

---

Theses and Dissertations

---

2022

**ICU-Related Medical Trauma: a socioecological exploration of contributing factors and experiences of traumatic stress in adult ICU survivors**

Jacqueline Hanson

Follow this and additional works at: <https://digitalcommons.pepperdine.edu/etd>



Part of the [Social Psychology Commons](#), and the [Trauma Commons](#)

---

Pepperdine University  
Graduate School of Education and Psychology

ICU-RELATED MEDICAL TRAUMA:  
A SOCIOECOLOGICAL EXPLORATION OF CONTRIBUTING FACTORS  
AND EXPERIENCES OF TRAUMATIC STRESS IN ADULT ICU SURVIVORS

A clinical dissertation submitted in partial satisfaction  
of the requirements for the degree of  
Doctor of Psychology

by

Jacqueline Hanson

May, 2022

Shelly Harrel, Ph.D – Dissertation Chairperson

This clinical dissertation, written by

Jacqueline Hanson

under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF PSYCHOLOGY

Doctoral Committee:

Shelly Harrel Ph.D., Chairperson

Robert deMayo, Ph.D.

Melissa Wasserman, Psy.D.

© Copyright by Jacqueline Hanson (2022)

All Rights Reserved

## TABLE OF CONTENTS

	Page
LIST OF TABLES.....	vii
LIST OF FIGURES .....	viii
DEDICATION .....	ix
ACKNOWLEDGEMENTS.....	x
VITA .....	xi
ABSTRACT .....	xix
Chapter 1: Introduction .....	1
Introduction .....	1
Organization of Contents.....	3
Chapter 2: Review of Relevant Literature .....	4
Snapshot of ICU Patient Experience.....	4
Challenges in Studying ICU Medical Trauma .....	5
ICU Survivors: Population and Prevalence .....	6
Prevalence of Post-ICU Psychopathology .....	6
Prevalence of ICU-Related PTSD .....	7
Trauma: Features, Definitions and Theory.....	8
Features and Definitions.....	9
Theory .....	12
PTSD in the DSM.....	15
Nonmedical vs. Medical Trauma: Foundations, Distinctions and Conceptual Models.....	16
Foundations: Pediatric Medical Trauma.....	16
Enduring Somatic Threat.....	20
Medical Trauma (Hall & Hall).....	21
Medical Trauma in Context: Overview of the Ecological Perspective .....	34
Exosystem and Macrosystem Influences on Patients.....	38
Current Healthcare in the United States.....	38
Socio-cultural, Political & Economic Influence .....	39
Synthesis of the Literature .....	41
Rationale and Scope of the Review and Analysis .....	41
Specific Aims and Objectives .....	43
Objectives .....	43
Chapter 3: Review and Analysis Methods .....	45
Rationale for Use of the Critical Review Approach .....	45
Inclusion/Exclusion Criteria for Literature Review.....	45

Topics and Keywords .....	45
Databases and Dates of Publication .....	47
Types of Documents .....	48
Critical Analysis Approach .....	48
Chapter 4: Results .....	50
Patient Factors .....	50
Age and Gender .....	50
Race/Ethnicity and Socioeconomic Circumstances .....	51
Psychiatric History: Previous Depression, Anxiety, Trauma .....	52
Social Support .....	53
Clinical Factors .....	54
ICU Diagnosis .....	54
ICU Length of Stay and Severity of Illness .....	55
In-ICU Mood & Acute Stress Symptoms .....	56
Sedation Practices .....	57
Benzodiazepines .....	58
Delirium .....	61
Memories and Recall .....	63
Mechanical Ventilation .....	65
Physical Restraint .....	66
Relational Factors .....	68
ICU Setting/Environmental Factors .....	71
Sound/Noise .....	71
Odor .....	72
Lighting .....	73
Sleep Disturbances .....	73
Privacy .....	74
Trauma-Related ICU Interventions .....	75
Sleep Disturbances .....	76
Delirium .....	77
Sedation Practices .....	78
Memories .....	79
Distress/Agitation/Sense of Safety .....	81
Mechanical Ventilation .....	83
Chapter 5: Discussion .....	84
Summary of Key Findings and Themes .....	84
Ecological Perspective Revisited .....	85
Adaptation of Bronfenbrenner's Model for ICU Medical Trauma .....	85
Nature of EP Process: Reciprocal and Dynamic .....	88
Illustration: Applied Hypothetical Case Example .....	88
ICU Healthcare Professionals: Essential and Burnt Out .....	91
Essential and Influential Role .....	91
Stressful Work Conditions .....	92
Implications for Mental Health Treatment .....	93
Format, Setting, Modalities .....	94
COVID-19 Considerations .....	99
Observations and Limitations .....	101

Observations .....	101
Limitations .....	103
Suggestions for Future Directions .....	104
Practical .....	104
Research .....	107
Conclusion .....	109
REFERENCES .....	111
APPENDIX .....	151
IRB Non-Human Subjects Determination Notice .....	152

## LIST OF TABLES

Table 1.	Comparison of Captivity Stressors and Hospital Stressors (Hall & Hall, 2017) .....	30
----------	--	----



## LIST OF FIGURES

Figure 1. Bronfenbrenner's Ecological Theory (Adapted from Berger, 2007; Nick Stanger, 2011) .....	35
Figure 2. Ecological Model of ICU Medical Trauma .....	86

## DEDICATION

This dissertation is dedicated to my family, friends, mentors, all those who suffer medical traumatic stress, the mental health providers who see the human and the story behind every presenting concern, and the healthcare workers (particularly ICU nurses) who have poured themselves into healing and continue to see beyond the physical body and into the person.

I would particularly like to dedicate this work to my father, Kelly Hanson, and my sister, Jessica Hanson, who tragically lost their lives in the accident that led to my own traumatic injuries, hospitalizations, and medical traumatic stress. I felt their presence throughout this process.

Additionally, I would like to dedicate this dissertation to my mother, Belinda Hanson, my living sisters, Carrienne and Casie, my partner, Matthew Wheeler, my sons, Kellan and Owen Wheeler, my grandfather, Robert Visty, Sr., and my late grandmother, Peggy Hanson. My center is strong and my life is full because of you.

## ACKNOWLEDGEMENTS

I would like to acknowledge my chair, Dr. Shelly Harrell, for her support as an advisor, supervisor, and mentor throughout my doctoral education. Your soulful and humanistic approach to supervision, training, and mentorship allowed me to challenge and stretch my capacities. Thank you to my committee member, Dr. Robert deMayo. You humbly and thoughtfully share your depths of wisdom in a way that invites one in to join you in collaboration and grow as a result. Thank you to my committee member, Dr. Melissa Wasserman. I appreciate your commitment to supporting me throughout this process with your thoughtful feedback and attention to detail in my writing, your personal engagement, and your words of genuine support.

Thank you to my clinical supervisors and professors who have provided guidance in training and research. Special thanks to the directors of the Wright Institute Los Angeles, Dr. Claudia Feldman and Dr. Michele Gomes; to Dr. Michelle Zeller at the West Los Angeles Veterans Affairs Healthcare Center; to Dr. Karen Miller at the UCLA Longevity Center; and to Dr. Aaron Aviera at the West Los Angeles Pepperdine Community Counseling Center.

Thank you to the researchers who have contributed to the literature on medical trauma. In particular, thank you to Donald Edmondson, Michelle Flaum Hall, and Scott Hall.

And finally, thank you to my dear friends who have been intimately apart of my journey in one way or another: Nina Siggins, Ani Khatchadourian, Jennifer Carver, Kyle Dudley, Kaleigh Robinson, Kimberlee Hoertz, Katie Unruh, Amanda Regin, Paige Smith, Annie Baghrmian, Irina Rice, and Katie Singley.

## VITA

Jacqueline Hanson, MA

---

### **EDUCATION**

**Pepperdine University, Graduate School of Education and Psychology** May 2022

*Doctoral Student in Clinical Psychology, APA Accredited Psy.D. Program*

Clinical Competency Exam – Pass with Distinction

Dissertation – Pass with Distinction

**Pepperdine University, Graduate School of Education and Psychology** May 2011

*Master of Arts in Psychology*

**University of San Diego** May 2003

*Bachelor of Arts, Sociology*

*Bachelor of Arts, Political Science*

Summa Cum Laude

### **CLINICAL EXPERIENCE**

**Wright Institute Los Angeles, Los Angeles, CA** October 2019 -

Present

Psychological Intern

Supervisor: Claudia Feldman, Ph.D.

- Provide individual outpatient psychotherapy to a diverse range of adult patients utilizing a predominantly psychodynamic approach with eclectic/integrated influences, as indicated
- Maintain an active caseload of 10-14 patients, including maintenance of patient charts with session progress notes, intake reports (including diagnostic workup and treatment plans), termination reports, billing, and/or other administrative needs
- Participate in weekly case conferences, individual and group supervisions, and didactic courses
- Conduct weekly phone intake sessions for prospective patients and provide referrals as indicated
- Explore peer-reviewed journals to gather information concerning conceptualization, general treatment recommendations, and best practices for individual client issues and diagnoses

**Pepperdine Community Counseling Center, Los Angeles, CA** September 2011- June 2019  
Psychotherapy Extern

Supervisor: Shelly Harrell, Ph.D.

- Conduct comprehensive intake assessments and diagnostic interviews
- Write integrative intake reports including conceptualization, differential diagnosis, and treatment plans
- Provide brief and/or extended outpatient psychotherapy to clients from diverse backgrounds including couples, adults, and adolescents with a wide range of diagnoses
- Present clinical cases in weekly individual and group supervision
- Explore peer-reviewed journals to gather information concerning conceptualization, general treatment recommendations, and evidenced-based practices for individual client issues and diagnoses
- Administer and interpret measures to monitor intervention response and therapeutic alliance

**Pepperdine Community Counseling Center**, Los Angeles, CA      October 2018 – June 2019

Peer Consultant  
2017

September 2016 - June

Supervisors: Aaron Aviera, Ph.D. and Robert deMayo, Ph.D.

- Provide weekly “peer to peer” clinical consultation to first- and second-year doctoral students in areas of intake interviewing, intake report writing, clinical case notes, case conceptualization, diagnosis, treatment planning, fluid case presentation, and general case management
- Participate in case conference meetings with first-year students and prepare consultees to present cases
- Participate in weekly group supervision with fellow peer consultants to discuss supervisory issues and collaborate about optimal interventions for managing concerns and improving students’ skills

**Peter Burnett Elementary School**, Hawthorne, CA  
2017

September 2016-May

Psychotherapy Extern

Supervisor: Keegan Tangeman, Psy.D.

- Conduct comprehensive intake assessments and diagnostic interviews with students, primary caregivers, teachers, and relevant school staff
- Write integrative intake reports including conceptualization, differential diagnosis, and treatment plans
- Provide weekly individual cognitive behavioral therapy on-site to elementary students
- Collaborate with teachers and caregivers in executing treatment plans and tracking progress across contexts
- Present clinical cases in weekly group supervision

**West Los Angeles Veterans Affairs Healthcare Center**, Los Angeles, CA

September 2014 -

May 2015      Psychology Pre-Intern  
*Rehabilitation Psychology*

Supervisor: Michelle Zeller, Psy.D., ABPP/CN

- Perform bedside consultation and brief diagnostic, psychological, neuropsychological, and suicide assessments; evaluate decision-making capacity; and provide supportive interventions for patients in the acute rehabilitation unit
- Formulate and share with healthcare providers streamlined assessment reports including medical and mental health history, assessment results, impressions, and recommendations
- Connect veterans to indicated resources both within and outside the VA healthcare system

*Primary Care Mental Health Integration (PC-MHI)* Supervisor: Suzie Chen, Ph.D.

- Collaborate with the team of co-located mental and behavioral healthcare services personnel, including psychologists, psychiatrists, nurse care managers and primary care providers to address mental health needs of patients with mild to moderate mental health issues, including depression and anxiety, PTSD, chronic illness, multiple medical problems, sleep disorders, pain disorders, and substance abuse
- Provide walk-in “curbside” psychological consultations through PC-MHI’s Open Access, including brief assessment and/or treatment
- Perform scheduled intake evaluations including brief screeners and assessments
- Provide short-term (4-6 week) therapy with evidence-based practice interventions to PC-MHI patients
- Participate in weekly team meetings, including case presentations, didactics, and programmatic discussions

*Health Psychology*

Supervisor: Charles McCreary, Ph.D.

