healthier critical care climate, will serve as a foundation for interventions in vulnerable areas like rural and frontier communities.

Sampling Method

To obtain a robust sample of ICU nurses, we included both day (7am-7pm) and night (7 pm-7am) shift nurses. Nurses with at least one year of licensed experience in ICU were recruited. Newly graduated nurses or recently hired nurses have stressors

specific to their cohort, so they were excluded from this sample (Chesak et al., 2015). All ICU nurses currently providing direct patient care within the ICU in Oregon were invited to participate in the survey. Inclusion and exclusion criteria follow:

To be eligible, screened participants were asked to answer "yes" to three questions:

1) Are you a Registered Nurse?

2) Are you currently providing direct patient care in a critical care practice setting?

3) Have you been a nurse providing direct patient care for more than 1 year?

Sample Size

The number of subjects needed was assessed in relation to the number of variables being measured where power is influenced by both sample size and misspecification errors in the regression analysis (Munro, 2005). The ability to generalize from the nurse sample to the nurse population increases with a larger sample size (Munro, 2005). Based on the MacCallum et al. (2000) method, power tables with varying degrees of freedom provided support for a minimum sample size of 250 to yield a power of .80 (with the model having three independent variables [IVs]). It was our goal to recruit at least 100 nurses from each shift to test the primary hypotheses. All nurses meeting the inclusion criteria were invited to participate in the survey. It was necessary to invite 12,000 nurses to participate (assuming a historical response rate of 8-35% and a critical care population of 10%) to achieve a sample of 250 subjects.

Recruitment Procedure

Through an open-records request, Oregon nurse email addresses were purchased from the Oregon Board of Nursing for $70. In total, there were 47,510 email addresses available from the Oregon Board of Nursing. After Internal Review Board (IRB) approval, nurses were recruited, and data were collected between February and May 2020. Because the recruitment occurred during the COVID-19 pandemic, a decision was made to continue recruitment and gather insight on the impact of the physical and psychological toll of the pandemic on ICU nurses. Hence, the recruitment strategy was repeated until the email list was completely used. Process:

1. In the first phase from the 47,510 email addresses available, 6,000 nurses were invited to participate. The first group was sent an automated email from calabro@ohsu.edu via REDCap® with the subject "Recruiting Critical Care Nurses for Research Survey," the body of the email message contained the recruitment message. A reminder email was sent 3 days after the initial email.
2. Two weeks after beginning recruitment, the next phase commenced, and a second wave of recruitment messages were sent to a different sample of 10,000 nurses. A reminder email was sent 3 days later. After 2 weeks, the next 10,000 nurses were invited to participate. We followed this process until the email list was exhausted, in the second week of May.

An eConsent was embedded within the email message to assess whether respondents were interested in completing the survey and meet the. eligibility criteria. The consenting process described the study time commitment (~ 20 minutes), goals, risks, and benefits. Participants were not able to continue on to the survey without

electronically consenting first (see *Appendices A* and *B* for complete proofs of the recruitment letter and eConsent).

A $5 Amazon eGift card incentive was offered to the first 200 participants who completed the survey. Because we achieved a greater response rate than predicted; and believed that all participants should be paid for their time, everyone who completed the survey had the option for the Amazon eGift card compensation. Instructions about how to redeem the incentive were provided after participants exited the survey. Participants received a 'Thank you' message for contributing to the study. Participants could elect to skip questions or stop the survey at any time. Participant emails were not connected with their survey results, and final surveys were de-identified to ensure privacy of participants. A total of 841 eGift cards were sent to participants who provided their email requesting compensation, for a total of $4205 awarded funds.

REDCap® Features

Research Electronic Data Capture® (REDCap®) is designed for collecting research data and is a secure web application that is protected by firewalls and backed up through off-site storage (Oregon Clinical & Translational Research Institute [OCTRI], 2019). REDCap® provides centralized data collection, autonomy, and ownership by the research team, audit trails to track user activity, and tools to de-identify and protect participant's personal information (OCTRI, 2019). Surveys are user-friendly and accessible through web, tablet, or smart-phones. Also, *Automated Survey Invitations* (ASIs) through REDCap® enables bulk e-mails through random selection to be sent at a rate of 500 invitations per hour. Only the principal investigators (Emily Calabro and Lissi Hansen) had access to audit functions (OCTRI, 2019). Participant emails were de-

identified when data were exported to statistical software.

Measurement

The variables in the study included demographic and descriptive characteristics (based on previous data that has shown statistically significant results among nurses), individual resilience factors, critical care climate characteristics, and the psychological factor of burnout (Charney, 2004; Foureur et al., 2013; McDonald et al., 2012; Mealer et al., 2017; Mealer et al., 2012). The demographic and descriptive characteristics are located in *Appendix C*. An open-ended question was available for respondents to add any additional thoughts or experiences about their work environment, resilience, personal well-being, or burnout. To address our aims, individual resilience and critical care climate variables were tested as IVs against work shift and the dependent variable (DV), burnout, to tease out the strength and association these variables have with burnout.

Internal and External Validity and Control for Error and Bias

To address concerns with internal and external validity and control for error and bias, the research team had several strategies for enhancing precision and accuracy. First, we standardized the measurement methods, included operational definitions in the IRB application and had an automated self-response questionnaire. This assisted in minimizing random error and increasing the precision of the measurement tools (Hulley et al., 2007). Second, because confidentiality was protected, investigator-observer variability was greatly reduced (Hulley et al., 2007). Because ICU nurses may have strong personal feelings or opinions related to their climate, details related to the specifics of the study were not included in the recruitment message to decrease the chance of selection bias. Third, to lessen the random error caused by subject variability, recruitment

consisted of ICU nurses within the state of Oregon who met the inclusion criteria, rather than recruiting from a convenience sample of one or two ICUs. By using reliable and valid measurement instruments, standardizing the survey through REDCap®, automating the recruitment process, and providing participant privacy we anticipated a rigorously precise and accurate research study (Hulley et al., 2007).

Scales/Measures

Reference *Table 2* for the internal consistency reliability, the approximate time burden, and acronym for each quantitative measure.

Individual Resilience Measure (IV)

Connor-Davidson Resiliency Scale (CD-RISC)

This is the most extensively used resilience measure, and it has been validated in several U.S. and international nursing populations (Baek et al., 2010; Hegney et al., 2015; Rushton et al., 2015). The 25-item scale contains a 6-point response scale ranging from *strongly disagree* to *strongly agree* with higher scores representing greater resilience (Connor & Davidson, 2003). The CD-RISC total score ranges from 0-100, with a median score of 82 in the general population (*n*= 577; Connor & Davidson, 2003). Divided into quartiles, the least resilient (lowest 25% of the population) has a score between 0-73, with the second, third, and fourth quartiles being 74-82, 83-90, and 91-100 respectively (Connor & Davidson, 2003). Previous researchers have reported mean scores for nurses ranging from 25.9 – 81.8 on the CD-RISC (Davidson, 2018).

Critical Care Climate Measures (IV)

To assess the critical care climate, we relied on the perspectives of the nurses' practice environment, leadership, shared power and decision making, safety culture,

frequency and duration of bullying, and transformative exchanges. We used the following two measures to capture factors within the critical care climate: Practice Environment Scale of the Nursing Work Index Revised and the Negative Acts Questionnaire-Revised.

Practice Environment Scale of the Nursing Work Index (PES-NWI)

The PES-NWI was used to assess nurses' perception of the critical care climate. This scale has been endorsed by organizations promoting quality in the workplace and job satisfaction for nurses (Aiken & Patrician, 2000). The 31-item measure addresses three facility-level phenomena: nurse manager ability, leadership, and support; staffing and resource adequacy; and collegial nurse-physician relationships (Aiken & Patrician, 2000; Lake, 2002; Vahey, Aiken et al., 2004; Warshawsky & Havens, 2011). Response options range from *strongly agree* (4) to *strongly disagree* (1) on a 4-point Likert-type scale, with lower scores representing workplace items that are most deficient (Aiken & Patrician, 2000; Lake, 2002; Vahey et al., 2004; Warshawsky & Havens, 2011). Stratifying the subscales allows for the ability to examine facility-level phenomena separately or examine the organization as a whole (Aiken & Patrician, 2000).

Negative Acts Questionnaire- Revised (NAQ-R)

The NAQ-R is designed to measure exposure to bullying in the workplace (Einarsen et al., 2009; Nam et al., 2010). Workplace bullying refers to psychological or aggressive behaviors that occur at work with the effect of humiliating, intimidating, frightening, or punishing the target (Einarsen et al., 2009). The measure emphasizes the frequency and duration of escalating hostile workplace relationships (Einarsen et al., 2009). The 22-item measure contains a 5-point Likert-type scale of frequency of

exposure to bullying behaviors that ranges from *never* (1) to *every day* (5) where higher scores indicate higher levels of exposure to workplace bullying (Einarsen et al., 2009).

Psychological Measure (DV)

Maslach Burnout Inventory (MBI)

The MBI examines three domains of burnout: emotional exhaustion (7 items), depersonalization (7 items), and lack of personal accomplishment (8 items; Maslach, Jackson, & Leiter, 1996). This scale includes 22-items in three subscales that are written in the form of personal statements (e.g. "I feel…"; Maslach et al., 1996). The survey uses a 7-point scale ranging from *never* to *every day* where higher scores indicate higher levels of burnout (Maslach et al., 1996). During the analysis phase, burnout is analyzed as total burnout and also stratified into three domains. Stratifying the domains allows for the ability to examine each domain separately and assess whether there is support for the burnout phenomenon where multiple burnout profiles correlate with organization characteristics (Leiter & Maslach, 2016, 2003). For example, emotional exhaustion and depersonalization may arise from work overload and interpersonal conflict whereas the lack of personal accomplishment emerges from perceived insufficient resources (e.g., time, staff; Maslach et al., 2003; 2016).

Optional Open-Ended Response

Participants were given an opportunity at the end of the survey to share any experience, insight, or story they wished to provide. These data were meant to enrich the survey experience and were not a requirement for the completion of the survey. The text populating the survey read:

This study is focusing on the protective factors of individual resilience and the critical care climate, and its impact on burnout among ICU day vs. night shift workers. We define resilience as the human ability to adapt in the event of trauma, adversity, or stress. Reflecting upon the critical care climate or your work environment, consider all your feelings and experiences.

What has been most difficult in your work environment and been a factor in causing you burnout? What has been most helpful in sustaining your resilience or personal well-being at work? Do you have any recommendations on how the critical care environment can help sustain nurse resilience or prevent burnout?

Please describe your thoughts, perceptions, protective factors that you believe make you a resilient nurse. Specific examples of points you are making are extremely valuable. If being resilient or burnout has impacted your professional nursing practice, please describe the impact. If being resilient or burnout has impacted your personal life/ relationships, please describe the impact.

All responses are optional and confidential.

Table 1
Measurement Scales, Cronbach alpha, and Time Burden

Measure	Variable	Acronym	Cronbach coefficient α	Time Burden	Number of Items
Connor-Davidson Resiliency Scale	Resilience (IV)	CD-RISC	.89	6 min	25
Practice Environment Scale of the Nursing Work Index Revised	Critical Care Climate (IV)	PES-NWI	.96	7-10 min	31
Negative Acts Questionnaire-Revised	Bullying (IV)	NAQ-R	.90	5 min	22
Maslach Burnout Inventory	Burnout (DV)	MBI	.80	5 min	22
Total				~ 25 min	115

Note. There were 13 demographic questions that could be answered in approximately 1 minute. See *Appendix E for* the demographic questionnaire.

Data Analysis

We cleaned the data and generated descriptive statistics. The amount and patterns of missing data, if any, were characterized. We conducted a sensitivity analysis comparing questionnaires with all questions answered and those missing some responses to see if there was evidence of significant differences between the two samples. If no difference, we used the non-missing sample for the analysis. Bivariate analyses were also conducted to examine the association among protective factors and burnout to check for multicollinearity issues. For all statistical analyses, we used the standard two-sided level of .05 for significance (Munro, 2005). Analyses were carried out using STATA statistical software.

Aim 1. Quantify the unique associations between day vs. night shift work, individual resilience, and the critical care climate on the outcome of burnout after controlling for other potential confounders.

Hypothesis. *Day vs. night shift work and protective factors of individual resilience and the critical care climate will account for significant variance in the DV.*

To address **Aim 1,** we sought to quantify the unique associations between day vs. night shift work, individual resilience, and the critical care climate on the outcome of burnout after controlling for other potential confounders. We controlled for standard demographic, nursing, and workplace characteristics because they have previously shown independent relationships with burnout in nurses (Dall'Ora et al., 2015). We tested the **hypothesis** that day vs. night shift work and protective factors of individual resilience and the critical care climate account for significant variance in the DV. We fit a multiple linear regression model with resilience, critical care climate, and day vs. night shift work as IVs and burnout as the DV. Combining resilience, the critical care climate, and day vs. night shift work variables produced optimal predictions of burnout to examine the relative importance (strength) of each variable's influence on burnout.

We regressed the DV of burnout on the IVs using multiple linear regression equation: $\hat{Y} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_i X_i + \varepsilon$. $\hat{Y}$ = one continuous DV of burnout, α = intercept (e.g. the predicted value of Y when $X_1 = 0$), ε = error term, $\beta_{1\text{-}3}$ = slope coefficient for each IV. With multiple linear regression we sought to answer whether the IVs explain a statistically significant amount of variance in the DV.

For all statistical analyses, a *p*-value of less than .05 represented a statistically significant relationship (Munro, 2005). Baseline covariates (e.g., years of working as an

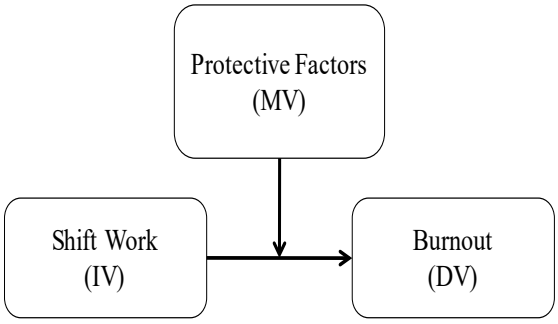
ICU nurse, education, gender, age) were added to the regression model to increase the precision of estimates and adjust for any potential confounders. The regression coefficient of the day vs. night shift work variable provided an estimate of the effect size, the direction of the association of day vs. night shift work, and protective factors (Munro, 2005). Variance inflation factor (VIF) testing was performed to assess for multicollinearity in the model (Munro, 2005). Histograms were analyzed for normal distribution and regression residuals for heteroscedasticity (Munro, 2005). Outliers were checked for each variable and scatterplots were examined between each IV and the DV to look for bivariate outliers and whether there was linear association.

Aim 2. Explore the extent to which protective factors (individual nurse resilience and critical care climate) moderates the effects of burnout between day vs. night nurses when controlling for demographic characteristics

Hypothesis. *The effects of day vs. night shift work on burnout are moderated by the level of resilience that a nurse has and their perceptions of the critical care climate.*

Figure 5. Protective Factors Moderating the Relationship Between Day and Night Shift Work on Burnout

Note. A path diagram in which the protective factors of resilience and critical care climate moderate burnout on day and night shift work.