- Provide group behavioral health interventions in the MOVE weight loss program: participate in patient didactic courses on nutrition and health and provide brief individual behavioral therapy
- Participate in *Biofeedback* component of Health Promotion and Disease Prevention Programs to help veterans regulate their physiological stress response
- Perform brief assessments and supportive interventions for patients in the Hematology/Oncology clinic, evaluating patients for current functioning, coping skills, and any underlying mental health issues

*Neuropsychology*

Supervisor: Charles H. Hinkin, Ph.D., ABPP-CN

- Provide neuropsychological and psychological assessments to outpatient veterans (ages 18-90) referred for neurological disorders including mild cognitive impairment (MCI), dementia, stroke, epilepsy, mild head injury, ADHD, psychiatric disorders, and other neuro-degenerative or neurological disorders.
- Review medical records using VA’s Vista and CPRS programs and create appropriate test batteries

- Write assessment reports integrating patient history, medical records and available neuroimaging studies
- Participate in feedback sessions with patient and family to discuss results and recommendations
- Attend weekly individual and group supervision and provide formal case presentations

## **UCLA Semel Institute for Neuroscience & Human Behavior, Los Angeles, CA**

August 2012 - July 2013

Neuropsychology Extern, Longevity Center

Supervisor: Karen Miller, Ph.D.

- Provide weekly neuropsychological and psychological assessments to outpatient adults (ages 25-90) referred for neurological disorders including mild cognitive impairment (MCI), dementia, mild head injury, psychiatric disorders, and other neuro-degenerative or neurological disorders
- Write assessment reports integrating patient history, medical records, and available neuroimaging studies
- Participate in feedback sessions with patient and family to discuss results and recommendations
- Participate in *Memory Care* group for individuals diagnosed with dementia, providing cognitive rehabilitation interventions and supportive care; co-facilitate supportive group therapy for caregivers of patients with dementia
- Conduct clinical interview and administer neuropsychological test battery to participants enrolled in various research studies related to aging and cognitive decline. Generate a brief research report integrating background information, relevant medical records, neuroimaging findings, and neuropsychological test results, including a diagnosis for research classification
- Attend weekly individual and group supervision and provide formal case presentations
- Attend weekly neuropsychology didactics targeted for postdoctoral fellows through the UCLA Medical Center & Semel Institute

## **RESEARCH EXPERIENCE**

### **Clinical Dissertation**

February 2021-March

2022

Pepperdine University, GSEP, Los Angeles, CA Chair: Shelly Harrell, Ph.D.

- Topic: ICU-Related Medical Trauma: A Socioecological Exploration of Contributing Factors and Experiences of Traumatic Stress in Adult ICU Survivors
- Utilizing an ecological perspective, critically review and synthesize literature related to patient- specific features, ICU setting, clinical, and staff factors, and immediate interventions to understand ICU-related traumatic stress more

thoroughly, offer treatment considerations, and offer suggestions for future research

•  
**PEaCE Research Lab for Promotion of Wellness and Community**

July 2014 - Present

Pepperdine University, Los Angeles, CA Research Lab Member

Director: Shelly Harrell, Ph.D.

- Collaborate with research team dedicated to work that highlights, emphasizes, and/or finds new ways of incorporating, recognizing, and paying tribute to the differing cultural needs of historically oppressed and marginalized communities in psychological interventions
- Assist in development of Resilience and Reconnection (R&R) Stress Management Group interventions, training manual, and facilitator guide, which focuses on positive well-being and connection
- Distribute measures and gather data related to development of new Multidimensional Well-Being Assessment (MWA) measure and analysis of psychometric properties

**Trauma and Military Research Lab**

July 2012 -

January 2013

Pepperdine University, Encino CA Research Lab Member

Director: David Foy, Ph.D.

- Conducted research related to moral injury and substance use disorders in Vietnam veterans utilizing NVVRS database and case control design
- Assisted in development of treatment guidelines and content for training video for Veterans Affairs chaplains and other mental health clinicians to treat moral injury in soldiers and veterans from multiple religious perspectives related to themes of guilt, shame, acceptance, purification and forgiveness
- Met with research team weekly to discuss and review relevant literature, intervention techniques, and management of ongoing projects

**Graduate Research – Pepperdine University, Los Angeles, CA**

September 2010 – December 2010 Student Researcher

Supervisor: Yuying Tsong, Ph.D.

- Research topic: Exploring Veterans Affairs Clinicians' Experiences in Treating Combat Veterans with Post-Traumatic Stress Disorders: How Can Clinicians Working with Trauma Populations Reduce the Risk of Vicarious Trauma and Compassion Fatigue?
- Obtained IRB Certification
- Performed a comprehensive review of the available and relevant literature
- Conducted four semi-structured interviews with Veterans Affairs clinicians who treat veterans with PTSD
- Applied appropriate qualitative methodological and data analysis techniques to the clinical setting (specifically, CQR with auditor for validity)
- Produced integrated research report, including Introduction, Review of Literature, Methodology, Results, and Discussion sections



## **RELATED VOLUNTEER EXPERIENCE**

**Immigrant Families Together California, Los Angeles** September  
2018-Present

- Connect immigrant families to mental health resources to cope with stresses related with deportation and immigrant status
- Increase awareness of the organization in effort to raise money and enhance resources via social media platforms and networking

**Veterans Affairs PTSD Clinical Team, Los Angeles** October  
2010 - June 2011

Group Therapy: PTSD and Substance Abuse; Communications Didactics

Invited by: Leslie Martin, LCSW

- Observed and participated in PTSD and Substance Abuse group therapy sessions and communications didactics seminars
- Observed and provided psychoeducation to veterans regarding trauma, including substance abuse/dependence, communication and relational difficulties with family and significant others, and emotional regulation difficulties as a result of combat experiences
- Provided empathy, warmth, and understanding to group members while exploring difficulties resulting from combat experiences

**Pregnant Minor Program, San Diego, CA** January 2002 - June 2002

- Acted as mentor to pregnant teens in low-income alternative high school
- Provided assistance with homework and completion of G.E.D.
- Provided education and assistance locating community resources in the following areas: nutrition, pediatric healthcare, adult healthcare, housing, and employment

**Migrant Workers Program, San Diego, CA** October 2000 - August  
2001

- Provided functional English language assistance to migrant workers aimed to assist workers in negotiating fair wages
- Provided groceries for migrant workers to support their nutritional integrity
- Celebrated mass and collaborated with migrant workers to maintain faith and provide additional spiritual, mental, and emotional support

**Linda Vista Leaders, San Diego, CA** September 1999 - May  
2001

- Acted as mentor to low-income children (ages 6-9)
- Raised money and awareness for Linda Vista Community Center on USD campus and in Linda Vista Community

- Tutored children, read stories, played sports, participated in activities with an emphasis on building community, and provided warmth and empathic understanding

## **PROFESSIONAL EXPERIENCE**

**Law, Brandmeyer & Packer, L.L.P** – Medical Malpractice Defense Firm 2007-2011  
Pasadena, CA

- Summarized medical records
- Transcribed, edited, and formatted partner and associate correspondence, legal pleadings, medical record summaries and deposition summaries
- Maintained client files and managed associate calendars

## **PROFESSIONAL AFFILIATIONS AND MEMBERSHIPS**

2011 – Present	<i>American Psychological Association</i> , Student Affiliate
2011 – Present	<i>Psi Chi</i> , International Honor Society in Psychology, Member
2010 – 2012	<i>Mindsight Institute</i> , Community Member
2000 – 2003 Member	<i>Alpha Kappa Delta</i> , International Honor Society in Sociology,
	• Chair of Community Service, USD Chapter, 2002-2003
2000-2003 Member	<i>Pi Sigma Alpha</i> , International Honor Society in Political Science,
	• Chair, USD Chapter, 2002-2003

## **SELECTED PROFESSIONAL ACTIVITIES & SEMINARS ATTENDED**

11/2021	<b>Psychoanalytic Group &amp; The Chicago School of Professional Psychology</b> Virtual Event Martha Stark Relentless Hope: The Refusal to Grieve
10/2021	<b>William Alanson White Institute</b> New York, NY (Virtual Event) Colloquim Series “Extraordinary Knowing: Case Studies of Bipersonal Communication”
06/2021	<b>New Center for Psychoanalysis</b> Virtual Event Martha Stark “A Heart Shattered, the Private Self, and a Life Unlived. An Existential-Humanistic Approach to Relentless Despair”
08/2010 – 06/2012	<b>Mindsight Institute</b> , Santa Monica, CA  Dan Siegel, M.D.

*Mindsight Lecture Series* year-round attendee

- Attended over 20 lectures regarding how to cultivate the development of an integrated brain, empathic relationships, and a healthy mind, with a focus on: principles of interpersonal neurobiology, the latest science regarding emotional and social intelligence, the social brain, neuroplasticity, and the neurological correlates and influences of attachment, amongst others.

2011                    **Meditation and Real Happiness**, Santa Monica, CA  
Sharon Salzberg

2009                    **Buddhist Psychology and Interpersonal Neurobiology**, Los Angeles,  
Jack Kornfield and Dan Siegel, M.D.

### **AWARDS AND SCHOLARSHIPS**

2022                    Psy.D. Dissertation, Pass with Distinction  
2015                    Psy.D. Clinical Competency Examination, Pass with Distinction  
2005                    Full tuition scholarship, Loyola Law School, Los Angeles, CA  
2003                    *Summa Cum Laude*, University of San Diego  
2000-2003            Academic Achievement Award, University of San Diego  
1999-2003            Full tuition scholarship, University of San Diego

## ABSTRACT

Advances in biomedical technologies and critical care are leading to increased survivorship rates of ICU patients. During critical care, patients confront a variety of stressors that may contribute to adverse psychological outcomes, including posttraumatic stress. The nature of posttraumatic stress in this population differs from that associated with traditional trauma. The phenomenon of medical trauma in ICU survivors is complex: it is highly subjective, exists on a continuum, is cumulative in nature and carries cumulative effects, involves a combination of endogenous and exogenous, physical and emotional stressors that vary in intensity and duration, occurs in an interpersonal context that involves medical professionals, and takes place in a controlled setting with particular sensory and architectural features. This dissertation adopts an ecological perspective to explore the individual and contextual dimensions of this phenomenon and how these mutually and dynamically influence one another. A critical review of the literature examines multiple levels and variables of influence: individual (e.g., age, sex, race/ethnicity), clinical (e.g., sedation, mechanical ventilation, restraints), relational (e.g., nature and quality of interactions with staff) and environmental (e.g., lighting, noise, privacy) and includes a review of interventions initiated in the ICU that aim to mitigate medical trauma (e.g., ICU diaries, eye masks, sedation vacations). Results elucidate the nature of the relationship between and amongst variables and show that clinical features represent the most significant risk factors while empathic, patient-centered interventions and approaches to care can cushion the impact of stressors. Treatment implications for individual outpatient therapy include the importance of establishing safety, knowledge about the nature of this type of trauma, and the awareness of the unique intrusion and avoidance symptoms in this population. There are special considerations for applicability of the data to COVID-19. Establishment of a unified construct, psychoeducation for staff, families, and patients, interdisciplinary and collaborative ICU teams, and use of technology are practical applications indicated from the review. Future research is needed that includes examination of the impact of race/ethnicity, socioeconomic

status, and social support, utilizes the Enduring Somatic Threat (Edmondson) and/or Medical Trauma (Hall & Hall) models, and explores the influence of personality and resilience features.

## **Chapter 1: Introduction**

### **Introduction**

The intensive care unit (ICU) presents unique, stressful demands upon its patients. It is a time of great vulnerability, as the patient's very survival is at risk and life-saving medical treatments are administered. Despite pushes towards interdisciplinary and holistic, person-centered approaches to care, ICU healthcare teams are staffed predominantly with medical professionals and the patient's physical body is the primary focus (Hall & Hall, 2017). From the moment of admission to discharge, the patient's physical state is vigilantly monitored and tended to with the tracking of objective data markers reflecting internal systems' functioning, such as blood pressure, oxygen saturation levels, and heart rate. Thanks to this attentive care and advances in critical care medicine and biomedical technologies, most of these ICU patients survive and are eventually able to return home (Barrett et al, 2014; Davydow et al, 2008). However, during their ICU stay, the psychology of the patients – their internal world that is much more difficult to discern – as well as their long-term emotional well-being is often secondary or at times disregarded (Hall & Hall, 2017). Shifting the focus away from the physical body and towards the embodied mind, this author's review of the available literature indicates the presence of suffering that for many years has been silent and/or underappreciated (Caiuby et al., 2010; Hall & Hall, 2017).

We now more intimately understand that ICU patients endure a significant amount of physical and emotional stressors during their hospital course (Jones et al., 2007; Kiekkas et al., 2010; McGiffin et al., 2016). Regardless of the admission context (e.g., serious accident, heart attack, stroke, respiratory arrest), a patient's experience is typically marked both by an abrupt and potent fear of death and feelings of powerlessness (Cyr et al., 2021; Davydow et al., 2008; Hatch et al., 2011). In the absence of a distinct "medical trauma" category in the Diagnostic and Statistical Manual of Mental Disorders (DSM; 5<sup>th</sup> ed.; DSM-5; American Psychiatric Association, 2013) that would capture the experience most accurately (Jackson et al., 2007), outcomes thus

far have included diagnosable disorders such as depression, adjustment disorder, anxiety, acute stress disorder (ASD), and posttraumatic stress disorder (PTSD), subthreshold symptoms in these areas, and compromised functioning in physical, relational, and occupational realms (Angus et al., 2003; Bienvenu & Neufeld, 2011; Davydow et al., 2009; Griffiths et al., 2007; Holbrook & Hoyt, 2004; Righy et al., 2019). Given the pre-pandemic average of 4.6 million ICU admissions per year (Barrett et al., 2014), and survivorship rates of about 80%-90% (Angus et al., 1996; Wu et al., 2002; Young & Birkmeyer, 2000), ICU-related medical trauma is an important area of focus for medical and mental health professionals alike in order to better understand and mitigate, prevent, and treat the phenomenon.

This is a tall order, however, given the complex nature of this type of trauma. ICU medical trauma occurs within a person operating inside of a system with many dynamic features. Patient-specific factors (e.g., demographics, preexisting mental health difficulties, history of trauma) interact with the environmental (e.g., ICU setting architectural and sensory experiences), relational (e.g., healthcare staff), and clinical factors (e.g., mechanical ventilation, delirium) unique to an ICU, all in a complex and charged field (Hall & Hall, 2017). Furthermore, the source of the most significant traumatic threat in an ICU patient often resides internally, within one's own body system. Adult medical trauma research is relatively new, and thus far most studies have adopted a narrow focus, highlighting either one particular critical illness (e.g., respiratory arrest; sepsis), a specific clinical feature (e.g., delirium; benzodiazepine administration), or looking at one psychological outcome (e.g., depression; PTSD; Cyr et al., 2021; Davydow et al., 2008). This dissertation adopts an ecological perspective and a wide scope as it examines the existing research related to patient-specific features, ICU clinical, staff and setting factors, and immediate trauma interventions in an effort to understand ICU-related traumatic stress more thoroughly, offer treatment considerations, and offer suggestions for future directions.

## **Organization of Contents**

This dissertation discusses a broad and complex phenomenon, examines data regarding specific factors that may contribute to the phenomenon, and discusses the findings and implications from the examination. The author's intent is to discuss empirical data while keeping the humanity of the subject alive. As such, it begins with a snapshot of the ICU experience from the patient's perspective. The research challenges and limitations related to studying the phenomenon of medical trauma in adult ICU survivors, as well as statistics related to the population, prevalence, and outcome of interest are introduced. A review of the general construct of trauma is provided, followed by a thorough review of the concept of medical traumatic stress, which includes foundational elements from the pediatric world and two important models, Edmondson's Enduring Somatic Threat (EST; 2014) and, most central to this dissertation, Hall and Hall's (2017) formulation of the concept of "medical trauma". Bronfenbrenner's ecological perspective and systems model (1975) provides the framework for the individual- and microsystem-level factors that are critically reviewed. This theory is introduced along with a brief discussion of some exosystem- and macrosystem-level factors that may influence an ICU patient. The methods for review are outlined along with the specific aims and objectives of the analysis. Results of the review of literature regarding the selected variables for analysis are presented, followed by a discussion that reintroduces the ecological perspective's framework, provides an applied case example, discusses treatment implications, and suggests future areas of practical and research focus.



## **Chapter 2: Review of Relevant Literature**

### **Snapshot of ICU Patient Experience**

Even with the best of care and life-preserving intentions, a patient's experience in an ICU can often be disorienting, dehumanizing, and psychologically harmful (Davydow et al., 2008; McGiffin et al., 2016). While a patient's naked body is covered only with a hospital gown, they experience reduced control over many aspects of ordinary life, such as routine, diet, mobility, and even toileting (Hall & Hall, 2017). The lack of tethers to the ordinary is amplified by the fact that patients are also cut off from the roles and functions of their normal daily lives. Privacy and autonomy are limited or absent. Medical staff enter and exit according to schedules unknown and often unpredictable to the patient. Sleep is disturbed frequently. The cool-white fluorescent lights, frequent beeping of machines, odors, and frigid temperature in rooms are stimuli that – unpleasant in and of themselves – can become richly encoded and associated with the patients' experiences while they struggle to survive a critical condition (Ehlers & Clark, 2000; Hall & Hall, 2017). Furthermore, patients are often in pain and some must endure painful, invasive life-saving interventions, such as endotracheal intubation and suctioning, nasogastric intubation, or electrical cardioversion (shock; Jones et al., 2007; Kiekkas et al., 2010). Pain, respiratory insufficiency, sleep disturbance, and/or heavy use of strong medications can lead to delirium, perceptual disturbances, and even psychosis (Davydow et al., 2008). Many patients experience communication limitations (McGiffin et al., 2016; Righy et al., 2019). All of this occurs in the context of a critical condition, which is, by definition, life threatening and typically accompanied by fear of impending death. As a result, many patients are eventually discharged home in stable physical condition but with unrecognized psychological impacts related to their stay (Peris et al., 2011). Expanded awareness of and appreciation for ICU survivors' experiences is important, and there has been increased research attention in recent years; however, studying a psychological phenomenon that occurs in a medical context (two distinct disciplines with a high volume of research contributions) poses a number of challenges.

## **Challenges in Studying ICU Medical Trauma**

The majority of the current ICU literature in general remains unsystematic. It is derived from multiple disciplines (e.g., medical psychiatry, psychology, social work, emergency medicine, critical care medicine, nursing, anesthesiology, or other areas of specializations) and often uses different research methods (McGiffin et al., 2016). Variable assessment and methodological techniques are utilized that differ in focus, design study, and timing of inquiry (McGiffin et al., 2016). Even the phenomenon of post-ICU psychological distress is referred to in the literature in different ways, including PTSD, ICU psychosis (Misak, 2005), postintensive care syndrome (PICS; Davidson et al., 2013), and post-psychosis PTSD (McGiffin et al., 2016; Wade et al., 2014). Additionally, research has typically focused on specific medical events paired with specific diagnoses (e.g., delirium and psychosis; respiratory arrest and anxiety), making it difficult to generalize findings (McGiffin et al., 2016).

Furthermore, because ICU patients are often admitted under traumatic contexts (i.e., a life-threatening injury or critical illness), isolating the ICU experience as a stressor has historically been an area of concern (McGiffin et al., 2016). However, after controlling for disease-related variables, O'Donnell and colleagues (2010) identified an independent association between ICU admission and the development of PTSD and Hatch et al., (2011) also addressed this and determined:

Whilst life-threatening injuries requiring ICU admission are frequently perceived as more psychologically traumatic, there is an increasing body of evidence suggesting a dependent relationship between ICU admission and the later development of PTSD, irrespective of the events preceding ICU admission. (p. 1)

Finally, as indicated above, ICU stays often involve debilitating physical states, disease, intense sedation, delirium, restraint, and/or invasive, unpleasant, or painful life-saving medical treatments (McGiffin et al., 2016). These may prevent the formation of cohesive memories and impact how patients experience and recall their stay later, further complicating both quantitative and qualitative research (Granja et al., 2005; McGiffin et al., 2016; Needham, et al., 2012).

Although these factors may make it more difficult to analyze and synthesize the heterogeneous literature related to post-ICU psychological distress, it does not diminish the value of the information generated from such research.

### **ICU Survivors: Population and Prevalence**

Each year about 4.6 million people are admitted to the ICU in the United States (Barrett et al., 2014). A patient is admitted or transferred to the ICU when he or she remains in critical or unstable condition due to illness, injuries, or complications from surgery (Hall & Hall, 2017). Neurological, cardiac, respiratory, and post-surgical conditions typically dominate admissions (McGiffin et al., 2016). Even prior to the coronavirus disease 2019 (COVID-19) pandemic, the number of patients experiencing a stay in an ICU was increasing. From 2002-2009, ICU stays rose at triple the rate of general hospital stays and the reason was uncertain (Barrett et al., 2014). The early phases of the COVID-19 health crisis and subsequent case and variant surges have led to unprecedented numbers of ICU patients requiring longer stays, with data from 2020 and 2021 showing ICU bed capacities across regions at 80%-90% full and sometimes exceeding 100% (Department of Health and Human Services, 2020).

Improvements in critical care medicine and biomedical technologies have been substantial over the last few decades, resulting in a survivorship rate of 80-90% (Angus et al., 1996; Wu et al., 2002; Young & Birkmeyer, 2000). The population of ICU survivors is thus growing significantly. Over the last decade in particular, researchers have begun to turn their attention to longer-term outcomes and quality of life for these critical care survivors, including psychiatric consequences (Cyr et al., 2021; Warlan & Howland, 2015).

### **Prevalence of Post-ICU Psychopathology**

Research examining the experiences of patients in the ICU as well as the psychological responses common for longer stays (> 4 days) has yielded concerning data (Hall & Hall, 2017; McGiffin et al., 2016). It is estimated that over half of ICU survivors (55%) will experience psychological difficulties secondary to their experiences (Wade et al., 2012), with recent studies

estimating that 25%-75% of ICU survivors will develop difficulties associated with anxiety, depression, PTSD and/or cognitive impairment (Makic, 2016). Thus, even with conservative estimates, research points to considerable evidence that symptoms of depression, anxiety, and PTSD occur more often in ICU survivors than the general population (Davydow et al., 2013). Although PTSD has received the most research attention, depression and anxiety (Davydow et al., 2009; Rattray et al., 2005), cognitive impairment (Carr, 2007; Jackson et al., 2007), sleep disruption (Fanfulla et al., 2011), delirium (Pandharipande & Ely, 2006), quality of life (QOL; Dowdy et al., 2005; Granja et al., 2005), family and social network distress (Jones et al., 2004; Myhren et al., 2009), and trans-diagnostic general distress (Myhren et al., 2009) have been explored (Hall & Hall, 2017; McGiffin et al., 2016). As indicated previously, the majority of research related to psychological impacts of medical trauma focuses on specific medical predictor variables and their association with a given psychiatric diagnosis (e.g., respiratory arrest and PTSD; stroke and depression; Cyr et al., 2021; Davydow et al., 2008; McGiffin et al., 2016). While many patients may develop symptoms that meet criteria for DSM-5 clinical disorders, others may not experience their stay as traumatic at all, and/or many others may develop emotional and psychological symptoms beneath the clinical threshold required for a full diagnosis. It is important not to view a trauma response dichotomously, but rather on a continuum, and recognize that a patient may experience many complex reactions not captured by a DSM diagnosis that are worthy of attention (Hall & Hall, 2017).

### **Prevalence of ICU-Related PTSD**

A 2021 study of PTSD prevalence in medical populations in general found intraoperative awareness and ICU stays were most frequently associated with PTSD (Cyr et al., 2021). The authors hypothesized two reasons for this outcome in ICU patients: (a) "ICU stays can encompass several traumas, starting with the accident or severe acute disease that required the ICU admission, plus the additional medical care or complications while in the ICU" (Cyr et al., 2021, p. 84); and, (b) "the patients are exposed to mechanical ventilation or significant

alterations in gas exchange that can affect brain function” (Cyr et al., 2021, pp.84-85; which is associated with increased anxiety and delusional memories; Rose et al., 2014).

Posttraumatic stress responses in ICU survivors have received significant research focus. Studies have found that, when compared to the general population, PTSD occurs about twice as often in ICU survivors (Righy et al., 2019). Precise prevalence estimates vary greatly, however. Griffiths et al.’s 2007 systematic review cited rates of PTSD following an ICU stay that ranged from 5%-64%. The variation was attributed to the aforementioned complications involving multiple disciplines, measurement techniques, foci (causal vs. predicative factors), and use of different methodologies in design study, timing of inquiry, and outcomes of interest (McGiffin et al., 2016). One of the most recent, thorough, and robust studies – Righy et al.’s 2019 systematic review and meta-analysis of PTSD symptoms in adult ICU survivors – indicated an overall prevalence of PTSD symptoms of 19.83%, with expected prevalence ranging from 3.7%-43.73%. Their review also examined multiple time points after discharge and found the following prevalence estimates: 15.93% at 3 months, 15.80% at 6 months, 18.96% at 12 months, and 20.21% > 12 months after discharge. Thus, they found overall that in the year following discharge, about one in five ICU survivors develops PTSD symptoms, that prevalence increases over time in patients who have not received PTSD treatment, and that clinicians should anticipate a high expected prevalence 12 months after discharge (Righy et al., 2019). Notably, despite the high prevalence of PTSD, the researchers also posited that the disorder is still likely underdiagnosed in survivors given the unique symptom cluster and the threshold required to meet criterion A of PTSD’s exposure variable (Righy et al., 2019). This once again highlights the value a distinct diagnostic category or trauma subtype could offer.

### **Trauma: Features, Definitions and Theory**

In exploring the concept of medical trauma in an ICU survivor, it is important to look at the general construct of trauma and foundational aspects of trauma theory and observe how these may apply to medical trauma.