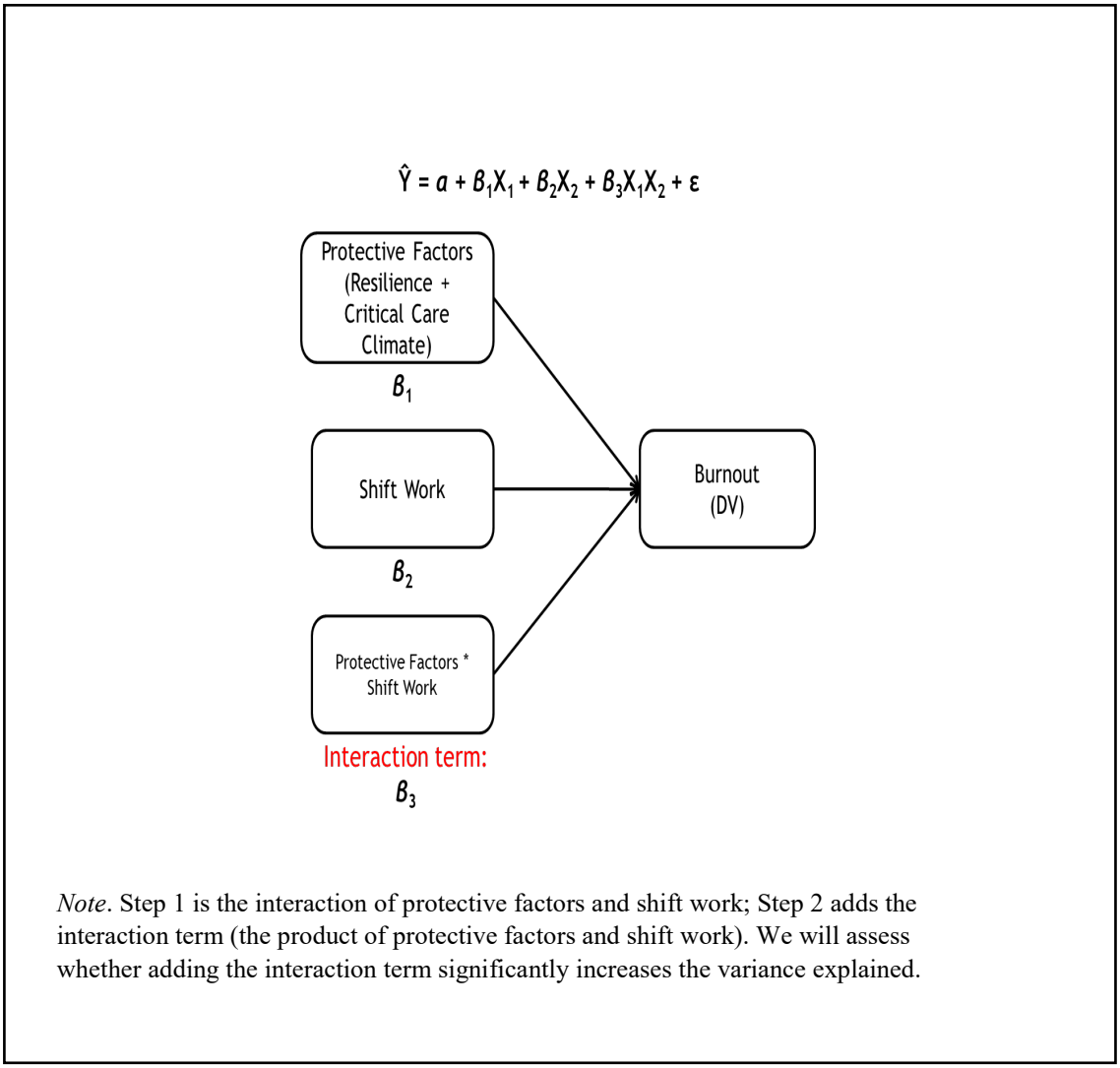


To address **Aim 2**, the moderating role of resilience and the critical care climate between day and night shift work on burnout were tested through hierarchical regression in STATA. As represented in *Figure 5*, the hypothesis posits that these protective factors will moderate day and night shift work on burnout (Charney, 2004; Mealer et al., 2017;

Rodriguez-Rey et al., 2017; Shamia et al., 2015; Tedeschi & Calhoun, 1996; Zerach & Shalev, 2015). Previously, resilience has acted as a mitigator when scores reach the upper 25th percentile (Lee et al., 2014). With hierarchical regression, we have the opportunity to evaluate whether the model fits equivalently in night vs. day shift ICU nurses or if there is a difference.

We used the statistical equation $\hat{Y} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 + \varepsilon$ to test for moderation. Step 1 is the main effects model ($\beta_1 X_1 + \beta_2 X_2$) and the interaction ($\beta_3 X_1 X_2$) was added in Step 2. The final model is represented in *Figure 6.* Significant increases in explained variance and interpretable coefficients support a moderating effect. Looking at the strength, direction, and significance of the moderation between groups is what increases our understanding of how and where to intervene in resilience interventions and adjust our theoretical resiliency framework.

Figure 6. Statistical Model for Protective Factors Moderating the Relationship Between Day vs. Night Shift Work and Burnout



Note. Step 1 is the interaction of protective factors and shift work; Step 2 adds the interaction term (the product of protective factors and shift work). We will assess whether adding the interaction term significantly increases the variance explained.

Anticipated Difficulties and Alternative Strategies

Obtaining the estimated sample size was initially anticipated to be challenging. Previously reported response rates in the nursing literature range from 35% for mailed surveys (Mealer et al., 2012) to over 80% for online surveys (Adams et al., 2010; Duchemin et al., 2015; Klatt et al., 2015). Obtaining a sample of 200 nurses would necessitate a response of ~35% for 6000 nurses (assuming ~10% are currently practicing

in the critical care setting). Because our recruitment fell during the first wave of COVID-19, we elected to capture a larger sample size by using the entire email list and making recruitment available to all nurses who fit the criteria and were willing to participate.

Human Subjects Considerations

Ethical approval was obtained from the IRB at OHSU on February 12, 2020, prior to the start of the study, which was identified as Minimal Risk. We collected and managed the data using REDCap® tools hosted at OHSU from February-May, 2020. RedCAP® was set to automatically assign subject identification numbers, ensuring the data were de-identified prior to analysis. Informed consent was obtained from each participant upon initiation of the online survey, and all data were secured using the institution's policy for quantitative data collection procedures. Once data were imported into the statistical software, identifying information was removed (participant emails/associated unique ID were de-identified) so that no survey results were tied to an individual participant.

Data and Burden

Participants were notified in the recruitment statement that their email addresses had been obtained from the Oregon State Board of Registered Nurses for research purposes only. If subjects declined to enroll or were determined ineligible for this study during the screening, their email contact information was destroyed as soon as the screening process was concluded. Individual results of this study were not shared with participants. Study data were not banked. Once data cleaning was complete, a data set that excluded all identifiers (e.g., email) was exported, and the project was deleted from REDCap®.

We planned to collect demographic data, so disaggregated data by gender was reported as a flow sheet for reviewers per National Institutes of Health's guidelines for sex as a biological variable. However, in the spirit of OHSU's inclusive environment, the option for gender identity ensured that participants could select their own internal sense and personal experience of gender outside the options of male and female (i.e., bigender).

We recognized the risk related to incidental findings of burnout. Although there is a low risk of psychological distress, this line of inquiry is safer to the nurse due to the higher level of confidentiality; participants were at little to no risk for organizational retaliation, bullying, or litigation (Council for International Organizations for Medical Sciences, 2017). We created questions carefully and eliminated overlapping items to minimize subject burden. The risk of psychological discomfort due to requests for information about work environments, resilience, and burnout during the questionnaire was present, however, low. Should this discomfort occur, it could impose minimal to mild psychological distress.

Payment to Participants

After completion of the survey, participants were given the option to provide an email address to receive an Amazon eGift Card as compensation. Participants were not required to submit their emails but of those who opted for compensation, identifying information was removed so no survey results were tied to an individual participant.

Risks to Participants

The physical risks were minimal. Participants may have become fatigued or distressed by certain survey questions. They could choose to skip any questions (except the eConsent and the three eligibility items). Participants could postpone survey

completion and resume at another time. There was minimal risk to loss of confidentiality if a participant provided identifying information in their free-text response to the open-ended question. If a participant did provide information that could potentially be identifying of the participant, their employer, or their patient, the identifying information was de-identified by the study team to prevent any potential identifiers from being disclosed. Participant emails were deleted from completed surveys so that no individual could be connected/identified with any single-survey. There were no financial or legal risks related to participating in this study. The alternative was to not participate. Participation was voluntary, and participants could withdraw at any time without giving reason and without penalty. Breach of confidentiality was a possible, minimal risk.

Future Implications

Findings from this study could advise future nurse resilience programs with focus given to the unique needs of different shifts in the ICU. Future researchers should address nurses located outside of Oregon, as this sample may not be generalizable to the United States nurse workforce. Including hospitals and clinics that treat rural and frontier counties presents a foundation for continued research in sustaining critical care staff in vulnerable populations where staff shortages are common. This research includes the exploration of supportive measures for ICU nurses such as healthier critical care climates, engagement in mentorship and teamwork to influence resilience, and the use of a conceptual framework that guides the complex processes of protective factors aimed at the extenuation of job burnout (Kavalieratos et al., 2017; Mealer et al., 2017).

Chapter Four

Results

This chapter presents results and describes the research aims and hypothesized relationships. All data analysis procedures, the type of statistics used, and the rationale for the choice of analysis are described below.

Data Analysis

Surveys were emailed to 47,510 Oregon-licensed registered nurses from February to May 2020. Nine-hundred and seventy-five participants completed the CD-RISC, 920 completed the PES, and 903 finished the NAQ-R. The final non-missing sample resulted in a total of 893 responses, for a response rate of 20% (10% of the nurses in the mailing list were expected to be critical care nurses). The 893 responses were sufficient to power our analysis. Data were cleaned in Microsoft Excel and descriptive statistics were generated in Stata version 14.2 statistical software in June 2020. Bivariate analyses were conducted to examine the association among protective factors and burnout to check for multicollinearity issues. For all statistical analyses, we used the standard two-sided level of .05 for significance (Munro, 2005).

To address **Aim 1,** we quantified the unique bivariate associations between day vs. night shift work, individual resilience, and the critical care climate on the outcome of burnout after controlling for other potential confounders. We controlled for demographic, nursing, and workplace characteristics as covariates because they have previously shown independent relationships with burnout in nurses (Dall' Ora et al., 2015). We tested the **hypothesis** that day vs. night shift work and protective factors of individual resilience and the critical care climate accounted for significant variance in the dependent variable (DV), and protective factors had a medium or large effect on burnout. We fit a multiple linear regression model with resilience, critical care climate, and day vs. night shift work

as independent variables (IVs) and burnout as the DV. When combining resilience, the critical care climate, and day vs. night shift work variables we produced optimal predictions of burnout and examined the relative importance (strength) of each effect in determining burnout.

We regressed each of the burnout subscales on the IVs using multiple linear regression equation: $\hat{Y} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_i X_i + \varepsilon$. $\hat{Y}$ = one continuous DV of burnout, α = intercept (e.g. the predicted value of Y when $X_1 = 0$), ε = error term, $\beta_{1\text{-}3}$ = slope coefficient for each IV. With multiple linear regression, we sought to answer whether the IVs explained a statistically significant amount of variance in the DV.

Baseline covariates (e.g., years of working as an ICU nurse, education, gender, age) were added to the regression model to increase the precision of estimates and adjust for any potential confounders. The regression coefficient of the day vs. night shift work variable provided an estimate of the effect size and the direction of the association of day vs. night shift work and protective factors (Munro, 2005). Variance inflation factor (VIF) testing was performed to assess for multicollinearity in the model (Munro, 2005). Histograms were analyzed for normal distribution and regression residuals for heteroscedasticity (Munro, 2005). Outliers were checked for each variable and scatterplots were examined between each IV and DV to look for bivariate outliers and whether there was any linear association.

To address **Aim 2**, the moderating role of resilience and the critical care climate between day vs. night shift work and burnout were tested through hierarchical regression in Stata. **Hypothesis 2** posits that these protective factors would moderate day vs. night shift work on burnout (Charney, 2004; Mealer et al., 2017; Rodriguez-Rey et al., 2017;

Shamia et al., 2015; Tedeschi & Calhoun, 1996; Zerach & Shalev, 2015). Previously, resilience has acted as a moderator when scores reach the upper 25th percentile (Arrogante & Aparicio-Zaldivar, 2017; Lee et al. 2014; Lim & Mi, 2019). With hierarchical regression, we had the opportunity to evaluate whether the model fit equivalently in day vs. night shift ICU nurses or if there was a difference.

We used the statistical equation $\hat{Y} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 + \varepsilon$ to test for moderation. Step 1 included the main effects model ($\beta_1 X_1 + \beta_2 X_2$) and interaction ($\beta_3 X_1 X_{2)}$ was added in Step 2. Significant increases in explained variance and interpretable coefficients would support a moderating effect. Looking at the strength, direction, and significance of the moderation between domains of burnout increases understanding of how and where to provide resilience interventions and adjust the theoretical resiliency framework.

Results

Participants

Descriptive Nurse Characteristics

The ages of sample participants ranged from 19 to over 70 with the majority (53%) of the sample between the ages of 26-40. Eighty-three percent were female, 72% held a bachelor's degree, 90% self-reported as White. More than one-fourth (27%) of the participants worked in Rural and Frontier counties, 69% worked in an Urban geographical location, and 11% worked in a major metropolitan area. The majority worked as staff nurses (86%), worked during the week and weekend (70%), and worked full-time (76%). Day-shift nurses accounted for 60% of the participants (*n*=535), night-shift 36% (*n*=322), and rotating and evening shift nurses 19% (*n*=169). Despite the

disproportionate number of day shift nurses to night and rotating shift nurses, our sample was large enough to sufficiently power our analysis. Twenty-one percent of the nurse participants had practiced for over 20 years with the majority (57%) falling in the 5-20-year range. Changes to the descriptive and demographic results were made to allow for statistical analysis and interpretation. Re-categorization was generated for the following demographic variables: gender, race, geographical location, work type, work status, and shift.

For shift selection, nurses were given the option to select all that applied for day, evening, nights, or rotating shifts. There were 103 nurses who made multiple selections; 535 responded that they worked day shift, 131 worked evening shift, 322 worked night shift, and 38 worked rotating shift. Nurses were re-categorized into the night shift category if they worked any night shift combination (e.g., night shift only; night-day shift combination; night-day-rotating shift combination). Nurses were re-categorized into the day shift category if they worked only day shift or the day and evening shift combination. After re-categorization, there were 544 day shift nurses and 349 night shift nurses. A sensitivity analysis was conducted to compare surveys that were re-categorized with surveys where all 103 multiple selections were removed to assess if there was evidence of significant differences between the two samples, and no differences were noted.