## ***Features and Definitions***

The phenomenon of trauma is conceptualized and defined in different ways both within the field of psychology and in the mainstream public. Definitions, what constitutes a trauma, its boundaries, the threshold required for something to be deemed “traumatic” and what mitigates a trauma’s effects are deliberated amongst scholars, practitioners, and lay people alike (McNally, 2003). Despite these debates, there are some features that are widely accepted. Most contemporary thinkers agree that, at its core, trauma involves experiencing a danger or threat (American Psychiatric Association [APA], 2013), and: is a complex and subjective phenomenon (Bloom, 1997; van der Kolk, 2014); exists on a continuum (is not an all-or-nothing experience)(van der Kolk, 2014); involves intense feelings of powerlessness and helplessness (Herman, 1997); overwhelms an individual’s capacity to effectively cope with a situation (McCann & Pearlman, 1990; van der Kolk, 2014); triggers a biophysiological stress response (i.e., activates HPA axis; Ogden et al., 2006; van der Kolk, 2014); can be cumulative in nature and/or carry a cumulative effect (Levine, 2010); and can impact the way in which an individual perceives the world or others as predictable, safe, and benevolent (APA, 2013; Janoff-Bulman, 1992). This speaks to the complex and extensive nature of trauma, as it can influence the biophysiological, cognitive, behavioral, relational, spiritual, psychological, and/or existential dimensions of an individual’s life (APA, 2013; Bloom, 1997; Janoff-Bulman 1992; Levine, 2010; Ogden et al., 2006; Scaer, 2005; van der Kolk, 2014).

Cultural historians observe that contemporary conceptualizations of PTSD are relatively new, and that the phenomenon, rather than having “the timeless universality and intrinsic unity assumed in our received notions of the disorder, has only recently been ‘glued together’” (Gone & Kirmayer, 2010, p.74). The concept of trauma has roots in 15<sup>th</sup> century Greece (where trauma meant “wound” and described physical injuries); however, it now encompasses a variety of understandings of suffering while retaining specific, institutionalized meanings (Merriam-Webster, n.d.). Within the psychological community, trauma is defined as “an emotional

response to a terrible event like an accident, rape, or natural disaster” (APA, 2013, p. 274). Trauma theorist, Judith Herman (1992), proposes that trauma is “...an affiliation of the powerless. At the moment of trauma, the victim is rendered helpless by overwhelming force....Traumatic events overwhelm the ordinary systems of care that give people a sense of control, connection, and meaning” (p. 33). McCann & Pearlman (1990) posit that an event is traumatic if it is “(a) sudden, unexpected, or non-normative, (b) exceeds the individual’s perceived ability to meet its demands and (c) disrupts the individual’s frame of reference and other central psychological needs and related schemas” (p. 10). Notably, these conceptualizations, as well as most mainstream and theoretical definitions of trauma, identify the location of the threat as external to the victim. In ICU patients, a critical illness or critical health condition is often the most significant threat to survival and resides internally (Edmondson, 2014), although interventions utilized in the treatment of the critical illness may certainly add to the experience of trauma, especially when they are invasive, painful, and/or mind-altering.

**Subjective Phenomenon.** With regards to the subjective nature, role of cognitive appraisal, and importance of meaning-making in trauma, there is consensus among many contemporary thinkers that a given event is not inherently traumatic, but it is how one experiences the event (i.e., one’s subjective experience) that makes it so (Herman, 1997; Levine, 2010; Ogden et al., 2006; van der Kolk, 2014; Williams & Sommer, 2002). Indeed, Davidson and Foa (1991) made convincing arguments to include subjective experience in diagnostic conceptualization; however, its predictive utility was determined to be unreliable (Hathaway et al., 2010; Kubany et al., 2010; Pereda & Ferero, 2012), and ultimately that dimension of the exposure criterion was excluded from the most recent edition of the *DSM* (5<sup>th</sup> ed; APA, 2013). Despite this, researchers have continued to examine and highlight the importance of subjectivity in experiences that may be traumatic (Rubin et al., 2008) and more recent conceptualizations of trauma recognize that “the same event will be experienced

differently based upon a range of variables including cultural context and social and psychological factors unique to the individual” (Knight, 2015, p. 26; see also Elliott & Urquiza, 2006). While perspectives that highlight the importance of these features in the role of trauma aim to privilege the subjective experience of the individual over rigid institutional notions, they may run the risk diagnostically of “conceptual bracket creep” [within] “an ever-widening field of adverse events is subsumed under Criterion A [PTSD in DSM-5]... and moves one bracket closer toward rendering the construct of PTSD meaningless” (McNally, 2003, p. 39; see also Rosen, 2004). Indeed, the idea that if someone experiences a situation as traumatic, then it is trauma (Hall & Hall, 2017) has led to concerns about dilution of the construct in its gross overuse in describing experiences as traumatic that may be better accounted for as something upsetting or distressing (Rosen, 2004). This also speaks to the importance of understanding trauma on a continuum, where there are gradations of intensity of both the traumatic stressor and one’s response, as opposed to an all-or-nothing designation.

**Psychophysiological Phenomenon.** The notion that trauma is subjective, involves a mind-body connection, may be cumulative, and can extend beyond the DSM’s boundaries of what constitutes a “traumatic event” has been appreciated by somatic psychologists (Levine, 2010; Ogden et al., 2006). Levine’s website that describes the theory and practice of somatic experiencing (SE), indicates:

Trauma may begin as acute stress from a perceived life-threat or as the end-product of cumulative stress. Both types of stress can seriously impair a person’s ability to function with resilience and ease. Trauma may result from a wide variety of stressors such as accidents, invasive medical procedures, sexual or physical assault, emotional abuse, neglect, war, natural disasters, loss, birth trauma, or the corrosive stressors of ongoing fear and conflict (Levine, What is Somatic Experiencing section, para.3, 2021).

The appreciation for the intimate interconnection between one’s physical and emotional self has grown as cartesian notions of a mind-body dualism have been debunked (Ogden et al., 2006; Porges, 2011; van der Kolk, 2014). Thanks to advancements in neuroscience, trauma,



and the brain, trauma is now understood to be a complex psychophysiological phenomenon (van der Kolk, 2014). The integration of data from these fields has elucidated what occurs when the body's stress-response system (particularly the HPA axis) is activated when it detects stressful stimuli and initiates a regulatory response (Porges, 2011). Research related to adverse childhood events (ACEs), combat trauma, and complex trauma has also contributed to our understanding about toxic stress and what may transpire if this type of activation becomes a patterned reaction to stressors. Some of the detrimental consequences of the repeated traumatic stress response and high levels of stress hormones include impacts on physical health (e.g., shortened telomeres, compromised heart health, reduced immune functioning, increased risk of chronic illness; Greenfield, 2010; Monnat & Chandler, 2015; Price et al., 2013), cognitive functioning (e.g., difficulty maintaining focus, reduced cognitive flexibility, learning and memory deficits secondary to hippocampal changes; Bick & Nelson, 2016), mental health (e.g., reduced adaptability, increased social isolation reduced self-esteem, increased dissociation, reduced stress threshold and increased reactivity to minor stressors, increased anger hostility, depression, anxiety, relational difficulties; Anda et al., 2006; Elliott et al., 2005; Oates, 1984; Teicher et al., 2003); and lifespan in general (in severe cases, life expectancy may be reduced by 20 years; Bauldry et al., 2012; Bonomi et al., 2008; Felitti et al., 1998; Kelly-Irving et al., 2013).

### ***Theory***

**Theory: Judith Herman.** Judith Herman's contributions (1997) related to psychological trauma were developed out of her clinical work with combat veterans and victims of sexual assault, domestic violence, and political terror (i.e., conventional, violent traumas), but many features apply equally to medical trauma survivors. In her foundational text, *Trauma and Recovery*, Herman (1997) names the existential threats to connection and meaning and threats to life and bodily integrity that are implanted by trauma. The feeling that one has a sense of control, connection, and meaning is removed such that "helplessness constitutes the essential

insult of trauma” (p. 41), as victims no longer feel agency over their own lives. All of these are significant aspects of the medical trauma picture, particularly in ICU patients.

Herman (1997) also discusses how a trauma can challenge global assumptions of basic trust and a sense of safety in the world by ripping away an individual’s sense of power and control. Patients in an ICU immediately lose their sense of assumed health and control over their bodies. One of the insults of a medical trauma is the altered relationship one has to their physical body. And yet, many trauma recovery models, including Herman’s (1997), involve first re-establishing safety and control within one’s body. The sense of bodily integrity and control over one’s body as a patient fights a disease or subjects themselves for a procedure is compromised (Esposito, 2016; Hall & Hall, 2017). An internal disease threat shifts the way in which an individual relates to their physical self as safe (Esposito, 2016). This important element is often neglected in traditional trauma models. There are aspects of Herman’s model of recovery (1997) that do apply, including her assertion that “helplessness and isolation are the core experiences of psychological trauma... and empowerment and reconnection are the core experiences of recovery” (p. 197). In order to find a path through their distress, ICU survivors struggling with traumatic stress must re-establish a sense of power and control to combat their feelings of helplessness and make efforts to mitigate isolation and enhance connection (Bloom, 1999; Herman 1997; Saakvitne, 2017).

**Theory: Sandra Bloom.** Sandra Bloom’s work (1997; 1999) related to trauma treatment speaks to the impacts on cognitions (memory), attachment systems, spirituality, identity, and existential concerns. While her contributions were borne out of her work with an inpatient clinical population of victims of childhood sexual abuse, the themes transcend this population and are applicable to ICU survivors. Bloom (1999) states, “a traumatic experience impacts the entire person – the way we think, the way we learn, the way we remember things, the way we feel about ourselves, the way we feel about other people, and the way we make sense of the world are all profoundly altered by traumatic experiences” (p.1). Any patient admitted to an ICU –

whether it be subsequent to a traumatic accident, invasive surgical procedure, or cardiac or respiratory arrest – is confronted suddenly with a reality that they are not healthy enough to survive without submitting their bodies to intensive medical assistance. When this assistance involves invasive, painful, or mind-altering therapies, the entire experience can affect one's memory, sense of self, interpersonal trust, and stir up existential anxieties. Similar to Herman's model, Bloom's (1999) model for trauma recovery presented in *Creating Sanctuary* indicates that the first step is to create safety. However, as indicated above, for many ICU survivors, the experience of their bodies as feeling safe has been severely compromised; and, they cannot escape it. Often when an individual experiences a traumatic event, they are overwhelmed by emotions to such an extent that they lose the capacity to speak or put words to their thoughts and feelings. When this occurs, there is often a downshift to nonverbal reactions and physical sensations (Bloom, 1999). However, for a medical trauma patient or ICU survivor, the body is now suspect, and every physical sensation can represent a possible symptom of an illness or threat to life, which further complicates the distress. This self-feeding loop is elucidated further in Edmondson's (2014) Enduring Somatic Threat (EST) model of PTSD due to acute life-threatening medical events, which will be discussed in greater detail below.

**Theory: Ronnie Janoff-Bulman.** The negative, global shifts in perceptions of oneself or the "shattered assumptions" associated with trauma are discussed by Janoff-Bulman (1992). She posits that trauma initiates a psychological disequilibrium that challenges the notion of a self as worthy and shatters the fundamental assumption that the world is benevolent and meaningful (Janoff-Bulman, 1992). When a patient suffers a life-threatening illness that requires intensive care hospitalization, they often experience a shift in their assumption that their health and survival are assured. When the care they receive in the ICU involves invasive or painful interventions or is accompanied by delirium, they may experience healthcare providers (previously trusted and respected others) as perpetrators (McGiffin et al., 2016). Furthermore, experiences of reduced autonomy related to toileting or concealing one's naked body may also

contribute to feelings of degradation and shatter assumptions of one's inherent worth. The unsettling similarities between captivity stressors found in torture settings and the environmental elements common in an ICU (examined in Metin Başoğlu's work [2009] and presented in detail below) further speak to this element of the psychological experience of an ICU patient and their shattered assumptions of trust and benevolence in others, and sense of worth in oneself.

All of the above reinforces that trauma is a complex phenomenon. Conventional definitions of trauma will apply in many ways to medical trauma, but there are also many distinctions. Prior to introducing these more directly, a brief review of PTSD as presented in the DSM is warranted.

### **PTSD in the DSM**

PTSD is a debilitating syndrome categorized in the DSM-5 as a trauma- and stressor-related disorder that results from exposure to a traumatic event that is life-threatening or perceived as life-threatening (APA, 2013). Symptoms of PTSD are characterized by persistent re-experiencing (intrusive recollections of the event), physiological/hyperarousal symptoms, negative alterations in cognition or mood, and avoidance of and/or numbing to stimuli associated with the trauma (APA, 2013).

As a psychological, diagnosable construct, PTSD was first proposed to be included in the DSM in the 1960s-1980s amidst great controversy by a group of Vietnam veterans and two psychoanalysts who successfully advocated for its inclusion in the *DSM-III* (APA, 1987; van der Kolk, 2014). In this edition, Criterion A (exposure to a traumatic event) included victims of or witness to combat, physical, or sexual assault or abuse, violent crime or natural disasters, or other events considered "outside the range of usual human experience" (APA, 1987, p. 236). Critical illness was ruled out as meeting Criterion A. Consequently, there was a successful push to recognize that PTSD could be a result of a life-threatening disease and it was included in the fourth edition of the DSM (4<sup>th</sup> ed., *DSM-IV*; APA, 1994). However, because the concept was heterogeneously understood and applied (Cordova, et al., 2017; Thakur et al., 2020), the fifth

edition tightened the definition and clarified that the medical events had to be sudden, unexpected, and potentially lethal (e.g., anaphylaxis or waking during surgery) to qualify as possibly traumatic (5<sup>th</sup> ed., DSM-5; APA, 2013). Thus, the potential for medical events to initiate a traumatic response was briefly acknowledged before being excluded in current diagnostic literature. This exclusion impacts recognition, research, and treatment. Frustration related to not being endorsed by the foremost psychological community (APA), commitment to serving the needs of the population of medical trauma survivors, and awareness that medical trauma includes unique characteristics that set it apart from nonmedical trauma, has led some researchers to propose distinct definitions, syndromes, and conceptual frameworks (Edmondson, 2014; Hall & Hall, 2017).

### **Nonmedical vs. Medical Trauma: Foundations, Distinctions and Conceptual Models**

The DSM-5's definition of a traumatic event is narrow, and the symptoms included in the disorder are discrete and objective in order to serve the manual's important diagnostic purpose (APA, 2013). Medical trauma shares many commonalities with nonmedical trauma but also possesses unique features that researchers have sought to elucidate. Contemporary understandings of the concept have primarily emerged from studies related to pediatric populations.

#### ***Foundations: Pediatric Medical Trauma***

Most literature that addresses the phenomenon of medically related traumatic stress does so in relation to the pediatric population. The concept was borne out of the recognition of the distressing experiences in pediatric patients and their families in medical environments, and its understandings, assessment measures, and treatment protocols are far more developed for this population than the adult population. Despite this, the concept of pediatric medical traumatic stress is also still relatively new, as the amount of research documenting the phenomenon in the last fifteen years has substantially increased (Kazak et al., 2009). According to the National Child Traumatic Stress Network, Pediatric Medical Traumatic Stress (PMTS) is defined as “a set

of psychological and physiological responses of children and their families to pain, injury, serious illness, medical procedures, and invasive or frightening treatment experiences” (National Child Traumatic Stress Network, n.d.). As is the case in adult patients, pediatric patients and their families may commonly experience traumatic stress reactions to medical events, and these reactions are only problematic if they persist, are significantly distressing, and/or substantially impact functioning in the child or family. Posttraumatic stress responses can include clinically diagnosable reactions such as acute stress disorder (ASD) and PTSD; however, Kazak et al., (2006) found that these disorders may not fit the phenomenology of child or family reactions to medical events and proposed that PMTS is broader, more general, and is better represented by a cluster of symptoms than a diagnosis (Kazak et al., 2009). As such, PMTS represents a conceptual tool that may assist in framing adverse responses to distressing medical experiences. Of note, PMTS applies to the experiences of both the pediatric patient and their family members. In the adult population, only the patient’s experience is considered; all other individuals who have distressing experiences secondary to the patient’s interactions in the medical environment would be understood within the framework of vicarious trauma.

With regard to risk factors, research related to ill and injured pediatric patients indicates that distress is associated more with one’s subjective experience of an event rather than objective indicators illness/injury severity (Kazak et al., 2006), making subjective experience the main risk factor. Additional risk factors in the child include patient-specific features and contextual features. Patient-specific features include pre-existing vulnerabilities (e.g., previous traumatic experiences) and prior behavioral or emotional concerns, as well as levels of coping skills, family support, psychological adjustment, and positive peer support (Kazak et al., 2006, 2009). Contextual factors include traumatic aspects of the medical event(s), such as pain severity levels during the event, subjective sense of the injury/illness severity, perceived degree of life threat, exposure to frightening visual and auditory features in the hospital, intensity of the treatment, and/or separation from parents or caregivers (Kazak et al., 2006, 2009). Research

has found that parents' risk for elevated posttraumatic stress responses related to a child's illness or injury is associated with previous trauma experiences, prior mental or emotional health problems, level of social support, and/or presence of concomitant life stressors or disruptions (Kazak et al., 2006, 2009; Landolt et al., 2003). For both the patient and the parent, the presence of a severe early traumatic stress reaction predicts more severe posttraumatic stress outcomes (Landolt et al., 2003).

Children's reactions to medically traumatic events are similar to those in adults and can include behavioral changes, symptoms of depression or anxiety, and posttraumatic reactions related to reexperiencing, avoidance, and hyperarousal symptoms (Guite & Kazak, 2010; Kazak et al., 2009). Reexperiencing symptoms may involve unwanted intrusive thoughts about the illness, procedure, or injury; feelings of distress at thoughts or reminders; and/or experiencing nightmares or flashbacks. A pediatric patient with a PMTS reaction may avoid thinking or talking about their experience, display decreased interest in typical activities, and/or feel emotionally numb or disconnected from those around them (Guite & Kazak, 2010; Kazak et al., 2009). Hyperarousal symptoms are similar to those found in adults and can include greater irritability, difficulty concentrating, insomnia, an exaggerated startle response, and hypervigilance (5<sup>th</sup> ed.; DSM-5; American Psychiatric Association, 2013). A child who experienced medically related traumatic stress may develop physical complaints not typically associated with their medical condition (e.g., "tummy ache" or headache), new fears associated with the medical event, and/or may feel "spacy" or as if they are in a daze (Guite & Kazak, 2010; Kazak et al., 2009).

The pediatric population is especially vulnerable given their sensitive cognitive and emotional developmental stages. In a pediatric patient, cognitive understanding of illness and treatment are typically reduced, and feelings of fear and confusion are often much more present (Kazak et al., 2006, 2009). Many medically necessary treatments can be experienced as frightening, especially when the environment includes distressing sights and sounds (e.g., unfamiliar machines, displays, alarms, noises related to others' suffering or fear; Kassam-

Adams & Butler, 2017). The role of powerlessness in trauma applies especially to pediatric patients, as children in medical settings often experience a lack of control over what their body is enduring, which can increase the chances for painful or distressing events to be traumatizing (Kassam-Adams & Butler, 2017). Pediatric patients who resist painful procedures are more often physically restrained in order to receive medically necessary interventions, which can further contribute to distress (Kazak et al., 2006). Additionally, younger patients often cognitively associate pain or distress with punishment, so patients may feel some sense of responsibility or punitive connection to their condition or treatments (National Child Traumatic Stress Network, 2014). As such, effective pain management and supportive parental involvement is important in reducing distress. Furthermore, the legal burden for consent to treatment is typically carried by the parent(s) or guardian(s), and pediatric patients may not feel a sense of autonomy. In order to mitigate the traumatic nature of these experiences, physicians are encouraged to introduce elements of control wherever possible (e.g., child chooses the distracting activity during a painful intervention; staff provides developmentally appropriate information and seeks assent, even informally; Kassam-Adams & Butler, 2017).

Overall, the pediatric model of medical traumatic stress offers many understandings that are applicable to the adult population while maintaining a few differences. Similarities include the centrality of the patient's subjective experience, risk factors (e.g., vulnerabilities of prior traumas; prior behavioral or emotional concerns), the impact of levels of coping and social support, the role of contextual features (including environmental sensory features), the role of powerlessness and elements of reduced autonomy, and the general types of reactions to medically traumatic events (e.g., depressive or anxious symptoms; posttraumatic reactions of reexperiencing, avoidance, and hyperarousal). Main differences are that the pediatric model includes both the patient and family members, the increased vulnerability, fear, and confusion given the developmental stages, the degree of reduced autonomy (including ability to provide



consent), the increased use of restraints on pediatric populations, and the existence of a strong conceptual framework, assessment measures, and prevention and treatment models.

### ***Enduring Somatic Threat***

Donald Edmonson (2014) was among the first to propose a conceptual model for the experience of medically related traumatic stress in adults. Edmonson's Enduring Somatic Threat (EST) "model of PTSD due to acute life-threatening medical events" (2014, p. 118) represents a significant step forward for the adult population. Specifically, Edmonson (2014) examined life-threatening medical events and differentiated medical trauma from nonmedical trauma in a few significant ways, including: "the external versus internal/somatic source of the threat, the past versus present/future temporal focus of threatening cognitions, the different types and consequences of avoidance behavior, and the different character and consequences of hyperarousal" (p. 118). First, he posited that nonmedical traumas and traditional PTSD responses typically occur in relation to a discrete, external event that occurred in the past (e.g., a violent assault, natural disaster, combat experience), whereas responses associated with medical traumas "endure" because the location of the threat resides internally and is often ongoing (i.e., illness, pain, a life-threatening condition; Edmondson, 2014). For individuals who suffer a life-threatening medical event (e.g., heart attack, stroke, glycemic shock, respiratory disease, cancer), continuing medical treatment and monitoring are needed in order to maintain health and prevent future episodes. The ongoing care requires repeatedly confronting the threat both consciously and unconsciously. Thus, it may be a distressing experience related to the disease or medical event (e.g., experiencing acute respiratory arrest; receiving a diagnosis of a terminal illness), the somatic experience of the symptoms related to the disease or medical event (e.g., shortness of breath; malaise), the interventions and treatments (e.g., oxygen treatment, chemotherapy), and/or the interactions within the healthcare system (e.g., doctor visits, CT scans) that may be part of a collective traumatizing picture (Edmondson, 2014). A cancer patient, for example, who develops a trauma response related to their illness and

treatment may do so because of a singular event (moment of receiving the diagnosis; Swartzman et al., 2017) and/or because of the inherent emotional experience and vulnerability associated with this life-threatening illness and its treatment (Edmondson, 2014; Hall & Hall, 2017).

Psychological triggers cannot be avoided for most patients who experienced a life-threatening medical event, as they can be retraumatized not only with ongoing medical care, but also by their own bodily sensations (e.g., elevated heart rate in a heart attack survivor; Edmondson, 2014). Furthermore, the repeated, ongoing, and inescapable exposure to the triggers internally and environmentally can further contribute to symptoms of hyperarousal, reexperiencing, and avoidance (APA, 2013; Edmondson, 2014). Additionally, the EST theory argues that a significant hazard associated with medical trauma is the self-sustaining feedback loop characteristic of such a phenomenon. That is, one's traumatic perception can influence an ongoing threat, which can in turn impact the somatic indicators of stress (e.g., heart rate, blood pressure, disrupted rest, inflammation), which feed the risk for subsequent life-threatening medical events. For example, an individual who suffered cardiac arrest (a medically traumatic event) may be hypervigilant in tracking their heart rate and experience hyperarousal if they sense any elevation in heart rate, even excitement related to a benign situation (e.g., watching their favorite sports team in a playoff game; Edmondson, 2014). Their perception of this somatic experience can activate a stress response that elevates their heart rate further, increases inflammation, and triggers shortness of breath, exacerbating the distress and increasing the risk of negative health outcomes.

### ***Medical Trauma (Hall & Hall)***

Hall and Hall (2017) proposed a definition and conceptualization of medical trauma which aligns most closely to the phenomenon discussed in this dissertation. They assert medical trauma is

A trauma that occurs from direct contact with the medical setting, and develops through a complex interaction between the patient, medical staff, medical environment, and the diagnostic and/or procedural experience that can have powerful psychological impacts due to the patient's unique interpretation of the event. (Hall & Hall, 2017, p.19)

Each component of this definition is intentional and significant. Firstly, in using the term *direct contact*, the patient's direct, personal experience of medical trauma is distinguished from the phenomenon of vicarious trauma that may be potentially experienced by medical staff, friends, or family. *Medical setting* refers to "any aspect of direct experience with health care systems" (Hall & Hall, 2017, p.19; e.g., presenting for an annual physical at the doctor, getting blood drawn, undergoing dialysis, having a root canal at the dentist, or being admitted to a hospital for treatment of an illness). Thirdly, medical trauma develops through a "*complex interaction of multiple factors, including the patient, medical setting (including interactions with the staff and the environment), and the diagnosis or procedure*" (Hall & Hall, 2017, p. 20). Medical trauma is a subjective experience, but locating the source of the trauma solely within the patient risks dismissing important, contributory environmental factors. This complex field includes the medical environment, the medical staff, and what occurs during a particular medical intervention, which all contribute to the patient's overall experience (Hall & Hall, 2017). Finally, *psychological impacts* include both clinical and subclinical mental health issues that can impact a patient's relationships, sense of self, body, occupational functioning, leisure, and spiritual life (Hall & Hall, 2017).

Additional, important features of medical trauma include the fact that it is subjective for the patient, may be cumulative, is best understood on a continuum, is biopsychosocialspiritual in primary experience and impacts, is contextual, and is relational (Hall & Hall, 2017).