For the variable of geographical location, nurses were given the option to select all geographical locations that they served. There were 47 nurses who selected multiple locations. Frontier and rural nurses were combined into the smaller geographical group and urban and metropolitan nurses were combined into the larger geographical group. Nurses selecting any combination of urban or metropolitan geographical location were

re-categorized into the larger geographical group (e.g., rural-urban, metro-frontier). A sensitivity analysis was conducted to compare surveys that were re-categorized with surveys where all 47 multiple selections were removed to assess if there was evidence of significant differences between the two samples, and no differences were noted. Re-categorizations regarding gender, race, work type, and work status, are presented in *Appendix F*. All demographic characteristics of the sample are described in *Appendix G*.

Protective Factors, the Critical Care Climate, and Burnout

In this sample, average resilience scores, as measured by the Connor-Davidson Resilience Scale (CD-RISC), were 76.13 ± 10.69. In the critical care climate, the average quality of the work environment scores, as measured by the Practice Environment Scale-Nurse Work Index (PES-NWI), was 59.14 ± 15.08, and average bullying scores, as measured by the Negative Acts Questionnaire-Revised (NAQ-R), were 33.11 ± 11.67. Cronbach's alphas were α=.88 for the CD-RISC, α=.92 for the PES-NWI, and α=.90 for the NAQ-R. There were fairly high standard deviations around each of the means, indicating high variability in resilience, critical care climate characteristics, and bullying in these participants. Eight percent of the participants scored highly resilient.

The DV, burnout, as measured by the Maslach Burnout Inventory (MBI), was stratified into three domains: emotional exhaustion, personal accomplishment, and depersonalization. The average scores for emotional exhaustion, reduced personal accomplishment (reverse coded), and depersonalization were 2.5 ± 1.3, 4.74 ± 0.83, and 1.8 ± 1.35, respectively. Cronbach's alphas were α=.92 for emotional exhaustion, α=.75 for personal accomplishment, α=.81 for depersonalization, and α=.91 for the total inventory. As noted earlier, the scores for personal accomplishment were reversed, so

that high scores reflected high inefficacy. Among these participants, 28.2% (*n*=253) tested high for emotional exhaustion, 47.8% (*n*=428) high for reduced personal accomplishment, and 12.6% (*n*=113) high for depersonalization. Of the 896 nurse participants, 58.4% (*n*=523) had at least one symptom of burnout. Bullying, as defined by the NAQ-R, was calculated when individuals had experienced at least two negative acts, weekly or more often, for 6 or more months in situations where they found it difficult to defend against and stop abuse, which occurred in 35% (*n*=314) of the nurse participants.

Histograms were normally distributed when we analyzed regression residuals for heteroskedasticity. Variance inflation factor (VIF) testing was performed to assess for multicollinearity in the variables. The resulting mean VIF was 1.91, indicating a very low risk for multicollinearity.

Aim 1: Results

Aim 1: Quantify the unique associations between day vs. night shift work, individual resilience, and the critical care climate on the outcome of burnout after controlling for potential confounders.

Hypothesis 1*: Day vs. night shift work and protective factors of individual resilience and the critical care climate account for significant variance in the dependent variable.*

Using hierarchical regression analysis, we quantified the unique bivariate associations between day vs. night shift work, resilience, and the critical care climate on burnout. As represented in *Appendices H-J,* total burnout, as well as each domain of burnout (emotional exhaustion, reduced personal accomplishment, and depersonalization), were analyzed against the independent variables while controlling for

potential confounders. Age, gender, race, self-identifying as Hispanic, educational degree, geographical location, work type (e.g. staff nurse, educator, manager), work status (i.e., full-time, part-time, per-diem), shift (day and night), years practiced, and years practiced in their current position were used in Model 1.

Total Burnout

Nurses' shift and other demographic characteristics explained 5.9% of the variance in total burnout. After adding resilience, critical care climate characteristics, and bullying in Model 2, 30.7% of the proportion of variance in total burnout was explained, a significant increase of 24.8% ($R^2\Delta = 0.248$, $F= 43.38$ (7, 849), $p< .0001$). The additional variance (24.8%) in protective factors on burnout was statistically significant above and beyond the variance explained by the nurse demographic characteristics, supporting *hypothesis 1*.

In this first model, a perceived deficient critical care climate was associated with high levels of burnout (β= 0.124 ± 0.034, $t= 3.62$, $p< .0001$). Additionally, increased exposure to workplace bullying was also associated with high levels of total burnout in nurses and was the number one direct contributor to predicting burnout in nurses (β=0.57 ± 0.045, $t= 12.5$, $p< .0001$; F [1, 843], p<.0001, η_p^2=.159). Within the critical care climate, poor relationships with direct managers were correlated to higher levels of feeling depleted and alienated at work (β= -.46 ± 0.20, $t= -2.26$, $p< .05$). Further, staff and resource inadequacies were also correlated to feelings of strain and exhaustion (β= .96 ± 0.22, $t= 4.27$, $p< .0001$). Every year working as a nurse significantly reduced the risk of total burnout in the workplace (β= -7.4 ± 2.35, $t= -3.15$, $p<.005$). Nurses who did not self-identify as Hispanic reported significantly less burnout compared to those who

did (β= -5.02 ± 2.01, *t*= -2049, *p*< .05). Nurses who felt supported by their managers, perceived adequate resources and staffing, and had few or no exposure to bullying, were far less likely to have symptoms of job burnout.

Emotional Exhaustion

Nurses' shift and other demographic characteristics explained 6.1% of the variance in emotional exhaustion. After adding resilience, critical care climate characteristics, and bullying in Model 2, 41.2% of the proportion of variance in emotional exhaustion was explained, a significant increase of 35.1% ($R^2\Delta$ = 0.351, *F*= 72.4 (7, 849), *p*< .0001). The additional variance (35.1%) in protective factors on emotional exhaustion was statistically significant above and beyond the variance explained by the nurse demographic characteristics, supporting *hypothesis 1*.

In this model, critical care climate perceived to be deficient was associated with high levels of emotional exhaustion (β= 0.015 ± 0.002, *t*= 5.17, *p*< .0001). Additionally, increased exposure to workplace bullying was also associated with high levels of emotional exhaustion in nurses (β= .047± .003, *t*= 13.28, *p*< .0001). Within the critical care climate, staff and resource inadequacies were also correlated to feelings of strain and exhaustion (β= 0.11 ± 0.17, *t*= 6.27, *p*< .0001). Resilience was significantly correlated to decreased levels of emotional exhaustion (β= -0.02 ± 0.003, *t*=-5.61, *p*< .0001).

Female nurses were more likely to experience emotional exhaustion compared to male nurses; older nurses were less at risk (β= 0.29 ± 0.09, *t*=3.06, *p*< .01; β= -0.34 ± 0.18, *t*=-1.95, *p*< .05). Every year working as a nurse significantly reduced the risk of emotional exhaustion in the workplace (β= -.41 ± .18, *t*= -2.26, *p*<.005). Overall, feeling energized at work was experienced among nurses who had adequate resources and

staffing, had few or no exposure to bullying, and were moderate to highly resilient. See *Appendix H* for a complete table of all results in this model.

Reduced Personal Accomplishment

Nurses' shift and other demographic characteristics explained 4.8% of the variance in reduced personal accomplishment. After adding resilience, critical care climate characteristics, and bullying, 23% of the proportion of variance in reduced personal accomplishment was explained by the model, a significant increase of 18.2% ($R^2\Delta = 0.182$, $F= 28.7$ (7, 849), $p< .0001$). The additional variance (18.2%) in protective factors on reduced personal accomplishment was statistically significant above and beyond the variance explained by the demographic characteristics, supporting *hypothesis 1*.

Similar to emotional exhaustion, a deficient critical care climate and increased exposure to workplace bullying were associated with a greater sense of professional inefficacy and low morale ($\beta= -0.007 \pm 0.002$, $t= -3.96$, $p< .0001$; $\beta= -0.006 \pm 0.003$, $t= -2.19$, $p< .05$). Staffing and resource adequacies were found more often by nurses with enhanced feelings of accomplishment ($\beta= -0.03 \pm 0.013$, $t= -2.07$, $p< .05$). Additionally, highly resilient nurses were more likely to report feelings of professional accomplishment, productivity, and high morale ($\beta= 0.027 \pm 0.002$, $t=10.73$, $p< .0001$). Females were found to be at a significantly higher risk for decreased personal accomplishment compared to their male counterparts ($\beta= -0.17 \pm 0.07$, $t= -2.50$, $p< .05$). Working part-time compared to fulltime employment was correlated with feelings of personal accomplishment and higher morale ($\beta= 0.15 \pm 0.075$, $t=2.07$, $p< .05$). See *Appendix I for* a complete table of all results in this model.

Depersonalization

Nurses' shift and other demographic characteristics explained 9.8% of the variance in depersonalization, cynicism, and detachment from the job. After adding resilience, critical care climate characteristics, and bullying, 26.2% of the proportion of variance in depersonalization was explained, a significant increase of 16.4% ($R^2\Delta$ = 0.164, F= 27.01 (7, 849), p< .0001). The additional variance (16.4%) in protective factors on depersonalization was statistically significant above and beyond the variance explained by demographic characteristics, supporting *hypothesis 1*.

As seen in the prior burnout domains, a deficient critical care climate and increased exposure to workplace bullying was associated with greater cynicism and detachment from the job (β= 0.009 ± 0.003, t= 3.04, p<.005; β= 0.04 ± 0.004, t= 9.38, p<.0001). Nurses who perceived management and administration as listening and responding to their concerns were more likely to be engaged in their workplace (β= -0.05 ± 0.018, t= -2.63, p<.005). Preceptor programs, working with clinically competent nurses, and the presence of staff development programs were correlated with decreased depersonalization in the workplace (β= 0.05 ± 0.013, t= 3.86, p<.001). Moreover, resiliency was associated with a decreased risk of depersonalization and detachment (β= -0.01 ± 0.004, t= -2.52, p<.05).

Female nurses and those who were older were likely to have decreased depersonalization in the workplace (β= -0.22 ± 0.1, t= -1.97, p<.05; β= -0.36 ± 0.11, t= -3.14, p<.005). Every year working as a nurse significantly reduced the risk of depersonalization in the workplace (β= -.70 ± .21, t= -3.28, p<.005). Being a part-time

nurse improved the chances of engagement in the workplace compared to nurses who worked fulltime ($\beta = -.28 \pm 0.12$, $t = -2.35$, $p < .05$).

Geographical Location

More than one-fourth (27%) of the participants worked in Rural and Frontier counties, whereas 69% worked in an Urban location, and 11% in a major metropolitan location. Frontier counties are those counties with 6 or fewer people per square mile. Rural counties are those 10 or more miles from a greater population of 40,000 people. Urban communities contain populations less than 1 million people, like Vancouver, WA or Portland, OR. Major metropolitan is a community that has a population greater than 1 million, like Seattle, WA. We found no geographical differences that protected against emotional exhaustion, reduced personal accomplishment, or depersonalization, suggesting that critical care nurses face similar challenges regardless of geographical location.

Aim 2: Protective Factors Moderating the Effects of Shift-Work on Burnout

Aim 2*:* Explore the extent to which protective factors (individual nurse resilience and critical care climate) moderate the effects of burnout between shift nurses when controlling for demographic characteristics.

Hypothesis: *The effects of day vs. night shift work on burnout will be moderated by the level of resilience that a nurse has and their perceptions of the critical care climate.*

To examine the moderating role of protective factors on the relationship between shift-work and burnout, hierarchical regression analysis was performed. Resilience was measured by the CD-RISC and the critical care climate was measured by the PES-NWI. We included the main effects and the interaction in the regression model and again

controlled for demographic characteristics that have previously been shown to influence burnout among nurses. The final models are reported in *Tables 2* and *3.* The interaction between day vs. night shift work and protective factors did not reach statistical significance (Resilience: F= 17.97 (18,887), p<.00001, R^2 = 0.27; ICU Climate: F= 17.95 (18, 868), p<.0001, R^2 = 0.2713).

Table 2.
Resilience Moderating the Effects of Day vs. Night Shift Work on Burnout

Total Burnout *N*=886		β Coeff.	Std. Err.	t	*P*
Shift (Days referent)		-4.45	6.54	-.68	.5
Resilience		-.04	.06	-.62	.53
Shift#Resilience		.05	.09	.55	.58
ICU Climate***		.12	.03	3.6	.000
Bullying***		.56	.04	12.50	.000
Age (≤ 40 years referent)	> 41 but ≤ 60 years	-2.04	1.24	-1.65	.10
	≥ 61 years	-3.63	2.20	-1.65	.10
Gender (Males referent)	Females	.11	1.22	.09	.93
Race (minority groups referent)	Caucasian*	4.30	1.87	2.30	.02
	Other/ Multi-Racial	4.37	2.46	1.78	.08
Work Status (Full-time referent)	Part-time	-2.14	1.31	-1.63	.10
	Per-diem	-3.24	1.95	-1.66	.09
	Travel	3.34	3.06	1.09	.28
	Other	.68	1.90	.36	.72
Total Practice Years (≤ 1 year but <3 years referent)	> 3 years but ≤ 5 years	-2.86	1.90	-1.50	.13
	> 5 years but ≤ 10 years	-2.09	1.68	-1.24	.216
	> 10 years but ≤ 20 years**	-5.11	1.75	-2.93	.004

	> 20 years**	-6.28	2.12	-2.97	.003
_cons***		51.92	10.70	4.85	.000

Note. F= 17.97 (18,887), p<.00001, R^2 = 0.27; N=886. *p<.05. **p<.01. ***p<.001.

Table 3.

Critical Care Climate Moderating the Effects of Day vs. Night Shift Work on Burnout

Total Burnout N=886		β Coeff.	Std. Err.	t	P
Shift (Days referent)		-.86	3.73	-.23	.82
ICU Climate**		.12	.04	2.93	.003
Shift#ICU Climate		-.0009	.06	-.01	.99
Resilience		-.02	.04	-.35	.73
Bullying***		.55	.04	12.47	.000
Age (≤ 40 years ref)	> 41 but ≤ 60 years	-2.05	1.24	-1.65	.10
	≥ 61 years	-3.64	2.20	-1.65	.10
Gender (Males referent)	Females	.11	1.22	.09	.93
Race (minority groups referent)	Caucasian*	4.33	1.87	2.31	.02
	Other/ Multi-Racial	4.43	2.46	1.80	.07
Work Status (Full-time)	Part-time	-2.14	1.32	-1.63	.10
	Per-diem	-3.29	1.95	-1.69	.09
	Travel	3.3	3.06	1.08	.28
	Other	.71	1.89	.38	.71
Total Practice Years (≤ 1 year but <3 years referent)	> 3 years but ≤ 5 years	-2.90	1.91	-1.52	.13
	> 5 years but ≤ 10 years	-2.06	1.68	-1.23	.22

> 10 years but ≤ 20 years **	-5.11	1.75	-2.92	.004
> 20 years **	-6.29	2.12	-2.97	.003
_cons***	46.73	7.11	6.57	.000

Note. F= 17.95 (18, 868), $p<.0001$, $R^2 = 0.2713$; Note. *N*=887. *$p<.05$. **$p<.01$. ***$p<.001$.