**Medical Trauma: Subjective and Cumulative.** A unique and important feature of medical trauma is that the event(s) that precipitate a stress or trauma response may not be the types of "big-T" traumas (Shapiro, 2001) that are universally thought of as traumatic, such as

experiences in combat, a violent assault, or natural disaster. As discussed previously, there is a growing appreciation for the variability in traumatic threshold and also in the function of cognitive processing and the relationship between a traumatic event and the psychological matrix of each individual (Davidson & Foa, 1991; Elliott & Urquiza, 2006; Herman, 1997; Knight, 2015; Ogden et al., 2006; Shapiro, 2001; Williams & Sommer, 2002). Scholars have explored every-day, non-shock traumas and emphasize the role of subjectivity in how one interprets the experience. For example, Scaer (2005) describes his early personal experience of pediatric medical trauma as distinctly distressing and contends that trauma “exists on a continuum of variably negative life events occurring over the life span, including events that may be accepted as ‘normal’ in the context of our daily experience because they are endorsed or perpetuated by our own cultural institutions” (p. 2). The perception and interpretation of a negative life event determines the degree to which it is experienced as traumatic. This is essential for understanding and appreciating medical trauma, because the subjectivity inherent in this type of trauma is fundamental. As noted above, the quality of cognitive processing during a traumatic event plays a role in posttraumatic symptom development (Elliott & Urquiza, 2006; Knight, 2015), especially when feelings of helplessness, powerlessness, confusion, and/or overwhelm are present (Bloom, 1999; Herman, 1997). Thus, ICU patients may be more susceptible to developing PTSD because their information-processing capacity may have been altered or compromised in some way during a traumatic event, either due to treatments administered or due to the critical illness itself.

Because trauma can be a cumulative experience and can exist on a continuum, it is important to appreciate the aggregate of the patient’s experience in the medical context. The concept of *cumulative adversity* (Turner & Lloyd, 1995) is applicable, as it describes multiple traumatic events and their impact on psychological distress. Alonzo (2000) examined the cumulative adversity associated with posttraumatic stress in chronically ill patients and found that it “produces a continuum of traumatic responses to chronic disease events ranging from

benign anxiety to full-blown PTSD” (p. 1480). In his discussion, Alonzo (2000) identifies primary, secondary, and tertiary trauma experiences in these patients. The primary trauma is the potentially fatal and life-threatening, possibly terminal illness. Secondary traumas include the experiences of ongoing treatment, whether they are severe and emergent (e.g., utilizing emergency services or experiencing hospitalization) or more diffuse, like possible changes in work or lifestyle associated with the requisite repeated physician consultations and medical regimens (Alonzo, 2000). The tertiary traumas are identified as the stressful hassles associated with being a patient in the contemporary American health system (i.e., dealing with health insurance, disability insurance, medical billing, and government health organizations; Alonzo, 2000). Although not all ICU patients have chronic illnesses, many of these concepts apply. With regard to cumulative adversity, during an intensive unit hospitalization, an ICU patient is likely to experience a number of stressors at different levels of intensity. For example, a patient may have a difficult experience with IV placement, experience unpleasant side effects from medications, receive painful wound care, and/or require intubation while conscious (McGiffin et al., 2016). Most of these patients will also require follow-up care after discharge and will also confront hassles related to billing and insurance (Hall & Hall, 2017). All of the above reinforces the notion that medical trauma exists on a continuum (i.e., it is not an all-or-nothing experience), can occur at any point in a patient’s care process, and can be a cumulative experience. These features make it difficult to capture with DSM-5 criteria and quantitative assessment measures that are based upon traditional characteristics of trauma.

**Medical Trauma: Biopsychosocialspiritual.** Medical trauma, like other traumas that directly connect to the body, occurs at – and impacts – multiple levels: it affects one’s physical body and psychophysiological system, is contextual, is social/relational, and can affect one’s spirituality. Medical trauma compromises the body’s physical integrity through the primary injury or illness and this insult, along with the treatment administered, directly impact the physical self, the neurobiological systems, and the internal organ systems. This feature of the dual sources of

traumatic threat – internal and external – is one of the most salient features of an ICU patient’s experience of medical trauma. As Hall and Hall (2017) indicate, “whenever the body is sick, injured, or procedurally cut/manipulated, a physical trauma occurs” (p. 39). This activates a stress response in the sympathetic nervous system, priming the system to be hyperaware to detect any additional threat (Levine, 2010; Porges, 2011; van der Kolk, 2014). While this system is activated, the patient receives intensive medical care interventions. The patient then interprets this experience of assault on one’s bodily integrity and the treatments administered within the medical setting in a highly subjective manner (as described above). Due to the nature of any intensive care condition and its treatment, the patient often has reduced communication, mobility, and autonomy, all of which increase feelings of fear, powerlessness, and helplessness and in turn exacerbate distress (McGiffin et al., 2016). The destabilization of one’s physical and mental well-being both during and after an ICU stay is a meaningful part of the clinical picture as well. Even after the primary threat to life (the critical injury or illness) has been stabilized, one’s physical and mental well-being may remain challenged. Destabilization may involve pain, injuries, wounds, compromised physical abilities, and unpleasant side effects from medications, amongst others (McGiffin et al., 2016).

The social component further colors the picture. The patient experiences all of the above in a medical setting staffed by medical personnel who will repeatedly interact with the patient. The presence of family members or loved ones augments the social aspect of the phenomenon and can add to complications or offer a protective buffer. The complex relational aspect of medical trauma will be fleshed out more thoroughly below.

Finally, especially in cases where one’s mortality is confronted, medical trauma can be experienced at a spiritual level. While spirituality is a deeply personal experience that may be variably defined, the National Center for PTSD-USA (in Manda, 2016, p. 1) defines it as “[An] inner belief system providing an individual with meaning and purpose in life, a sense of sacredness of life, and a vision for the betterment of the world” or, more simply, a connection to

that which transcends the self (Donahue, 1985; Pargament, 2007; Tomer & Eliason, 2000). Spiritual beliefs impact how a person makes meaning out of their experiences (Donahue, 1985; Park, 2005; Tomer & Eliason, 2000) and this can be challenged in cases of trauma, as encountering traumatic experiences may challenge one's core beliefs about safety, self-worth, benevolence, and the meaning of life (Janoff-Bulman, 1992). After experiencing a medical trauma, patients may feel abandoned or confused and may question their sense of feeling protected and safe, their belief in a loving, all-powerful force, or the relationship between creator and humankind (Hall & Johnson, 2001). Although there are disparate findings related to the degree to which spirituality is helpful or harmful in trauma management (Falsetti et al., 2003; Fontana & Rosenheck, 2004; Strawbridge et al., 1998), a patient's spirituality can offer instrumental support and assist patients in their healing from a medical trauma.

Given that the whole of the patient is impacted, a holistic perspective is called for in understanding a patient's experience. While any trauma is subjective in nature and highly influenced by patient-specific factors that impact the perception of an experience as traumatic, the environmental context (medical staff and environment) also plays a significant role.

**Medical Trauma: Contextual.** Like all types of trauma, medical trauma does not happen in a vacuum. Patient-specific factors, such as history of prior trauma or preexisting mental health conditions (Hapke et al., 2006) may predispose a patient to being traumatized, but there are a number of other variables that may impact the experience of an event as traumatic. Qualities of the setting, including lighting, temperature, sounds, odors, clothing (or lack of personal clothing), and access to privacy can all play a role in both heightening stress and increasing the likelihood of a traumatic reaction (Baker, 1984; Baker et al., 1993; McGiffin et al., 2016). The communication style of medical staff members (e.g., whether they make eye contact, have clipped speech, or use language the patient can understand), the level of empathy displayed, and the levels of stress, burnout, or vicarious trauma of staff members can all subtly or significantly impact patients' experiences (Berry, 2001; Coulehan, 1995; Doherty et

al., 2013; Neumann et al., 2009). The level of ecological concordance (person-environment good fit) or discordance (person-environment ill fit) also matters, as it has implications on how one experiences a situation (Hall & Hall, 2017). Amongst other effects, the level of ecological concordance an individual feels will impact the degree to which one experiences pleasure versus displeasure, is able to relax or feel stressed, feels confident in asserting themselves, copes with vulnerability, reacts to discomforts or disappointments, and even perceives the valence of interpersonal exchanges (Cook, 2012; Hall & Hall, 2017). For many patients, entering into a medical environment may leave them feeling uprooted and separated from familiar people and places, which can increase discomfort and vulnerability. The majority of healthcare workers operate within their medical environments regularly and are quite familiar with and comfortable in their context. They understand the language, culture, protocols, broad operating systems and even seemingly miniscule details such as the layout of the floors in a medical facility. A patient in a hospital is not as acquainted with the medical setting within which they find themselves and can feel like a traveler visiting a foreign country where they don't feel oriented to the sights and smells around them, intuitively understand how to navigate the environment, or speak the language. This experience can create heightened levels of stress; when this is accompanied by pain and/or fear, the risk of psychological distress is high. Research related to torture illustrates this powerfully.

***Torture Studies and ICU.*** As indicated above, contextual factors matter. They can exacerbate distress and/or act as triggers for a traumatic stress response in individuals. Research in torture and in “cruel, inhuman, and degrading treatments” (CIDTs) illustrates this poignantly. These studies contribute to the understanding of psychological sequelae following intensive medical treatment, even though the intent and spirit in CIDTs and those in ICU treatment could not be more disparate (Hall & Hall, 2017). The motivation behind every intervention and process in an ICU is to restore optimal health and functioning; however,



“captivity stressors” involved in CIDTs or torture settings include some of the same contextual elements as hospitals, particularly ICU environments.

Dr. Metin Başoğlu (2009) examined experiences of torture and the context of captivity within multiple populations of prisoners in order to better understand victims’ psychological responses as well as potential protective factors. He laid out four criteria for what constitutes an act or series of acts as “torture”:

- Intent
- Purpose (e.g., to extract info/confession or as an act of punishment or vengeance)
- Exposures to often multiple, unpredictable, uncontrollable, and potentially traumatic stressors likely to induce intense distress in most people
- Deliberate and systematic attempts to remove all forms of control from the person to maximize stressor impact and induce a state of total helplessness (Başoğlu, 2009, p. 136).

Given the above, it is clear the intent and purpose of treatment in an ICU do not qualify; however, the remaining two criteria do appear to be applicable, especially considering the subjective nature of medical trauma and the experience through the *patient’s* lens. The physical crisis necessitating admission into an ICU and the interventions administered to treat a patient’s critical condition are both likely to include elements that are unpredictable, are uncontrollable, and have potential to induce intense distress in most people (third criterion). Especially when stays are prolonged and the condition is severe, the patient’s experience is likely to involve pain and fear, and the stay is likely to be accompanied by exposure to traumatic stressors (McGiffin et al., 2016). In hospitals and particularly in critical care environments, the patient’s personal control and agency are significantly reduced (fourth criterion; McGiffin et al., 2016). The reason for removing a patient’s control over everyday life elements (e.g., clothing, eating, drinking, toileting) is entirely in line with a humane end goal of mending and healing. Pure motivations to restore health, however, do not change the ultimate outcome for the patient, which is: they no longer have the basic liberties, autonomy, and mobility that they are accustomed to having and

this can lead to elevated distress. Once again, the subjectivity of experience is essential to consider. Some patients may be able to resolve the cognitive dissonance of consenting to physically unpleasant medical interventions by keeping in mind the health-promoting intention. This ability to turn the dissonant into consonant may be easier in certain contexts. This is one of the key points in understanding the environmental effects associated with medical trauma and Başoğlu's (2019) work highlights this poignantly. Amongst other findings, his study determined that ultimately the physical torture experienced by detainees was *less damaging* than the captivity stressors. The table below, replicated from Hall and Hall (2017), delineates the captivity stressors from Başoğlu's analysis and compares them with environmental elements common in a hospital (and often exaggerated in an ICU).

When motivation and intentionality are removed, the contextual elements show some unsettling parallels. For example, sleep disruption, movement restrictions (due to physical injuries or connections to IVs, monitors, ventilations, etc.), physical pain or extreme discomfort, disruptions in basic needs (e.g., monitored liquid intake, restricted diet), exposure to uncomfortable sensory stimuli (e.g., cold temperatures, unwanted sounds, fluorescent lighting), denial of privacy, lack of personal clothing, and the possibility of losing one's life or health are all present and can be significant factors in the psychological experience of a hospitalized patient. Başoğlu's (2019) research reinforces the knowledge that stressors present in a physical environment can play a powerful role in experiences that involve pain and fear. All of these environmental factors can contribute to the overall experience of medical trauma by increasing a patient's distress, impairing sleep needed for a recovery, and by becoming part of the stimuli encoded and associated with a patient's experience. In addition to these important environmental features, it is important to keep in mind the relational dynamic of medical trauma, as it often occurs in a person-to-person context.

**Table 1***Comparison of Captivity Stressors and Hospital Stressors (Hall & Hall, 2017)*

<b>Comparison of CIDT Captivity Stressors and ICU/Hospital Stressors</b>	
<b>Torture and CIDT/Captivity Stressors (Başoğlu, 2009)</b>	<b>ICU/Hospital Stressors</b>
Sexual torture <ul style="list-style-type: none"> <li>- Rape, fondling of genitals</li> </ul>	Treatment interventions involving genitals and private body parts <ul style="list-style-type: none"> <li>- Cancer surgeries and testing (colon, breast, ovarian/cervical/uterine)</li> <li>- Foley catheter placement/removal</li> </ul>
Physical torture <ul style="list-style-type: none"> <li>- Inflicting intense physical pain using multiple methods</li> </ul>	Treatment interventions involving <ul style="list-style-type: none"> <li>- Pain</li> <li>- Extreme discomfort</li> </ul>
Psychological manipulations <ul style="list-style-type: none"> <li>- Explicit threats of harm for the purpose of inciting psychological distress</li> </ul>	Psychological sequelae of medical intervention <ul style="list-style-type: none"> <li>- Explicit or implicit threats to life and well-being due to the severity of illness/injuries</li> </ul>
Humiliating treatment <ul style="list-style-type: none"> <li>- Purposeful humiliation in order to dehumanize and shame</li> <li>- Stripping naked, verbal abuse, excrement in food, on body</li> </ul>	Vulnerability due to decontextualization <ul style="list-style-type: none"> <li>- Unintentional embarrassment due to removal of clothing</li> <li>- Required to wear hospital gown to give unfamiliar people access to body</li> <li>- Requiring assistance with private bodily function (elimination)</li> </ul>
Forced stress positions <ul style="list-style-type: none"> <li>- Bondage</li> <li>- Forced standing</li> <li>- Restriction of movement</li> </ul>	Movement restrictions due to illness/injury/treatment <ul style="list-style-type: none"> <li>- Inability to move from bed</li> <li>- Connections to monitors, IVs, ventilators, etc.</li> </ul>
Sensory discomfort <ul style="list-style-type: none"> <li>- Exposure to extreme hot/cold</li> <li>- Exposure to bright light</li> <li>- Exposure to loud music</li> </ul>	Sensory discomfort <ul style="list-style-type: none"> <li>- Exposure to uncomfortable temperatures</li> <li>- Exposure to fluorescent lighting</li> <li>- Exposure to unwanted sounds: monitors, hospital staff, TV, other patients' moaning</li> <li>- Exposure to tactile discomforts: IVs, needles, gown/bedding</li> </ul>
Deprivation of basic needs <ul style="list-style-type: none"> <li>- Sleep deprivation</li> <li>- Water deprivation</li> <li>- Hygiene deprivation</li> <li>- Denial of privacy</li> </ul>	Disruption in basic needs and routine <ul style="list-style-type: none"> <li>- Irregular sleep</li> <li>- Monitored liquid intake</li> <li>- Restricted diet (or food deprivation with upcoming surgery)</li> <li>- Lack of normal hygiene routine (e.g. bathing, appearance regimen)</li> </ul>

**Medical Trauma: Relational.** Medical trauma is relational in the sense that it occurs within the patient-provider relationship context. This is a significant consideration, which contributes to the complexity of traumas experienced in medical contexts—an example of one of Scaer's (2005) "cultural institutions" that may perpetuate or endorse certain events or experiences. The level of rapport, trust, and working alliance between a patient and their

provider in a medical interaction matters greatly (Lemmers & van der Voort, 2021). In the ICU, a provider's ability to build rapport quickly and communicate care and respect to the patient may be more challenging than in other medical contexts but is equally important (Lemmers & van der Voort, 2021). When a medical trauma occurs, trust can be fractured. If it goes unrepaired, trust in providers in general can suffer, leading to retreat from engagement in the medical care system and potentially exacerbating one's physical health outcomes (Edmondson, 2014).

**Power Dynamic.** The relationship between a patient and their healthcare provider is also unique in its power dynamic. As is the case with any helping relationship or a situation wherein one is the "expert" and the other is not, there is an inherent power differential. In any helping relationship, the person seeking help automatically occupies a vulnerable position. Moreover, the more serious the need for help is, the greater the vulnerability. Individuals will submit themselves to the expertise of a provider in situations of great vulnerability; this is especially true in the medical arena in disempowering situations such as surgeries, invasive procedures, or ICU care (Lemmers & van der Voort, 2021). This dynamic in the help provider-help recipient relationship is reinforced and influenced by clothing and environmental features as well. For example, a doctor's white coat connotes power and expertise, which often leads to unconscious submission to the doctor's opinions and diminishment of one's own. It can also lead to heightened stress, as is seen in the phenomenon of "white coat hypertension" when a patient's blood pressure increases from its natural baseline in the presence of a doctor or nurse (Martin & McGrath, 2014). When the HPA axis is already activated, unpleasant experiences can be perceived as more threatening (van der Kolk, 2014) which, in the healthcare system, may lead to experiences of medical trauma.

**Socialization to Patient Role.** Sociocultural influences also impact the relationship between doctor and patient. From a young age, most individuals are socialized to accept the notion that medical treatment will improve health. Children who have not been fully socialized to this notion show greater confusion and distress (Kassam-Adams & Butler, 2017). At any age,

regardless of the level of socialization, there is an experience of real dissonance in consenting to painful procedures or uncomfortable medical interventions. It seems many patients unwittingly provide lifelong consent to healthcare providers to do what it takes to restore health. In this, they may submit their bodies to procedures, medications, and treatments, while often keeping fears hidden. As such, psychological distress related to medical trauma is often ignored, and perceptions of healthcare providers can be negatively altered (Hall & Hall, 2017).

In the ICU in particular, high levels of pain, respiratory insufficiency, and certain medications (particularly benzodiazepines) can alter a patient's mental state to such an extent that it may cause delirium or psychosis (Marra et al., 2017). Accounts from ICU survivors of their stays have included hallucinations that doctors were trying to harvest the patient's organs, that nurses' or family members' bodies had been taken over by aliens, or that loved ones were being held hostage in exchange for the patient's blood (Darbyshire et al., 2016). This is an example of how contextual features interact with relational features and can exacerbate what is already a distressing experience.

***Double Bind.*** The phenomenon of the double bind may also be present in the provider-patient relationship. While most current literature that addresses this phenomenon does so in relation to schizophrenia, it also applies to medical traumas. Gibney (2006) describes the double bind as a "communication matrix, in which messages contradict each other, the contradiction is not able to be communicated on and the unwell person is not able to leave the field of interaction" (p. 50). In the dilemma created by a double bind, an individual receives two or more conflicting messages from a sender. It creates a lose-lose situation in that if the receiver successfully responds to one message, he fails to respond to the other, and vice versa, such that there is no possibility for success. Furthermore, the nature of the phenomenon is such that the receiver cannot comment on the conflict, cannot resolve it, and cannot opt out either. This leads to confusion and this confusion is also not validated by the sender. When these types of double binds are characteristic of an ongoing relationship, it can present greater complications.

In the medical trauma context, especially in an ICU where painful and sometimes frightening interventions may be necessary for a patient to survive, the patient experiences a dilemma: consent to an intervention that will cause fear and pain, or do not consent and risk death. In conjunction with this physical dilemma is a complicated relational dynamic where the healthcare provider is now experienced as both healer and perpetrator of trauma. Most adults intellectually understand that medical staff perform these interventions with the intent to mend or save. However, the pain endured by patients' bodies and the feelings of fear, helplessness, and/or confusion that can be experienced are not always reduced by the knowledge of pure intentions (Hall & Hall, 2017). In fact, it may be that these good intentions and the socialization to patient role significantly contributes to patients to remaining silent about their distress. The concept of the double bind is most applicable in instances where there is a greater life threat, is accompanied by intense feelings of powerlessness, fear, terror and/or uncertainty, and the patient experiences the medical care as resembling torture.

***Disenfranchised Trauma.*** Because adult medical trauma has largely been unrecognized by our medical and mental health systems, was downgraded in the DSM-5, and for a long time did not even have a label, it can be considered a type of disenfranchised trauma (Hall & Hall, 2017). Patients may be confused by their experiences and silently suffer in the absence of acknowledgment by others outside of themselves. The concept of a disenfranchised trauma parallels that of “disenfranchised grief,” which has been used to describe the experience one might have after a loss that is not typically socially endorsed as worthy of an intense reaction, such as a miscarriage or the death of a pet (Doka, 2008; Hall & Hall, 2017). Although the National Child Traumatic Stress Network uses the term “medical trauma” in describing experiences of children and their families dealing with pediatric illness, there is a significant scarcity of published books and peer-reviewed articles that include this terminology as it relates to adults. The reason that medical trauma has been overlooked is multilayered. Despite efforts towards patient-centered care and integrated services in medical settings, the focus continues

to be overwhelmingly on the patient's physical body (Hall & Hall, 2017). This is evident throughout the patient's time in a hospital, from the first contact in admission (e.g., vital signs being recorded) to the ongoing care (e.g., inquiries made about pain levels, urine output is measured, blood lab results analyzed), to the information provided at discharge and communicated to family or caretakers who will continue the care at home (e.g., physical implications, medications, wound care instructions). The emotional distress of a patient may be overshadowed by his or her physical condition. This results in a lack of acknowledgment and can have significant implications (Edmondson, 2014; McGiffin et al., 2016).

### **Medical Trauma in Context: Overview of the Ecological Perspective**

As previously noted, medical trauma is a complex phenomenon because it involves a constellation of dynamic variables and is, by nature, not the result of a single, isolated factor. It is especially unique because while patient-specific factors (e.g., trauma history, temperament; McGiffin et al., 2016; van der Kolk, 2014) certainly contribute to the development of medically-related traumatic stress, it is the patient who exists in and is influenced by particular contexts and environmental features that contribute to the medical trauma phenomenon. This notion – that “behavior is contextual” and that there are often multiple factors (residing both within a person and in their environment) that influence thoughts, feelings, or behaviors – is captured by the ecological perspective (EP). Kurt Lewin (1935) proposed that an individual's behavior ( $B$ ) is the result of an interaction ( $f$ ) between a person ( $P$ ) and their environment ( $E$ ), and represented this in the following formula:

$$\bullet \quad B = f(P, E)$$

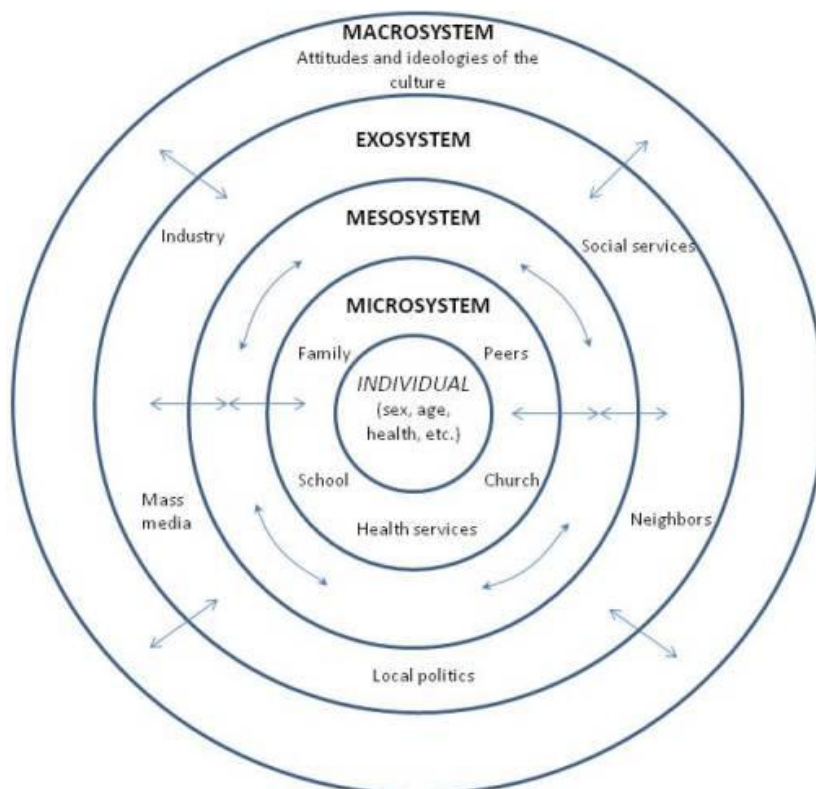
EP is a very complex and detailed theory, but at the most basic level, and for the sake of this dissertation, it is used to illustrate that human behavior is complicated and that *context matters*. An individual's experiences cannot be separated from the dynamic and multilayered systems and contexts within which they operate. This is captured in Uri Bronfenbrenner's ecological model (1975). Influenced by his mentor, Lewin, Bronfenbrenner (1975) developed

what he called an “ecological model of human development” (Rosa and Tudge, 2013). ‘Ecology’ was used to describe “the fit between the individual and his/her environment” (Eriksson et al., 2018, p. 419). In order to not only survive but continue to develop optimally, Bronfenbrenner (1975) believed there must be a close fit between the individual and its environment.