We can posit from these hierarchical models of cross-sectional data that protective factors do not moderate the effects of day vs. night shift work on burnout, even among nurses who score highly resilient or work in above average critical care climates. This finding did not support our hypothesis or the results of previous researchers.

Unexpected Findings

When comparing the participants at the beginning of the pandemic (March and April 2020) to nurses after what was believed to be the peak (May), we found significant differences in the levels of burnout. Nurses were more likely to experience higher levels of emotional exhaustion before the peak of the COVID-19 pandemic, with 30.3% testing positive for emotional exhaustion before the peak and 25.8% after (β= 0.11 ± 0.05, *t*=2.13, $p<.05$). There was also a nonsignificant decrease in nurses who experienced depersonalization after the peak, 14.3% compared to 10.5% (β= .10 ± 0.05, *t*=1.81, *p* =.07). Further, nurses reported improved feelings of personal accomplishment in the workplace, 50.9% to 53.7% (β= .06 ± 0.05, *t*=1.13, *p*= .26). Those reporting at least one symptom of burnout decreased from 59% to 57.8%, however, those scoring moderately to highly resilient also decreased from 32.7% to 32%. When comparing the means of individual variables pre and post, exposure to bullying decreased (β= -.05 ± 0.07, *t*=-.011,

p= .42), while sense of purpose (β= .15 ± 0.05, *t*=.29, *p*= .77), a reliance on God (β= -.06 ± 0.05, *t*=-.22, *p*= .82), and the perception of working with clinically competent nurses increased (β=-.03 ± 0.05, *t*=-0.58, *p*= .56). The perception of team work between nurses and physicians was lower (β=-.10 ± 0.06, *t*=-1.88, *p*=0.06), although the difference was nonsignificant.

Chapter Five

Discussion, Summary, and Implications

In this chapter I present an interpretation of the results and discuss the theoretical and clinical contributions and importance of my findings. I examine the relationship between my research findings and previous research that was described in Chapter Two. Full integration between the aims, the conceptual framework model, the methods, results, and discussion are included. Implications of the research, limitations, and future research conclude this chapter.

Intensive Care Unit (ICU) nurses are at the greatest risk for job burnout (Khan et al., 2019) and resilience has been shown to minimize and buffer the impact of the critical care climate on ICU nurses (Arrogante & Aparicio-Zaldivar, 2017; Lim & Mi, 2019). However, focusing exclusively on the resilience of an ICU nurse removes the responsibility of the workplace in providing a healthy work environment that fosters resilience and allows employees to thrive. In a cross-sectional study, we sought to determine what protective factors were associated with burnout among ICU nurses working day and night shift.

Surveys were emailed to 47,510 Oregon licensed registered nurses from February-May 2020 and included: demographic questions, the Connor-Davidson Resilience Scale (CD-RISC), Practice Environment Scale of the Nursing Work Index (PES-NWI), Maslach Burnout Inventory (MBI), Negative Acts Questionnaire-Revised (NAQ-R), and an optional open-ended question. Hierarchical regression modeling was used to address the aims and compare protective factors and burnout among day (n=544) and night (n=349) ICU shift nurses. Overall, 975 of the email surveys were returned for a response rate of 20% (10% of the nurses in the mailing list were critical care nurses), and complete data were available on a total of 893 nurses.

Major Findings

My research was an initial attempt to test hypotheses about multiple internal and external protective factors contributing to or moderating burnout among ICU nurses. This study provides insight into the physical and psychological impact among ICU nurses in the context of COVID-19, as it was embedded in the experiences of the nurse participants.

Burnout

Of our ICU nurse participants, 58% tested high in at least one domain of burnout. One in 3 tested high for emotional exhaustion, and 1 in 2 for reduced personal accomplishment. Female nurses were significantly more likely to experience emotional exhaustion and decreased personal accomplishment compared to male nurses, however, older nurses were significantly less at risk for emotional exhaustion and depersonalization in the workplace. Nurses working part-time were at a significantly lower risk for developing emotional exhaustion, depersonalization, and reduced personal accomplishment. Further, part-time nurses reported lower levels of emotional exhaustion compared to full-time nurses. For every additional year worked, the risk of total burnout decreased significantly for nurses. Those who did not self-identify as Hispanic reported significantly reduced burnout than those who did self-identify as Hispanic.

Individual resilience and the critical care climate accounted for significant variance in burnout. After stratifying burnout into three domains (emotional exhaustion, reduced personal accomplishment, and depersonalization), hierarchical regression analysis was run to test whether protective factors were statistically significant above and beyond the variance explained by nurse demographic characteristics. In all three models,

internal and external protective factors were statistically significant in contributing to (or moderating) burnout.

When examining each burnout domain separately, the resulting proportion of variance and the statistically significant variables differed for each outcome, supporting prior research that the phenomenon of burnout involves multiple burnout profiles that correlate with organization characteristics (Leiter & Maslach, 2016, 2003). For example, emotional exhaustion and depersonalization may arise from work overload and interpersonal conflict whereas the lack of personal accomplishment emerges from perceived insufficient resources (e.g., time, staff) (Maslach et al., 2003, 2016). We had similar findings when stratifying burnout domains and characteristics within the critical care climate.

Resilience

Resilience was significantly correlated with improved levels of emotional exhaustion, depersonalization, and a lack of personal accomplishment, however, only 7.4% of our nurse participants scored “highly resilient”. Two-thirds of our nurse participants scored in the “least resilient” category.

When examining resilience as a moderator of shift work on burnout, we discovered that the effects of day vs. night shift work on burnout were not moderated by the resilience of a nurse or the perception of their critical care climate. This was consistent for both shifts. This finding is important because it reinforces the complexity of burnout and suggests that other protective factors, outside of the organization and self, exist. These unknown protective factors may have a stronger impact on moderating job burnout for ICU nurses.

Critical Care Climate

Within the critical care climate, a lack of preceptor programs, clinically competent nurses, and staff development programs were correlated to higher levels of feeling depleted, fatigued, and emotionally exhausted at work. On the other side of the continuum, feeling energized at work was experienced among nurses who had perceived adequate resources and staffing, had few or no exposure to bullying, and were supported by managers and clear and competent nursing models. Hospitals in which nurses perceived sufficient resources and staffing were correlated with positive attitudes about work.

Day and Night Shift Work

There were no significant differences in how day and night shift nurses processed emotional exhaustion, reduced personal accomplishment, and depersonalization. However, working part-time (compared to fulltime) significantly reduced the risk of depersonalization in the workplace and improved levels of personal accomplishment. Depersonalization is a detachment from the job and has been described as cynicism (Leiter & Maslach, 2016). In the burnout inventory, the 12.6% of nurses who tested high for depersonalization answered that they frequently felt that patients were impersonal objects, had become more callous toward people since taking the job, worried the job was hardening them emotionally, did not really care what happened to some patients, and felt that patients blamed them for some of their problems. Emotional exhaustion has been described as feeling worn out, depleted, and fatigued (Leiter & Maslach, 2016) and almost one-third of our nurse participants tested high for emotional exhaustion. Nurses scoring emotionally exhausted frequently felt used up at the end of the workday, strained

and stressed from working with people all day, frustrated, and that they were working too hard.

Notable Findings

To our knowledge, this is the first study focusing on and comparing internal and external protective factors that moderated burnout among ICU nurses. However, due to the timing of this dissertation study, this is also the first study that investigated burnout during the United States COVID-19 outbreak. Further, we gathered evidence on how bullying and geographical location interacts with the complexity of burnout, aiding in the modification of a theoretical resiliency framework for ICU nurses.

Bullying

Bullying, as defined by the Negative Acts Questionnaire-Revised (NAQ-R), was calculated when individuals experienced at least two negative acts, weekly or more often, for 6 or more months in situations where targets found it difficult to defend against and stop the abuse. Workplace bullying refers to psychological or aggressive behaviors that occur at work with the effect of humiliating, intimidating, frightening, or punishing the target (Einarsen et al., 2009). Bullying was found to occur in 35% (n=314) of our nurse participants. Previous researchers have shown that lateral violence and bullying are found worldwide and nurse prevalence ranges from 1%-87% with victims often considering leaving the nursing profession (Bambi et al., 2019). Nurse managers play a crucial role in preventing bullying (Bambi et al., 2019), but it is not well understood how often bullying occurs between managers and nursing staff. We found that increased exposure to workplace bullying was also associated with high levels of emotional exhaustion, reduced personal accomplishment, and depersonalization in the workplace and was by far the

greatest predictor of total burnout, explaining 15.9% of the total variance of burnout (*F* (1, 843), $p<.0001$, $\eta_p^2=.159$). Overall, bullying was significantly related to each domain of burnout. We believe lessening the exposure to workplace bullying may be an important protective factor in mitigating job burnout that is often overlooked by organizations and researchers.

Geographical Location

More than one-fourth (27%) of the participants worked in Rural and Frontier counties, whereas 69% worked in an Urban location, and 11% in a major metropolitan location. Frontier counties are those counties with 6 or fewer people per square mile. Rural counties are those 10 or more miles from a greater population of 40,000 people. Urban communities contain populations less than 1 million people, like Vancouver, WA or Portland, OR. Major metropolitan is a community that has a population greater than 1 million, like Seattle, WA. We found no geographical differences that protected against emotional exhaustion, reduced personal accomplishment, or depersonalization, suggesting that critical care nurses face similar challenges regardless of geographical location.

COVID-19

Because we collected data from February to May 2020, we were able to compare quantitative responses from two different groups of nurses, one before what was believed to be the peak and one after (February to March and April to May). Nurses were more likely to experience higher levels of emotional exhaustion, depersonalization, and a lack of personal accomplishment before the peak of the COVID-19 pandemic (emotional exhaustion, 40.3% to 25.8%; lack of personal accomplishment, 42.2% to 41%;

depersonalization, 14.3% to 10.5%). After the initial peak of the pandemic, those reporting at least one symptom of burnout decreased from 59% to 57.8%, however, those scoring moderately to highly resilient also decreased from 32.7% to 32%. However, because this was cross sectional data and not longitudinal, any conclusions drawn from this data should be taken carefully. For instance, nurses experiencing high levels of burnout after the first peak may not have participated in the survey, so sampling during COVID may be biased toward the higher functioning. Further, contextual factors surrounding COVID-19 in these nurses should be a foundation for continued research in this area.

Discussion

Burnout

In the literature review in Chapter Two, 25 studies were identified in which ICU nurse burnout was examined. In those studies, burnout was positively correlated with substance abuse, anxiety, depression, PTSD, and suicidal thoughts; and physical ailments like headaches, hypertension, sleep disorders, gastrointestinal problems, and musculoskeletal disorders (Burke et al., 2019). Although we did not measure these psychological and physical symptoms, nurses frequently mentioned indicators in their open-ended responses. These responses will be further analyzed qualitatively after the completion of this dissertation.

Anxiety and depression are often correlated with burnout; in one study 100% of the ICU nurses surveyed (n=27), tested positive for symptoms of anxiety and 77% tested positive for symptoms of depression, emotional exhaustion, and depersonalization (Mealer et al., 2014). In a survey of 744 ICU nurses, 61% were positive for emotional

exhaustion, 44% for depersonalization, and 50% for lack of personal accomplishment (Mealer et al, 2012). Our participants were notably lower; only 28% tested positive for emotional exhaustion, 12.6% for depersonalization, and 47.8% for reduced personal accomplishment. Overall, 58.4% of our subjects had at least one symptom of burnout, drastically lower than the typical 80% that other researchers have reported (Hinderer et al., 2014; Khan et al., 2018; Marcum et al., 2018; Mealer et al., 2012; Rushton, 2015).

It is unclear why our sample tested significantly lower on symptoms of burnout than those in prior studies. One possibility is that the quality of the work environment, state staffing regulations, and strong unions may improve the critical care climate. In a systematic review, Khan et al., (2019) found that the quality of the work environment, the relationships among colleagues, and traumatic and stressful workplace experiences were direct contributors influencing nurses' intent to leave the ICU specialty. In an ICU that had 679 nurses, low burnout was highly correlated to having lower chaos, less stress, and very high teamwork as well as an alignment of core values among administration, leadership, and physicians (LeClaire et al., 2019). In another study (n=29), the highest levels of burnout were associated with workload and conflicts with other health professionals (Cotrău et al., 2019). This is consistent with our findings that the organization (specifically the working relationships with managers), staffing and resource availability, and quality of nursing care were all associated with lower levels of burnout among ICU nurses. This supports a shift from individual responsibility to ameliorate burnout to the responsibility of an organization to find solutions that support nurses' psychological well-being and resilience.

Another possible explanation for our lower burnout scores is the confounding variable of COVID-19. We saw a decrease in burnout levels after what we designated as the first peak, but that timepoint may be miscalculated or skewed. For a more accurate representation of a pre and post burnout level during the pandemic, it would strengthen our study to have burnout measured before any cases of COVID-19 in the United States. If burnout was higher before the first case in Washington, this would explain the lower burnout levels compared to the literature. This would support other recent research findings that nurses working in COVID-19 units experienced significantly less burnout than those who did not work in COVID-19 units (Wu et al., 2020).

Our preliminary findings support the research by Leiter and Maslach (2016), that different burnout profiles correlate with organizational variables. Although we did not have the resources to fully analyze all organizational variables by the completion of this dissertation, by collecting responses related to the organization we can later complete a supplementary latent profile analysis. This could further modify the theoretical framework for protective factors affecting ICU nurse burnout, and advance the science on understanding the complex phenomenon of burnout.

Resilience

Our findings support the literature that highly resilient nurses are independently associated with improved levels of emotional exhaustion, depersonalization, and reduced personal accomplishment (Adams et al., 2010; Arrogante, & Aparicio-Zaldivar, 2017; Foureur et al., 2013; Lim, & Mi, 2019; Mealer et al., 2012), however, resilience alone is not enough to moderate burnout among ICU nurses. A critical finding in our study is that only 66 (7.4%) of our participants tested “highly resilient”; Mealer et al. (2012) reported

similar findings. Of the 744 nurses surveyed in Mealer and colleagues' (2012) national study, 13 (1.7%) tested "highly resilient." Resilience is the human ability to adapt in the event of trauma, adversity, or stress (Southwick et al., 2014), and previous researchers have demonstrated that resilient behaviors can protect against some aspects of job burnout among nurses (Adams et al., 2010; Arrogante, & Aparicio-Zaldivar, 2017; Foureur et al., 2013; Lim, & Mi, 2019; Mealer et al., 2012). However, we found that although58.4% of our sample had at least one symptom of job burnout, 32.4% were moderate to highly resilient. This is an important finding because resilience is often associated with protecting or combating burnout, however, burnout and resilience may not be mutually exclusive but mutually reinforcing- that is a part of resilience might be the self-awareness of knowing when you are burned out. In fact, when re-evaluating the data, almost 12% of participants who tested moderately to highly resilient had at least one symptom of job burnout. The ability to know they are able to leave an unhealthy environment may be a protective factor and a characteristic of resilient ICU nurses.

Khan et al. (2019) found that the nature and quality of working relationships were a direct contributor to sustaining ICU nurses' resilience, with the additional need for autonomy, empowerment, and self-development. If the narrative around resilience in burnout research is shifted to focus on the quality of the work environment, then a reduction of burnout in the workplace would be attainable for more than just the "highly resilient."

Critical Care Climate

The critical care climate is unique in its high exposure to traumatic events compared to other acute care environments. Epp (2012) examined contributors to the

critical care environment and discovered the most damaging to nurses were the high acuity of patients leading to demands for complex care, the need to care for both patient and family, the responsibility to execute final decisions made by physicians and families, and the conflicting role between professional and personal beliefs leading to moral dilemmas (Epp, 2012). However, these variables are not always captured in the quantitative measures used to examine our critical care climate. Variables that we examined and those that should be considered in future studies are evaluated below. We divided the critical care climate into three areas: physical, social, and organizational (Khan et al., 2019).

Physical

Previous researchers have shown that noise reduction, adequate staffing, and lower nurse to patient ratios were strongly associated with positive physical aspects of the work environment (Lim et al., 2019; Marcum et al., 2018; Ramos et al., 2016; Rushton et al., 2015). In our results, staffing was significantly correlated to levels of burnout as were adequate breaks and the ability to rest and recharge after a shift. It will be important for future researchers to consider the physical toll that pandemic care takes on this cohort of nurses. Isolation gear, higher acuity of patients, and hospitals overcapacity may drastically alter the physical demands of ICU nurses.

Social

We found similar results to previous literature when comparing the social aspects of the critical care environment on burnout. ICU nurses who were enabled to share and discuss their concerns openly, often in the form of shared governance with managers and administrators, or to facilitate patient care with physicians and the treatment team were

less likely to experience job burnout, similar to a study that examined over 16,000 nurses (Khan et al., 2019). Moreover, ICU nurses reporting flexible shift rotations, a social support system, and feeling empowered in their positions, assessed the social aspect of their work environment positively (Khan et al., 2019; Lim et al., 2019; Marcum et al., 2018; Ramos et al., 2016; Rushton et al., 2015). It is important to further evaluate the relationships that nurses have with family members as well as support systems. This was not examined with our quantitative measures and should be a focus for future researchers interested in social protective factors among ICU nurses.

Organization

Our findings support the literature on the importance of organizational factors for nurse burnout in critical care environments. When ICU nurses have competent teams; professional development pathways; collaboration; quality relationships among coworkers, managers, and physicians; hold specialized qualifications; and receive meaningful recognition for their jobs they are far less likely to have job burnout (Khan et al., 2019; Lim et al., 2019; Marcum et al., 2018; Ramos et al., 2016; Rushton et al., 2015). Because bullying significantly increased the risk of each burnout domain, we recommend adding bullying to quantitative measures that aim to assess the perception of nurses' climate.

Day and Night Shift Work

We found a non-significant difference between day shift and night shift nurses in the way they processed burnout. Previous researchers who have examined latent burnout profiles, have shown that each profile correlates with organizational variables (Leiter & Maslach, 2016). Emotional exhaustion is how fatigued nurses feel about work, the

depersonalization or cynicism dimension is the difficulty in dealing with other people and activities in the work world, and a lack of personal accomplishment is low morale and reduced productivity (Leiter & Maslach, 2016). Although these dimensions often rise and fall simultaneously, they do not do so all the time. This was seen in our study where nurses differed drastically among those who tested high for emotional exhaustion (28.2%), vs. depersonalization (12.6%), vs a lack of personal accomplishment (47.8%).

We believe it is important to consider the full spectrum of burnout for individuals. Maslach et al. (2001), proposed that the solution to burnout may exist in job engagement. Job engagement is conceptualized as a positive and persistent motivational state of fulfillment in employees characterized by energy and vigor, involvement and dedication, and self-efficacious behaviors (Maslach et al., 2001; Maslach, 2003). However, because engagement is a separate latent profile from emotional exhaustion, depersonalization, or reduced personal accomplishment, more research is needed into what other factors might moderate or reduce the risk of emotional exhaustion, depersonalization, and lack of personal accomplishment in the workplace. Our finding that the reduction of depersonalization and reduced personal accomplishment correlated with part-time work, is an important first step in better understanding the profile of depersonalization. We believe this finding is deserving of both theoretical and clinical attention.

Summary

Our findings support research that the presence of resilience is independently associated with healthier psychological profiles in ICU nurses (Mealer et al., 2012); however, our findings also support a shift in the narrative to include an organization's responsibility in the reduction of nurse burnout and possibly in the ability to sustain nurse

resilience. Previous research among nurses has shown significant differences in how day and night shift nurses processed burnout (Calabro et al., 2018; Hu et al., 2020), although our findings differed from this. Our study was the first to differentiate between shift and examine the relationship between burnout and resilience among ICU nurses. Previous researchers suggested that shift played an influential role in understanding burnout because various factors moderated the effects of day vs. night shift work on burnout (Calabro et al., 2018; Hu et al., 2020). However, these previous studies had significantly different clinical demographics like clinical setting, patient load and acuity, and years practiced; and our study included the exposure to workplace bullying.

Previous researchers have suggested that positive aspects of the critical care climate include factors like adequate staffing; empowerment; competent teams; collaboration; quality relationships among coworkers, managers, and physicians; and professional development opportunities (Khan et al., 2019). In our study both shifts were similarly associated with symptoms of burnout. Protective factors, like working during the night to avoid the stresses during the day, did not impact the level of burnout. On the other hand, working part-time was correlated with lower levels of depersonalization and reduced personal accomplishment compared to nurses working full-time. Most importantly though, in our participants, nurses described having “sufficient time off” and “family support” preventing them from burning out, which supports other recent research (Hu et al., 2020; Khan et al., 2018).

Implications

Implications for Theory

As predicted, resilience alone is not enough to moderate burnout in ICU nurses. The majority (58.4%) of our sample had at least one symptom of job burnout, however, 32.4% were moderate to highly resilient. This is important because resilience is often associated with combating burnout, however, a part of resilience might be the self-awareness of knowing when you are burned out. The ability to know when to leave an unhealthy environment is a protective factor that may be a characteristic of resilient ICU nurses.

Nurses having both symptoms of burnout and scoring moderately to highly resilient supports our theoretical framework that other protective factors may have strong relationships with burnout. Our proposed theoretical framework included resilience and critical care climate characteristics, which explained 23.8%- 42% of the variance of burnout domains when controlling for other confounding variables. Although the additional variance over demographic characteristics was statistically significant, it still had a relatively small to medium effect sizes, suggesting that other protective factors play a role in explaining why nurses burn out. Further, because our chosen protective factors failed to moderate the role between day vs. night shift work and burnout, we conclude that we need to reassess the strength and role of other protective factors in mitigating burnout in the workplace.

Revised Protective Factors Framework

Figure 7. A Framework of Protective Factors for ICU Nurses

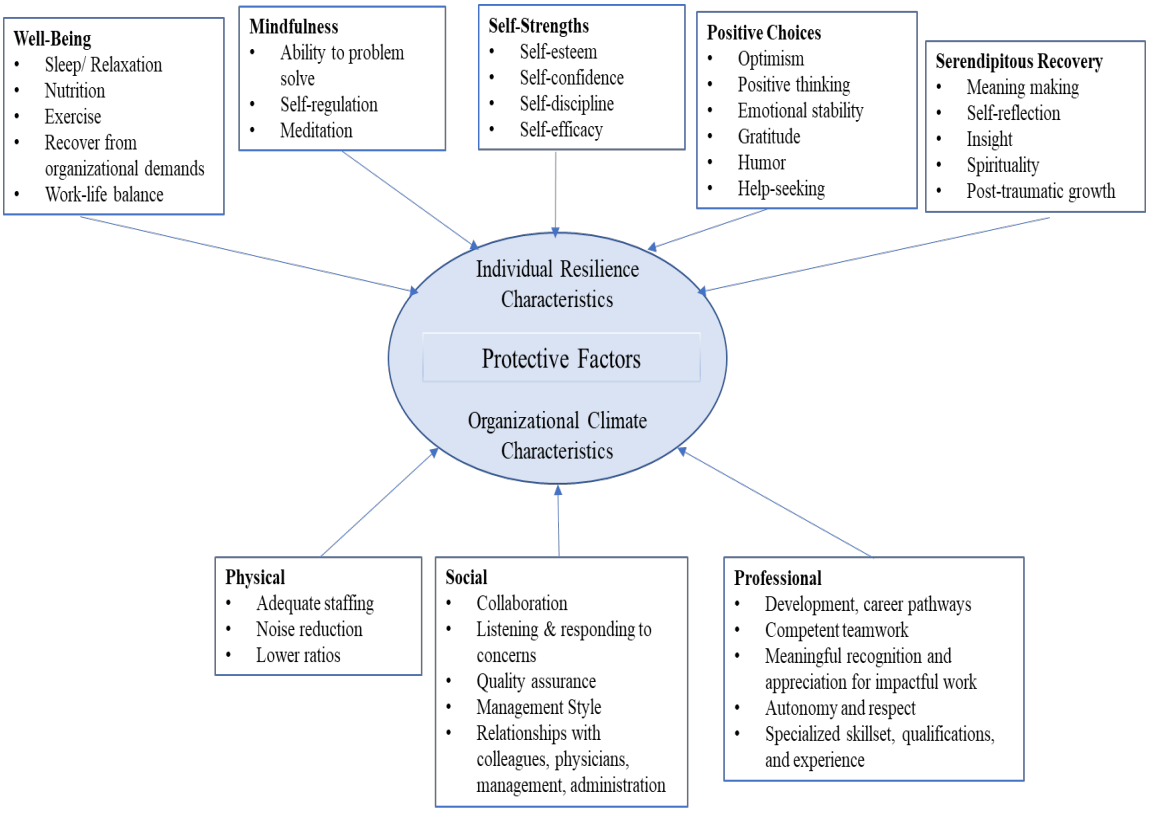


Figure 7. Protective factors can be separated into eight groups: (a) well-being, (b) mindfulness, (c) self-strengths, (d) positive choices, (e) serendipitous recovery, (f) physical climate characteristics, (g) social climate characteristics, and (h) professional climate characteristics. There are characteristics within each group that describes the operational definition of that group (e.g., a person's work-life balance and ability to recover from organizational demands; their quality of life, sleep, nutrition, and exercise describe well-being).

Figure 8. A Framework of Protective Factors for ICU Nurses-Revised

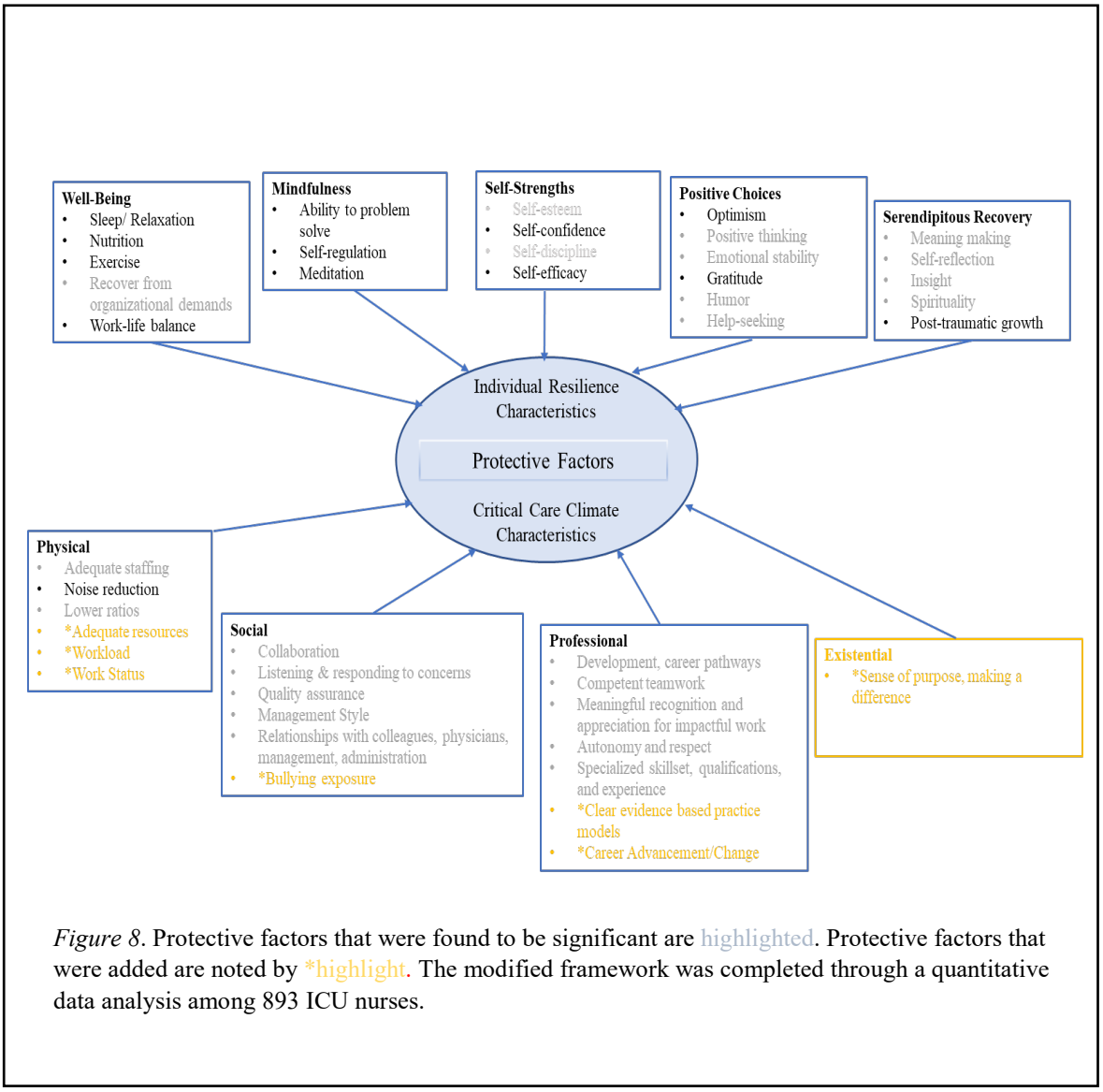


Figure 8. Protective factors that were found to be significant are highlighted. Protective factors that were added are noted by *highlight. The modified framework was completed through a quantitative data analysis among 893 ICU nurses.

The revised protective factors framework was examined and tested. *Figure 7* was the proposed revised protective framework as described in Ch 2, using characteristics from Connor and Davidson (2003), Siebert (2005), Charney (2004), Southwick et al.

(2014), Yehuda et al. (2006) and Positive Organizational Behavior Theory (Youssef & Luthans, 2007). This framework was tested and modified in the dissertation study, and a final model is proposed in *Figure 8*. Significant pathways are highlighted and new ones are added that became apparent in this dissertation study. Those that were not tested are left unchanged in black.

We believe that ICU nurse burnout is a complex phenomenon that is highly affected by the critical care environment. New areas that were added to the resilience model included were adequate resources in the physical domain, bullying exposure in the social domain, and clear and competent nursing models in the professional domain. Because work status (part-time) significantly improved feelings of personal accomplishment and a change in career (like becoming a researcher) reduced feelings of depersonalization in the workplace, those variables were also modified in the physical and professional domains of the organization (respectively).

We were able to modify the protective framework from significant associations found during the quantitative analysis, however, we believe the quantitative measures failed to capture other significant protective factors. Because protective factors failed to moderate the role of day vs. night shift work on burnout as seen in Aim 2, we believe that other protective factors exist that were not measured by the CD-RISC or PES-NWI. An example of this is the exposure to bullying; a significant experience that occurs in a third of ICU nurses, yet it is not measured by the CD-RISC or PES-NWI. It is a critical next step to analyze nurses' open-ended responses so we can gain insight on possible missing factors. This will further inform the protective factor framework and may inform the

creation of a measure that more fully captures internal and external characteristics of an ICU nurse.

Clinical Implications

Knowing which protective factors lead to burnout is important for several reasons. First, what constitutes a healthy or poor work environment for ICU nurses should be based on the perception of those ICU nurses rather than those in charge or making policies. We found that where nurses are not heard and the goals of the organization are mismatched from the goals of ICU nurses there was a much higher risk for emotional exhaustion, depersonalization, and lack of personal accomplishment. ICU nurses are unique in that they seek greater autonomy, empowerment, and self-development (Khan et al., 2019), so it was appropriate that solid nursing foundations, working with clinically competent nurses, and high standards of care were all independently associated with a lower risk of burnout in our findings.

Increased exposure to workplace bullying was significantly associated with high levels of emotional exhaustion, reduced personal accomplishment, and depersonalization in the workplace. Nursing managers and administrators should attend to the critical care climate, create a positive work atmosphere, offer opportunities for advancement, listen and respond to employee concerns, and lessen the exposure to workplace bullying. Providing sufficient resources and involving nurses in creating policies and procedures may aid in allocating and retaining clinically talented critical care nurses who thrive in the workplace.

Directions for Future Research

A movement in the workplace of nursing culture to prevent turnover has led to a greater focus on what mechanisms cause burnout. Although we and other researchers have found that nurse demographics like age, gender, years practiced, or job-status have independent relationships with burnout, because most of these are not changeable, we believe that they should not be the sole focus of an organization striving to be "healthy" (Dall' Ora et al., 2015). Rather, our research findings suggest that the organization itself shares a greater role in nurse burnout and can alter its course through changes like adequate staffing, clear nursing philosophies as a foundation for the patient care environment, clinically competent nurses, shared governance committees, an active staff development program, and fostering nurse-physician/administration/manager relationships. By providing a supportive social network through listening to employees, validating their concerns, and cultivating an environment that is overall supportive of nurses, the prevalence of burnout in a workplace may decline.

Although there has been an emphasis on personal responsibility and personal attributes to improve nurse outcomes, to have a reduction in nurse burnout, a focus should be on workplace organizational characteristics. Additional research that focuses on the nurses' workplace, specifically the relationship between the administration and employees, should include the role that different geographical settings play into how burnout is processed.

Strengths and Limitations

Strengths

This study had many strengths. First, this study was the first to be guided by a multi-factorial theoretical framework that consisted of both internal and external protective factors. Unlike previous resiliency and burnout research, much of which lack a theoretical framework that includes individual resilience and organizational climate science, we developed a framework that was guided by both internal and external protective factors (Charney, 2004; Denz-Penhey & Murdoch, 2008; Siebert, 2005; Yehuda et al., 2006). Second, this study examined the influence of multiple factors affecting burnout among ICU nurses. The majority of previous ICU nurse burnout research has examined a single factor, like resilience or the critical care climate, aside from demographics (Adams et al., 2010; Arrogante, & Aparicio-Zaldivar, 2017; Foureur et al., 2013; Lim & Mi, 2019; Mealer et al., 2012). This dissertation provided clarity on the relationships among resilience, the critical care climate, day vs. night shift work, and burnout among ICU nurses, as there was no published study that simultaneously examined the influence of internal and external protective factors on burnout.

Third, by adding measures that included bullying and geographical location, this study is the first to illuminate areas that have not been previously included or considered as possible significant protective factors affecting burnout.

Fourth, because this study captured experiences during the onset of a pandemic, we were able to provide insight on the physical and psychological impact among ICU nurses in the context of COVID-19.

Fifth, this study used the gold standards of measurement for resilience, burnout, bullying, and the nurse practice environment. High Cronbach alphas and a very low risk of multicollinearity supported the use of these measures to assess the aims, however, these measures did not always capture significant protective factors found in the critical care climate.

Sixth, although a 20% response rate was lower than similar studies (historically 35%-80%; Adams et al., 2010; Duchemin et al., 2015; Klatt et al., 2015; Mealer et al., 2012), the number of respondents achieved was enough to power our analysis and test for confounding variables that may impact burnout in ICU nurses.

Although we did not have the resources to fully analyze the qualitative responses by the completion of this dissertation, by collecting the open-ended responses we later will be able to complete a thematic analysis, assess nurses' experiences, and further modify the theoretical framework for protective factors affecting ICU nurse burnout.

Limitations

The study had several limitations. First, although the initial findings are encouraging, a weakness of cross-sectional studies is the inability to establish causal relationships. Replicating this study in the future would be beneficial. Second, although this study was a good starting point for exploring protective factors among ICU nurses, it is critical that future researchers build on this foundation and develop a more complex procedure for longitudinal profile analyses, latent profile analysis, and qualitative analysis to find other protective factors that were not captured with our quantitative measures.

Third, we intended to survey nurses in adult ICUs, however, because our recruitment letter said only "critical care nursing," we received responses from nurses who worked in pediatric intensive care units, neonatal intensive care units, and emergency departments. When asked to describe their current ICU in the demographic questionnaire, nurses were allowed to select all that apply; although the majority of nurses chose an ICU that was available (Medical 54%, Cardiac 25%, Cardiovascular 23%, Trauma 27%, Neuro 26%, and Post-anesthesia 17%), 31% selected the "other" option suggesting that the available options were insufficient for the nurses who decided to participate and considered themselves critical care nurses. Finally, the ICU nurses in this study were not representative of the general ICU nurse population because this study does not reflect the varying demography of the United States. Because these nurses were recruited from Oregon State's Board of Nursing registry, most nurses emailed are assumed (however not confirmed) to be located in the Pacific Northwest.

Reflection and Positionality

As we contemplate the ramifications of this rapidly evolving Covid-19 pandemic, this dissertation serves as a foundation for an area that deserves attention in the coming months to years. Critical care nurses serve on the frontlines of epidemics and health crises, and although the COVID-19 pandemic is far from over, there is an opportunity to reflect on past and current challenges in the context of nursing during a pandemic. Further, as researchers and clinicians, we must also consider what our next steps might entail after the abatement of one of the most horrific health crises of our lifetime.

To be fully reflective and transparent in the research process it is important to explicitly recognize the positionality of a researcher. Reflexive research practice aids in

disclosing any narratives or biases that may serve as foundational when subjective interpretation, discussions, and explanations are made. Thus, I offer key aspects of my experiences working as a critical care nurse during the pandemic.

I have been a nurse for over 12 years and a critical care nurse for almost 8 years. I self-identified as "burned out" after 2 years in nursing and discovered that frequently changing my work environment protected me against the most severe feelings of burnout, which fit well with a career in travel nursing. The hospital I served in during the pandemic was one I had served in as a traveler 5 years ago. I had continued to work part-time or per diem during my doctoral program, often seeking friendships, experiences, and advice from other ICU nurses about burnout, resilience, and their perceptions of the work environment. After half a decade listening to the stories of my co-workers, I felt indebted and empowered to share those experiences through my dissertation focus.

Over the past 6 months though, critical care nursing has changed drastically. My hospital was quickly converted into a designated COVID-19 center and our ICU evolved every day, trying desperately to keep up with the changing guidelines and science. The first 2 months of the pandemic felt like chaos. Many of us described our ICU as the "Wild West", where we struggled to survive and made up policies when none existed.

We ran short on PPE, staff, sedation medication, IV tubing and pumps, ventilators, proning beds, and dialysis machines. I remember one Friday where our CEO joined us for a huddle and told us we had enough N95 masks for 3 weeks; by Monday we had run out. The reagent used for point-of-care testing was re-directed to Seattle laboratories, so we ran out of testing materials, and those who were tested waited 10-14 days for results. End-of-life care changed as well. Families were not permitted to be with

their loved ones. We tried to communicate through telephones or video-conferencing, but it often confused the restrained and ventilated patient who couldn't speak. I remembering feeling like everyone died. Our first known deaths were an older couple. I remember thinking how awful it was that a family lost both parents, hours apart from each other, and family were not permitted at the bedside. I cried the first time a COVID patient was transferred out of the ICU alive; she was my age.

I feared transmitting the virus to my 1-year old daughter and my first-responder husband. We decided to send my daughter to my parents for quarantine so I could continue to work. I was without her for over a month. Six other nurses that I worked with also ended up sending their children to places they believed to be safer.

I was angry at my administration and management. I wanted answers, an evidence-based plan, and to know that I would be safe. I felt they took too long to act, were not transparent about our hospital's inventory, and failed to address concerns raised by the staff. I became so frustrated that I spoke to the media about the hospital's lack of transparency.

Policies and protocols changed so frequently that nurses eventually gave up relying on administration for leadership and instead came together to solve daily challenges. For example, to conserve PPE, we moved IV poles to the outside of rooms. Every time a pump would alarm or medication would run out, we could silence or rehang without having to don new PPE. At first, we piggybacked IV lines together to get them to reach the patient. One nurse thought of using catheter laboratory tubing to reach the extra distance. In other instances, nurses were creative in how they proned patients, especially when we ran out of proning beds. To give bedside report to physicians, we initiated

videoconferencing meetings with an iPad taped to an IV pole so they could assess patients from the “clean” unit, saving on PPE. Physicians relied heavily on the assessments and intuition of nurses, and nurses relied heavily on their team. In the face of grave challenges, we worked together in solidarity.

Reflecting on my own experiences, there are still many unknowns in the trajectory of COVID-19. Did we see a decrease in burnout in our data after that first peak because ICU nurses had more autonomy, teamwork, and distanced themselves from the administration? Was it because nurses felt a sense of purpose and there was an exorbitant appreciation by the local community if not the global community? Will nurses eventually wear out? What will be the final toll in traumatic stress and compassion fatigue from seeing so many people die? How do we retain these specialized nurses if they decide the transmission risk is too high and they leave nursing? It is unknown what lasting physical and psychological toll this pandemic will take on healthcare professionals, but it is imperative to give special attention and continue research among frontline nurses faced with the additional stressors and challenges that are encased with this unparalleled health crisis.

Conclusion

Burnout and resilience are not the singular outcomes of personal characteristics; this study shows the influential role that an organization or work environment can play in explaining burnout. Unfortunately, many resiliency models do not include personal, environmental, organizational, or existential supportive measures that lead to greater overall resilience. This study demonstrates that both personal resilience characteristics and those of an organization can influence the prevalence of nurse burnout. Our findings

suggest that healthcare institutions and administrations that foster a practice environment where administration listens and responds to employees' concerns, sets clear nursing philosophies as a foundation for the patient care environment, hires clinically competent nurses, and is supportive of nurses might notice a reduction in nurse burnout which is often related to intent to leave and nurse turnover (Vahey et al., 2004). Our findings support that the complexity of burnout can be partially buffered with various protective factors, depending on the organizational problem; the critical care climate and individual resilience are mutually reinforcing. Most notably, a critical care climate that supports employees by listening to their concerns, provides safe staffing ratios, lessen the exposure to workplace bullying, recognizes nurses for their accomplishments, creates clear nursing models with clinically competent nurses, and fosters healthy relationships among colleagues, management, and physicians sustains a staff who thrive within their workplace.

Appendix A: IRB Approval of Submission

February 12, 2020

Dear Investigator:

On February 12, 2020, the IRB reviewed the following submission:

IRB ID:	STUDY00021052
Type of Review:	Initial Study
Title of Study:	Utilization of protective factors that mitigate burnout among night and day shift ICU nurses
Principal Investigator:	Lissi Hansen
Funding:	Name: OHSU School of Nursing, PPQ #: n/a
IND, IDE, or HDE:	None
Documents Reviewed:	• Practice Environment Scale of Nursing Work Index-STUDY00021052.docx • Protocol • Negative Acts Questionnaire- STUDY00021052.docx • Maslach Burnout Inventory- STUDY00021052.docx • Recruitment Message • Consent • Connor-Davidson Resiliency Scale-STUDY00021052.docx

The IRB granted final approval on 2/12/2020. The study requires you to submit a check-in before 2/10/2023.

Review Category: Exempt Category # 2

Copies of all approved documents are available in the study's **Final** Documents (far right column under the documents tab) list in the eIRB. Any additional documents that require an IRB signature (e.g. IIAs and IAAs) will be posted when signed. If this applies to your study, you will receive a notification when these additional signed documents are available.

Appendix B: Operational and Conceptual Definitions

Burnout: A prolonged response to stressors in the workplace defined by emotional exhaustion, depersonalization, and lack of personal accomplishment (Maslach & Leiter, 2016).

Critical care climate: The physical, social, and professional characteristics of a specialized department of a healthcare facility that provides intensive care services (Khan et al., 2019).

Day Shift Work: Nurses working around the hours of 0700-1900.

Individual resilience: Conceptualized as the human ability or process to adapt in the event of trauma, adversity, or stress (Southwick et al., 2014); operationalized as the ability to thrive in the face of adversity and measured by the Connor-Davidson Resiliency Scale (CD-RISC), in which the five domains (well-being, mindfulness, self-strengths, positive choices, and serendipitous recovery), culminate into a single result with higher scores representing greater resilience (Connor & Davidson, 2003).

Mindfulness: The capacity to intentionally bring awareness to present-moment experience and problem solve through self-regulation, decreased reactivity, and meditation (Connor & Davidson, 2003; Southwick et al., 2014).

Night Shift Work: Nurses working around the hours of 1900-0700.

Organizational climate: The perceived work environment by individuals who live and work in the environment that ultimately influences the motivation, behavior, and performance of these people (Montoya & Tostes, 2017). The organizational climate is made up of nine dimensions: structure, responsibility, reward, challenge, relationships, cooperation, performance standards, conflicts, and identity (Montoya & Tostes, 2017).

Physical climate: The portion of the critical care work environment that includes staffing, noise, and nurse to patient ratios.

Positive choices: A component, which efficacious habits are created, through optimism, positive thinking, emotional stability, gratitude, humor, and help-seeking (Foureur et al., 2013; Connor & Davidson, 2003; Siebert, 2005; Southwick et al., 2014; Yehuda et al., 2006).

Professional climate: The portion of the critical care work environment that includes career development, teamwork, recognition, autonomy, and specialized skill development (Khan et al., 2019)

Protective factors: The sum of individual resilience characteristics and organizational climate (i.e., critical care climate) characteristics correlated with or used to moderate or moderate the effects of burnout.

Rotating Shift Work: Nurses working a combination of day and night shift schedules.

Self-strengths: The response to personal shortcomings, failures, and inadequacies with self-esteem, self-confidence, self-discipline, and self-efficacy (Pidgeon et al., 2013; Charney, 2004; Siebert, 2005; Southwick et al., 2014; Connor & Davidson, 2003).

Serendipitous recovery: A sense of meaning-making and hope that life does indeed make sense, despite chaos, stress, and despair often found through self-reflection, insight, spirituality and post-traumatic growth (Tedeschi & Calhoun, 1996; Southwick et al., 2014; Siebert, 2005).

Shift work: Any work schedule that is not a consistent 0900 to 1700 work schedule (Vyas et al., 2012).

Social climate: The portion of the critical care work environment that includes collaboration, management style, co-worker relationships, communication, and quality assurance processes (Khan et al., 2019).

Well-being: A person's work-life balance and ability to recover from organizational demands; their quality of life, sleep, nutrition, and exercise (Connor & Davidson, 2003).

Appendix C: Recruitment Letter to Potential Participants

Subject title: Recruiting Critical Care Nurses for Research Survey

Dear Registered Nurse,

Your email was obtained from the Oregon State Board of Registered Nurses for research purposes only. I am a Ph.D. student with Oregon Health and Science University conducting a study on nurse work environments. The goal of this research is to explore the personal well-being of nurses working in a critical care setting. I would really value your time and input for this research.

You may be eligible if you answer **YES** to all three questions:
1) Are you a Registered Nurse?
2) Are you currently providing direct patient care in a critical care practice setting?
3) Have you been a nurse providing direct patient care for more than 1 year?

What is involved?
- Approximately 20 minutes of your time
- Answering survey questions on an electronic device of your choice

What are the risks/benefits of participating?
- Although there is a low risk of psychological distress, this line of inquiry is safer to you due to the higher level of confidentiality (Council for International Organizations for Medical Sciences, 2017).

- For participants who complete the entire survey, after submitting/closing the survey, instructions will appear for how to claim a $5 Amazon eGift card. This process cannot be completed anonymously. Survey responses are not linked to the eGift card claims.

You may open the survey in your web browser by clicking the link below:
[survey-link]

If the link above does not work, try copying the link below into your web browser:
[survey-url]

This link is unique to you and should not be forwarded or shared with others.
With sincere appreciation in advance for your consideration,

Emily Calabro RN, Ph.D. Candidate
Researcher, Oregon Health & Science University
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Lissi Hansen, Ph.D., RN
Principal Investigator, Oregon Health & Science University
hansenli@ohsu.edu
IRB Study #21052

Appendix D: Imbedded eConsent

I am a PhD student at Oregon Health & Science University (OHSU) working on my doctoral dissertation. My research topic is exploring the resilience of nurses working in a critical care setting.

You are being asked to participate in an online research study. The survey will take approximately 20 minutes of your time. This survey poses minimal risk to you as a participant. Risks may include loss of confidentiality, loss of time while answering the survey and potential distress while answering questions related to your feelings and perceptions of burnout related to your nursing career. If you have severe distress, one resource for emotional support is the Oregon Nurse Assistance Network, which is available 24/7 to provide free and confidential support at 888-516-2796. Your responses to the survey are confidential, and any information which could identify you will be removed after submission into the secure database. Data collected from/about you in this study will not be used or shared for future research. There is no direct benefit to you while taking the survey; however, the study results may provide insight into the experiences of nurses working in the critical care environment. Your insights may guide future intervention studies aimed at improving personal well-being and retention of the nursing workforce.

Participation is completely voluntary. Once you click the radio button consenting to participate, you will be immediately directed to the survey. There is no consequence for not participating. If you feel at any time while taking the survey that you wish not to continue or withdraw, you may do so at any time without issue or penalty. The first 200 participants who complete the survey can claim a $5 Amazon eGift card. You may only complete the survey once.

Thank you for your time and effort in answering the survey. If you wish to contact me with any questions, concerns, or complaints regarding this study now or in the future, or you think you may have been injured or harmed by the study, please feel free to do so either by cellphone (316) 293-9612 or email calabro@ohsu.edu. This contract will be kept strictly confidential.

If you have any questions about your rights as a research participant, you may contact the OHSU Institutional Review Board (IRB) at (503) 494- 7887.

Thank you,

Emily Calabro RN, Ph.D. Candidate
Researcher
Lissi Hansen, Ph.D., RN
Principal Investigator
IRB Study #21052

Your submission of this electronic form by clicking on “I AGREE TO PARTICIPATE” indicates that you have read the entire Information Form and that you agree to take the survey. If you change your mind, you may exit the survey at any time.

[1] Yes, I agree to participate
[0] No, I do not wish to participate

Appendix E: Descriptive and Demographic Questionnaire

Descriptive and Demographic Questionnaire

Question	Options
What is your age?	>18 but ≤ 25 years >26 but ≤ 40 years > 41 but ≤ 60 years > 61 but ≤ 70 years > 70 years
How would you describe your gender?	Male Female Non-binary Other
How would you describe your Race? (select all that apply)	American Indian or Alaskan Native Asian Black or African American Native Hawaiian or Other Pacific Islander White or Caucasian Other
Would you describe yourself as Hispanic or Latino?	Yes No
What is your highest educational degree in nursing?	Diploma Associates Bachelors Masters Doctorate
What primary geographical location does your hospital serve? (select all that apply)	Frontier (counties with 6 or fewer people per square mile) Rural (10 or more miles from a greater population of 40,000 people) Urban (population less than 1 million, i.e. Vancouver, WA; Portland, OR) Metropolitan (a population greater than 1 million, i.e. Seattle)
How would you describe your ICU (select all that apply)	Medical (MICU) Cardiac Cardiovascular Trauma Neurological Post-anesthesia Other

How would you describe your work as a nurse? (select all that apply)	Staff Nurse Charge Nurse Travel Nurse Advanced Practice Nurse Educator Executive Manager Researcher
How would you describe the status of your primary work as a nurse? (select all that apply)	Full-time Part-time Per-diem Travel
When during the week do you most often work in your primary job as a nurse?	Primarily during the week Primarily during the weekend During the week and weekend
When during the day do you typically work in your primary job as a nurse? (select all that apply)	Days Evenings Nights Rotating
How many years have you practiced as a nurse in total?	≤ 1 year > 1 year but ≤ 3 years > 3 years but ≤ 5 years > 5 years but ≤ 10 years > 10 years but ≤ 20 years > 20 years
How many years have you practiced in your current job?	≤ 1 year > 1 year but ≤ 3 years > 3 years but ≤ 5 years > 5 years but ≤ 10 years > 10 years but ≤ 20 years > 20 years

Note. Select all that apply options were available with checkboxes while all others were radio buttons.

Appendix F: Formatting the Descriptive and Demographic Questionnaire for Analysis

Changes to the Questionnaire to allow for Statistical Analysis and Interpretation

Question	Options	Revision	Notes
How would you describe your gender?	Male Female Non-binary (*n*=3) Other (*n*=1)	Male (*n*=151) Female (*n*=741)	Formatted non-binary and other as missing variables
How would you describe your Race? (select all that apply)	American Indian or Alaskan Native Asian Black or African American Native Hawaiian or Other Pacific Islander White or Caucasian Other	Minority groups (*n*=55) White (*n*=776) Other/Multi-Racial (*n*=82)	(*n*=35) identified as Multi-Racial, a new column was created for those selecting more than 1 Race; Other and Multi-Racial were combined; All other minority groups combined
What is your highest educational degree in nursing?	Diploma Associates Bachelors Masters Doctorate	Diploma/Associates (*n*=164) Bachelors (*n*=646) Graduate (*n*=103)	Diploma and associate's degrees were combined; graduate level degrees were combined.
What primary geographical location does your hospital serve? (select all that apply) *	Frontier (counties with 6 or fewer people per square mile) Rural (10 or more miles from a greater population of 40,000 people) Urban (population less than 1 million, i.e. Vancouver, WA; Portland, OR) Metropolitan (a population greater than 1 million, i.e. Seattle)	Frontier and Rural (*n*=203) Urban and Metropolitan (*n*=692)	(*n*=47) selected multiple locations. Formatted into 2 groups, 1= Frontier/Rural, 2= Urban and Metro. Those selecting any category of 3 and 4 were placed in group 2.

How would you describe your work as a nurse? (select all that apply)	Staff Nurse Charge Nurse Travel Nurse Advanced Practice Nurse Educator Executive Manager Researcher	Staff Nurse (*n*=571) Charge Nurse (*n*=32) Advanced Nurse (*n*=83) **Other/Multi** (*n*=210)	(*n*=210) chose multiple items. An additional "Other/Multi" category was created to contain anyone who chose multiple items. Travel Nurse was eliminated because every travel nurse chose more than one category. Advanced degrees were combined.
How would you describe the status of your primary work as a nurse? (select all that apply)	Full-time Part-time Per-diem Travel	Full-time (*n*=632) Part-time (*n*=133) Per-diem (*n*=52) Travel (*n*=20) **Other** (*n*=57)	(*n*=57) chose multiple. An additional "Other" category was created to contain anyone who chose multiple items.
When during the day do you typically work in your primary job as a nurse? (select all that apply)*	Days (*n*=535) Evenings(*n*=131*)* Nights(*n*=322) Rotating *(n*=38)	Days (*n=544)* Nights (*n*=349)	(*n*=103) chose multiple. (*n*=3) chose all 4; (*n*=24) chose 3; (*n*=76) chose 2. Days were combined with evenings; nights were combined with rotating.
How many years have you practiced as a nurse in total?	≤ 1 year > 1 year but ≤ 3 years > 3 years but ≤ 5 years > 5 years but ≤ 10 years > 10 years but ≤ 20 years > 20 years	≤ 1 year but ≤ 3 years > 3 years but ≤ 5 years > 5 years but ≤ 10 years > 10 years but ≤ 20 years > 20 years	Combined less than one year to the ≤ 1 year but ≤ 3 years Group (*n*=3 changes made)

Note. In STATA the first variable listed is the referent variable. * A sensitivity analysis was performed after these two revisions to safeguard robustness in the re-allocation of the data.

Appendix G: Descriptive and Demographic Nurse Characteristics

Descriptive and Demographic Nurse Characteristics (N=896)

Question	Options	Mean ± or n (%)
What is your age?	>18 but ≤ 25 years	32 (3%)
	>26 but ≤ 40 years	476 (53%)
	> 41 but ≤ 60 years	320 (35%)
	> 61 but ≤ 70 years	66 (7%)
	> 70 years	2 (.22%)
How would you describe your gender?	Male	151 (17%)
	Female	741 (83%)
	Non-binary	3 (.33%)
	Other	1 (.11%)
How would you describe your Race? (select all that apply)	American Indian or Alaskan Native	24 (2%)
	Asian	47 (5%)
	Black or African American	13 (1.45%)
	Native Hawaiian or Other Pacific Islander	8 (.89%)
	White or Caucasian	810 (90%)
	Other	36 (4%)
Would you describe yourself as Hispanic or Latino?	Yes	51 (6%)
	No	842 (94%)
What is your highest educational degree in nursing?	Diploma	7 (.78%)
	Associates	157 (17%)
	Bachelors	646 (72%)
	Masters	81 (9%)
	Doctorate	5 (.56%)
What primary geographical location does your hospital serve? (select all that apply)	Frontier (counties with 6 or fewer people per square mile)	22 (2%)
	Rural (10 or more miles from a greater population of 40,000 people)	226 (25%)
	Urban (population less than 1 million, i.e. Vancouver, WA; Portland, OR)	614 (68%)
	Metropolitan (a population greater than 1 million, i.e. Seattle)	96 (11%)

How would you describe your ICU (select all that apply)	Medical (MICU)	503 (56%)
	Cardiac	221 (25%)
	Cardiovascular	219 (24%)
	Trauma	229 (26%)
	Neurological	230 (26%)
	Post-anesthesia	159 (18%)
	Other	273 (30%)
How would you describe your work as a nurse? (select all that apply)	Staff Nurse	771 (86%)
	Charge Nurse	196 (22%)
	Travel Nurse	98 (11%)
	Advanced Practice Nurse	23 (3%)
	Educator	34 (4%)
	Executive	3 (.33%)
	Manager	22 (2%)
	Researcher	4 (.45%)
How would you describe the status of your primary work as a nurse? (select all that apply)	Full-time	678 (76%)
	Part-time	145 (16%)
	Per-diem	73 (8%)
	Travel	57 (6%)
When during the week do you most often work in your primary job as a nurse?	Primarily during the week	224 (25%)
	Primarily during the weekend	49 (5%)
	During the week and weekend	622 (70%)
When during the day do you typically work in your primary job as a nurse? (select all that apply)	Days	535 (60%)
	Evenings	131 (15%)
	Nights	322 (36%)
	Rotating	38 (4%)
How many years have you practiced as a nurse in total?	≤ 1 year	3 (.33%)
	> 1 year but ≤ 3 years	87 (10%)
	> 3 years but ≤ 5 years	116 (13%)
	> 5 years but ≤ 10 years	249 (28%)
	> 10 years but ≤ 20 years	257 (29%)
	> 20 years	184 (20%)
How many years have you practiced in your current job?	≤ 1 year	112 (12%)
	> 1 year but ≤ 3 years	238 (27%)
	> 3 years but ≤ 5 years	172 (19%)
	> 5 years but ≤ 10 years	175 (19%)
	> 10 years but ≤ 20 years	127 (14%)
	> 20 years	72 (8%)

Note. Select all that apply options were available with checkboxes while all others were radio buttons.

Appendix H: Protective Factors Predicting Emotional Exhaustion

Hierarchical Multiple Regression Analysis Predicting Emotional Exhaustion in ICU nurses

Variable		Coef.	[95% Conf. Interval]
Age (≤ 40 years referent)	> 41 but ≤ 60 years ≥ 61 years	-.13 -.345*	[-.319,.067] [-.69, .001]
Gender (Males referent)	Females	.29**	[.1, .47]
Race (minority group referent)	Caucasian Other/Multi-Racial	.16 .438*	[-.123, .445] [.058, .821]
Hispanic (Yes referent)	No	-.433**	[-.74, -.125]
Degree (Diploma/Associates Referent)	Bachelors Graduate	-.115 -.19	[-.30,.07] [-.47,.09]
Geographical Location (Front/Rural referent)	Urban/Metro	.119	[-.06, .29]
Nurse Type (Staff Nurse referent)	Charge Nurse Advanced Degree Other/Multi	.09 .26 .02	[-.28, .46] [-.008, .53] [-.15, .19]
Work Status (Full-time referent)	Part-time Per-diem Travel Other	-.26* -.30* .13 -.05	[-.46, -.05] [-.59, .002] [-.36, .63] [-.35, .25]
Shift (Days referent)	Nights	.007	[-.14, .154]
Total Years (≤ 1 year but <3 years referent)	> 3 years but ≤ 5 years > 5 years but ≤ 10 years > 10 years but ≤ 20 years > 20 years	-.3* -.274* -.460** -.414*	[-.603, .001] [-.548, .003] [-.751, -.168] [-.774, -.06]
Current Job Years (≤ 1 year referent)	> 1 year but ≤ 3 years > 3 years but ≤ 5 years > 5 years but ≤ 10 years > 10 years but ≤ 20 years > 20 years	-.229 -.1 -.15 -.115 -.187	[-.47, .009] [-.35, .16] [-.42, .11] [-.414, .185] [-.567, .192]
Resilience		-.02***	[-.03, -.01]
Participation		.013	[-.008,.04]

Quality of Care		.006	[-.02, .028]
Managers		-.03	[-.06, .0001]
Staffing		.11***	[.08, .14]
RN and MD relationship		-.01	[-.06, .03]
Bullying		.05***	[.04, .054]
Critical Care Climate (NWI)		.02***	[.01,.02]
R^2	Model 1	.061**	
	Model 2	.41***	
$\triangle R^2$		.351***	

Note. *N*=896. CI= confidence interval. **p*<.05. ***p*<.01. ****p*<.001. Race minority group referent includes: American Indian or Alaskan Native, Asian, Black or African American, and Native Hawaiian or Other Pacific Islander.

Appendix I: Protective Factors Predicting Personal Accomplishment

Hierarchical Multiple Regression Analysis Predicting Personal Accomplishment in ICU nurses

Variable		Coef.	[95% Conf. Interval]
Age (≤ 40 years referent)	> 41 but ≤ 60 years	.09	[-.05, .23]
	≥ 61 years	.20	[-.05,.45]
Gender (Males referent)	Females	-.17*	[-.31, -.04]
Race (minority group referent)	Caucasian	.17	[-.04, .37]
	Other/Multi-Racial	.14	[-.14, .42]
Hispanic (Yes referent)	No	.10	[-.13, .32]
Degree (Diploma/Associates Referent)	Bachelors	.12	[-.02,.25]
	Graduate	.16	[-.04,.37]
Geographical Location (Front/Rural referent)	Urban/Metro	-.001	[-.13, .12]
Nurse Type (Staff Nurse referent)	Charge Nurse	.06	[-.21, .34]
	Advanced Degree	-.09	[-.29, .10]
	Other/Multi	-.05	[-.18, .07]
Work Status (Full-time referent)	Part-time	.15*	[.008, .30]
	Per-diem	.03	[-.19, .24]
	Travel	.04	[-.31, .40]
	Other	.02	[-.20, .23]
Shift (Days referent)	Nights	-.09	[-.19, .02]
Total Years (≤ 1 year but <3 years referent)	> 3 years but ≤ 5 years	-.08	[-.29, .14]
	> 5 years but ≤ 10 years	-.01	[-.21, .19]
	> 10 years but ≤ 20 years	-.03	[-.25, .18]
	> 20 years	-.03	[-.29, .24]
Current Job Years (≤ 1 year referent)	> 1 year but ≤ 3 years	.01	[-.16, .19]
	> 3 years but ≤ 5 years	.16	[-.02, .35]
	> 5 years but ≤ 10 years	.13	[-.06, .33]
	> 10 years but ≤ 20 years	.03	[-.18, .25]
	> 20 years	.13	[-.14, .41]
Resilience		.03***	[.02, .03]

Participation		-.01	[-.03, .004]
Quality of Care		-.0009	[-.02, .02]
Managers		.006	[-.02, .03]
Staffing		-.03*	[-.05, -.001]
RN and MD relationship		-.01	[-.04, .02]
Bullying		-.006*	[-.01, -.0006]
R^2	Model 1	.048	
	Model 2	.230***	
$\triangle R^2$		.182***	

Note. *N*=896. CI= confidence interval. *p<.05. **p<.01. ***p<.001. Race minority group referent includes: American Indian or Alaskan Native, Asian, Black or African American, and Native Hawaiian or Other Pacific Islander.

Appendix J: Protective Factors Predicting Depersonalization

Hierarchical Multiple Regression Analysis Predicting Depersonalization in ICU nurses

Variable		Coef.	[95% Conf. Interval]
Age (≤ 40 years referent)	> 41 but ≤ 60 years	-.36**	
	≥ 61 years	-.37	[-.58, -.13]
			[-.77, .03]
Gender (Males referent)	Females	-.22*	[-.43, -.0005]
Race (minority group referent)	Caucasian	.40*	[.07, .72]
	Other/Multi-Racial	.26	[-1.19, .70]
Hispanic (Yes referent)	No	-.38*	[-.74, -.02]
Degree (Diploma/Associates Referent)	Bachelors	-.04	[-.26, .18]
	Graduate	-.31	[-.64, .01]
Geographical Location (Front/Rural referent)	Urban/Metro	.006	[-.20, .20]
Nurse Type (Staff Nurse referent)	Charge Nurse	.18	[-.25, .61]
	Advanced Degree	.12	[-.19, .43]
	Other/Multi	.06	[-.14, .25]
Work Status (Full-time referent)	Part-time	-.28*	[-.51, -.04]
	Per-diem	-.09	[-.43, .25]
	Travel	.48	[.09, 1.05]
	Other	.005	[-.34, .35]
Shift (Days referent)	Nights	.14	[-.03, .32]
Total Years (≤ 1 year but < 3 years referent)	> 3 years but ≤ 5 years	-.17	[-.52, .18]
	> 5 years but ≤ 10 years	-.16	[-.48, .16]
	> 10 years but ≤ 20 years	-.38*	[-.71, -.04]
	> 20 years	-.70**	[-1.11, -.28]
Current Job Years (≤ 1 year referent)	> 1 year but ≤ 3 years	.005	[-.27, .28]
	> 3 years but ≤ 5 years	.17	[-.13, .46]
	> 5 years but ≤ 10 years	.01	[-.30, .32]
	> 10 years but ≤ 20 years	.16	[-.19, .51]
	> 20 years	.02	[-.42, .46]
Resilience		-.01*	[-.02, -.002]

Participation		-.008	[-.03, .02]
Quality of Care		.05***	[.02, .08]
Managers		-.05**	[-.08, -.01]
Staffing		.04	[-.003, .08]
RN and MD relationship		-.01	[-.06, .04]
Bullying		.04***	[.03, .05]
R^2	Model 1	.098***	
	Model 2	.262***	
$\triangle R^2$		.164***	

Note. *N*=896. CI= confidence interval. *p<.05. **p<.01. ***p<.001. Race minority group referent includes: American Indian or Alaskan Native, Asian, Black or African American, and Native Hawaiian or Other Pacific Islander.

Appendix K: Summary of Tool Abbreviations and Scoring Options

Resilience Protective Factors

a. Connor-Davidson Resilience Scale, 25 items (6-point Likert scale)

CD-RISC = Sum of all items (highly resilient 91-100, least resilient 0-73)

Critical Care Climate Factors

b. Practice Environment Scale of Nursing Work Index, 31 items (4-point Likert scale)

1. Nurse Participation in Hospital Affairs [sum of 1-9]
2. Nursing Foundations for Quality of Care [sum of 10-19]
3. Nurse Manager Ability, Leadership, and Support of Nurses [sum of 20-24]
4. Staffing and Resource Adequacy [sum of 25 -28]
5. Collegial Nurse-Physician Relations [sum of 29-31]

c. Negative Acts Questionnaire, 22 items (5-point Likert scale)

NAQ = Sum of all items (bullying is positive with at least two negative acts, weekly or more often, for six or more months)

Burnout

a. Maslach Burnout Inventory, 22 items (7- point Likert scale)

1. Emotional Exhaustion [sum of 1-9]
2. Personal Accomplishment [sum of 10-19, reverse coded]
3. Depersonalization [sum of 19-22]

Appendix L: Connor-Davidson Resilience Scale

Connor-Davidson Resilience Scale 25 (CD-RISC-25) ©

For each item, please mark an "x" in the box below that best indicates how much you agree with the following statements as they apply to you over the last month. If a particular situation has not occurred recently, answer according to how you think you would have felt.

not true at all (0); rarely true (1); sometimes true (2); often true (3); true nearly all the time (4)

1. I am able to adapt when changes occur.
2. I have at least one close and secure relationship that helps me when I am stressed.
3. When there are no clear solutions to my problems, sometimes fate or God can help.
4. I can deal with whatever comes my way.
5. Past successes give me confidence in dealing with new challenges and difficulties.
6. I try to see the humorous side of things when I am faced with problems.
7. Having to cope with stress can make me stronger.
8. I tend to bounce back after illness, injury, or other hardships.
9. Good or bad, I believe that most things happen for a reason.
10. I give my best effort no matter what the outcome may be.
11. I believe I can achieve my goals, even if there are obstacles.
12. Even when things look hopeless, I don't give up.
13. During times of stress/crisis, I know where to turn for help.
14. Under pressure, I stay focused and think clearly.
15. I prefer to take the lead in solving problems rather than letting others make all the decisions.
16. I am not easily discouraged by failure.
17. I think of myself as a strong person when dealing with life's challenges and difficulties.
18. I can make unpopular or difficult decisions that affect other people, if it is necessary.
19. I am able to handle unpleasant or painful feelings like sadness, fear, and anger.
20. In dealing with life's problems, sometimes you have to act on a hunch without knowing why.
21. I have a strong sense of purpose in life.
22. I feel in control of my life.
23. I like challenges.
24. I work to attain my goals no matter what roadblocks I encounter along the way.
25. I take pride in my achievements.

Add up your score for each column 0 + ____ + ____ + ____ + ____
Add each of the column totals to obtain CD-RISC score =

_____

Appendix M: Practice Environment Scale of the Nurse Work Index

Practice Environment Scale of the Nursing Work Index (PES-NWI)

For each item, please indicate the extent to which you agree that the item is

PRESENT IN YOUR CURRENT JOB.

Response options: strongly agree, agree, disagree, strongly disagree.

Nurse Participation in Hospital Affairs

1. Career development/clinical ladder opportunity.

2. Opportunity for staff nurses to participate in policy decisions.

3. A chief nursing officer which is highly visible and accessible to staff.

4. A chief nursing officer equal in power and authority to other top-level hospital executives.

5. Opportunities for advancement.

6. Administration that listens and responds to employee concerns.

7. Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy

committees).

8. Staff nurses have the opportunity to serve on hospital and nursing committees.

9. Nursing administrators consult with staff on daily problems and procedures.

Nursing Foundations for Quality of Care

1. Active staff development or continuing education programs for nurses.

2. High standards of nursing care are expected by the administration.

3. A clear philosophy of nursing that pervades the patient care environment.

4. Working with nurses who are clinically competent.

5. An active quality assurance program.

6. A preceptor program for newly hired RNs.

7. Nursing care is based on a nursing, rather than a medical, model.

8. Written, up-to-date nursing care plans for all patients.

9. Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient

from one day to the next.

10. Use of nursing diagnoses.

Nurse Manager Ability, Leadership, and Support of Nurses

1. A supervisory staff that is supportive of the nurses.

2. Supervisors use mistakes as learning opportunities, not criticism.

3. A nurse manager who is a good manager and leader.

4. Praise and recognition for a job well done.

5. A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with

a physician.

Staffing and Resource Adequacy

1. Adequate support services allow me to spend time with my patients.

2. Enough time and opportunity to discuss patient care problems with other nurses.

3. Enough registered nurses to provide quality patient care.

4. Enough staff to get the work done.

Collegial Nurse-Physician Relations

1. Physicians and nurses have good working relationships.

2. A lot of team work between nurses and physicians.

3. Collaboration (joint practice) between nurses and physicians.

Appendix N: Negative Acts Questionnaire-Revised

NEGATIVE ACTS QUESTIONNAIRE- Revised (NAQ-R)

These statements describe your interactions with your coworkers. For each statement please rate the frequency with which you experience the following interactions by CIRCLING the appropriate number.

1. Someone withholding information which affects your performance
2. Being humiliated or ridiculed in connection with your work
3. Being ordered to do work below your level of competence
4. Having key areas of responsibility removed or replaced with more trivialor unpleasant tasks
5. Spreading of gossip and rumors about you
6. Being ignored or excluded
7. Having insulting or offensive remarks made about your person, yourattitudes, or your private life
8. Being shouted at or being the target of spontaneous anger
9. Intimidating behaviors such as finger-pointing, invasion of personalspace, shoving, blocking your way
10. Hints or signals from others that you should quit your job
11. Repeated reminders of your errors or mistakes
12. Being ignored or facing a hostile reaction when you approach
13. Persistent criticism of your errors or mistakes
14. Having your opinions ignored
15. Practical jokes carried out by people you don’t get along with
16. Being given tasks with unreasonable deadlines
17. Having allegations made against you
18. Excessive monitoring of your work
19. Pressure not to claim something to which by right you are entitled (e.g.sick leave, holiday)
20. Being the subject of excessive teasing and sarcasm
21. Being exposed to an unmanageable workload
22. Threats of violence or physical abuse or actual abuse

When using the NAQ, bullying is defined as occurring when an individual experience at least two negative acts, weekly or more often, for six or more months in situations where targets find it difficult to defend against and stop abuse.

Appendix O: Maslach Burnout Inventory

MBI Human Services Survey for Medical Personnel
Christina Maslach & Susan E. Jackson

The purpose of this survey is to discover how various people in the human services or the helping professions view their job and the people with whom they work closely.

Instructions: On the following page are 22 statements of job-related feelings. Please read each statement carefully and decide if you ever feel this way about *your* job. If you have *never* had this feeling, write the number "0" (zero) in the space before the statement. If you have had this feeling, indicate *how often* you feel it by writing the number (from 1 to 6) that best describes how frequently you feel that way. An example is shown below.

Example: How often:	**0**	**1**	**2**	**3**	**4**	**5**	**6**
Never	A few times a year or less	Once a month or less	A few times a month	Once a week	A few times a week	Every day	

How often 0-6	**Statement:**
1. _____	I feel depressed at work.

If you never feel depressed at work, you would write the number "0" (zero) under the heading "How often." If you rarely feel depressed at work (a few times a year or less), you would write the number "1." If your feelings of depression are fairly frequent (a few times a week but not daily), you would write the number "5."

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