In his theory, Bronfenbrenner (1975) characterized the ‘ecological environment’ as consisting of five system levels. These levels were represented in nested systems, or environmental contexts, wherein the innermost circles represented environments most proximal to the individual (and thus most influential) and proceeded in fashion to the most distal influences (See Figure 1 below). At the center is the individual, whose internal system includes

**Figure 1**

*Bronfenbrenner’s Ecological Theory*



*Note.* From *Bronfenbrenner’s Ecological Theory of Development*, by Hchokr, 2012, Wikimedia Commons CC by SA 3.0 November 20, 2012 ([https://commons.wikimedia.org/wiki/File:Bronfenbrenner%27s\\_Ecological\\_Theory\\_of\\_Development\\_\(English\).jpg#file](https://commons.wikimedia.org/wiki/File:Bronfenbrenner%27s_Ecological_Theory_of_Development_(English).jpg#file)). In the public domain.



the interacting features of personality, physical attributes, health, development, autobiographical history, thoughts, feelings, and behaviors.

Next is what is usually listed as the first level of his theory, the *microsystem*. The microsystem is most proximal to the individual and includes the immediate environments encompassing the individual (i.e., home, work, family, school, religious institutions) (Bronfenbrenner, 1975). These are the contexts in which an individual is most intimately involved, plays multiple roles, and engages in dyadic interactions (e.g., partner, parent, friend; Hall & Hall, 2017).

Next is the *mesosystem*. The relationships and exchanges between the various microsystems that exist in an individual's life (e.g., relations between home and work, friends and family, etc.) describe the composition and function of the mesosystem. In the context of a medical setting, this could include interactions between a patient's family members and doctor (Bronfenbrenner, 1975).

Moving further out is level three, the *exosystem*, which represents the broader social system and includes social structures such as neighbors, the community and its resources, local industry, mass media, and public agencies. The individual is not directly apart of the exosystem (in participation or interaction) but is indirectly influenced by it, by way of the exosystem affecting an individual's microsystems (Bronfenbrenner, 1975; Eriksson et al., 2018; Hall & Hall, 2017). In the medical context, it may be the hospital's board of trustees (who may influence budgets for biomedical technologies used in the hospital) or the state legislature (who may influence healthcare policies).

The *macrosystem* represents the larger social and cultural context of the previously noted systems; it is removed from the individual but still greatly impacts him or her. This can include something as broad as "American culture" or a country's political climate, or more specific subcultural influences related to religion, sports, the military, urban versus rural environments, etc. Furthermore, sociocultural perceptions, norms and expectations associated

with an individual's gender, race, socioeconomic system, age, or health all operate in the macrosystem (Eriksson et al., 2018; Hall & Hall, 2017). In the medical system, this may include the culture of intellectualization where hard data is prized and emotions are devalued, or the culture of a doctor-patient power dynamic, where a patient defers to the expertise of the individual wearing a white coat. With regard to race, it may include the hesitancy that some nonwhite Americans, and black Americans in particular, may feel in seeking medical care due to historical abuses and betrayals and ongoing stereotypes that continue to create significant disparities in quantity and quality of care (Williams & Rucker, 2000).

The *chronosystem* is the fifth and final level of Bronfenbrenner's ecological systems theory. This system is comprised of "all the changes that occur over the lifetime which influence development, including major life transitions and historical events" (Härkönen, 2007, p. 2). The chronosystem levels may cover a long or short period of time and terms like "change," "development," "history," "time," and "course" all refer to elements at this level (Härkönen, 2007). In the medical context, this may refer to broad changes over time in approach to care, such as the movement towards a patient-centered model, or short periods of time, like the duration of an individual's stay in an ICU ward, or the duration of heavy sedation a patient endures.

As has been highlighted in the general trauma literature, pediatric medical trauma literature, and medical trauma literature, an individual's subjective experience of an event is key in shaping their response. The ecological perspective provides a framework that allows all elements that may contribute to a person's subjective experience to be considered. This is especially relevant for ICU patients, as the context is distinct in its complexity and its involvement of multiple systems, both internal and external to a patient. For purposes of this dissertation, the critical review will examine individual and ICU system influences that are most proximal to the patient, that is, individual- and microsystem-level. Influences from the broader exosystem and macrosystem levels, although less direct and immediate, are nonetheless

important and can impact the nature and quality of care a patient receives. Some entities from these realms are introduced below and will be referenced during the discussion of findings.

### **Exosystem and Macrosystem Influences on Patients**

The hospital policies, attitudes, and values that influence the experiences of patients and staff vary somewhat from setting to setting based upon the type of medical facility (e.g., a teaching hospital, community hospital, private hospital, etc.), mission of the hospital, the population it serves, its funding and budget, and the individuals who run day-to-day operations or are primary stakeholders. County, state, national, and international organizations and institutions create policies and conduct scholarly research that trickle down to influence a patient's experience.

### ***Current Healthcare in the United States***

A description and analysis of the U.S. healthcare system is well beyond the scope of this dissertation. However, the influence of the outer system levels of the ecological system model on patient experiences calls for discussion.

Health care coverage in the U.S. involves public health coverage (e.g., Medicaid and Medicare) and private health insurance. The organizations that make up the healthcare system in the U.S. include healthcare providers (independent and group practice), insurance companies, and hospital systems. Some of the national and global organizations that influence healthcare practice in the U.S. are the Institute of Medicine (IOM), Health Resources and Services Administration (HRSA), Center for Integrated Health Solutions, Agency for Healthcare Research and Quality, and the World Health Organization.

With regard to current trends in healthcare and the influence of organizations, the IOM published an historical report in 2001 that reconceptualized health care quality, asserting for the first time that "health care should be safe, effective, patient-centered, timely, efficient, and equitable" (Hall & Hall, 2017; IOM, 2001, p.40). This a departure from previous conceptualizations that appeared to downgrade the patient's input and solely take into account

the knowledge of the health care providers. This report was instrumental in assisting healthcare systems improve patient care and outcomes.

In addition to the IOM (and other institutions, organizations, scholars and practitioners), government legislators can greatly influence the industry of health care in the United States. Most recently and significantly, the 2010 Health Reform Bill, or Patient Protection and Affordable Care Act (PPACA) initiated wide-sweeping implications for the health care industry that, amongst many other objectives, aimed to improve health care quality through reimbursing quality rather than quantity and called for integrated multidisciplinary care. It included mental health professionals for the first time in the definition of “health care workforce” and “health professionals,” signaling progress towards integrated health care that is multidisciplinary and places the patient’s whole-person wellness at the center (Patient Protection and Affordable Care Act, 2010).

### ***Socio-cultural, Political & Economic Influence***

The broader socio-cultural, political and economic systems of the U.S. and their associated philosophies infuse the healthcare system and impact a patient before, during, and after an ICU stay. The U.S. operates as a Western democratic and capitalistic society that is driven by individualistic values. The high value placed on individual liberties and freedoms may emerge as salient to a patient’s experience in the ICU, as there may be an unconscious expectation that these will be preserved across contexts and that personal agency will remain strong. The vulnerability of critical illness and its accompanying sense of powerlessness and loss of agency can be quite jarring to individuals who are used to feeling they can set and control the parameters of their experiences. Similarly, the individualistic nature of US culture emphasizes the individual over the group and can create expectations, especially in more privileged populations, that one’s experience, dignity, and value should be prioritized and honored across contexts. This attitude may contribute to negative perceptions and interpretations of experiences of care in the ICU, especially as patients may feel unpleasant

things are being “done to” them instead of care being “provided for” them. As noted previously, “the same event will be experienced differently based upon a range of variables including cultural context and social and psychological factors unique to the individual” (Elliott & Urquiza, 2006; Knight, 2015, p. 26). This was evident in a study that examined ethnocultural differences in psychological responses to ICU stays (Tripathi et al., 2019). Amongst other findings, the authors observed that Indian patients who reported “dreams” or “flashes of memory, like remembering the feeling of a tube in [his] mouth every time [he] brushed [his] teeth” were not only convinced these events were not unpleasant for them but they also had a high level of acceptance and even gratitude to the doctor/nurse who provided the intervention. The same event (intubation) may be experienced quite differently by an individual from a marginalized population in the U.S., especially if they identify with groups who have been victims of genocide, slavery, colonialism, exploitation, and/or oppression. The experience of intubation or having physical restraints placed may trigger historical traumas and initiate a trauma response. This may be especially true for patients who are black, indigenous, or people of color (BIPOC) if they do not see themselves reflected in the healthcare staff who are administering the interventions.

In addition to the values of personal liberty and individuality, and social systems and forces of racism, the U.S. capitalistic orientation has influence on health research and health care. Capitalistic values tend to focus on outcome-oriented, data driven measures of productivity and success – most commonly, profit. This outcome-oriented and content-focused perspective is present in the biomedical model approach to healthcare that dominates in the US. The importance placed on hard data can lead to over-valuation of quantitative results and there may be a neglect of and appreciation for process-oriented and qualitative knowledge that captures the human experience. Similarly, this philosophy drives medical and mental health care, wherein quantity rather than quality has historically been reimbursed and the entire healthcare system, especially pharmaceutical companies, have become part of a large for-profit

industry rather than a system focused on providing and maintaining optimal health for its citizens.

### **Synthesis of the Literature**

The above literature shows that the prevalence and nature of the problem of medical trauma in ICU survivors is significant. While medical trauma shares many features of traditional, nonmedical trauma, there are also unique features that set it apart (Hall & Hall, 2017). These have not been sufficiently understood or appreciated by researchers or practitioners thus far and as a result, individuals are continuing to struggle with symptoms that may be prevented or mitigated. The pediatric model of medical traumatic stress offers a model worth replicating, as it allows for systematic research, and has a robust evidence base with measures, protocols, and support for the population most impacted by distress associated with the phenomenon (Kazak et al., 2006; National Child Traumatic Stress Network, 2014). Edmondson (2014) and Hall and Hall (2017) have offered models that are important steps towards enhancing awareness and creating consensus constructs in the adult population. The EST model is particularly valuable for its illustration of unique PTSD symptom manifestation and impact on this population, while Hall and Hall's medical trauma model qualitatively describes the phenomenon's features and "whole-person" impacts. While some research has been undertaken to explore medical trauma in various medical populations, including ICU patients, the scope has been narrow and has typically focused on one dimension of the experience. The phenomenon of ICU medical trauma occurs within a person operating inside of a complex and multidimensional system with dynamic, mutually influencing variables, which is captured well by Bronfenbrenner's ecological systems model (1975). Application of this model would allow for a more thorough understanding of this phenomenon than is currently afforded by existing literature.

### **Rationale and Scope of the Review and Analysis**

To date, there is no research or practical consensus on an adult medical trauma construct. Existing literature is not synthesized across disciplines or in a way that merges the

individual, clinical, relational, and environmental influences. ICU medical trauma is a phenomenon that affects a significant population and, because of advancements in care, that population is growing. The biomedical model is excellent for management of biological disease processes; however, the population it is serving is a dynamic and complex group comprised of social beings with emotional worlds. Research has shown that the mind-body connection is strong and mutually influential (Levine, 2010). As such, there is a need for information that takes into account the multidimensional aspects of the phenomenon and offers a synthesis for both medical and mental health professionals who share the goal of enhancing wellness in the people they serve.

This dissertation includes a comprehensive, interdisciplinary review of literature related to the concept of medical trauma in general, and medical trauma in ICU survivors particularly. An ecological perspective informs the organization of factors for critical review and analysis. The focus of the critical review involves parameters of time and setting: factors present or events that occur in an ICU patient room (setting) during the course of critical care treatment (time). A comprehensive, interdisciplinary review of literature examines what is currently known about specific personal, ICU contextual, and ICU intervention-related factors and their impact on the development of PTSD in adult ICU survivors. The objective of the critical analysis is to integrate findings in order to enhance understanding of the multiple variables present in an ICU that may impact the experience of medical trauma in adult ICU survivors. This includes a discussion about the nature of the relationship between and amongst factors at different levels of an ecological model adapted for ICU-related medical trauma. This also includes a discussion of implications from findings, including recommendations for clinical practice with individuals struggling with medically related traumatic stress—particularly adult ICU survivors, and suggestions for future practical and research directions.

## **Specific Aims and Objectives**

The aim of this dissertation is to enhance understanding of the experience of medical trauma in adult ICU survivors and to comprehensively address how patient-specific factors, ICU clinical factors, ICU relational factors, ICU environment factors, and interventions administered during an ICU stay may impact development of PTSD in adult ICU survivors.

### ***Objectives***

More specifically, the objectives of this study were:

1. To conduct a comprehensive review of selected literature related to patient-specific factors (e.g., age, sex, race/ethnicity, psychiatric history, SES, social support) and how they impact the development of medical trauma in an ICU survivor.
2. To conduct a comprehensive review of selected literature related to contextual elements that may impact the development of medical trauma in an ICU survivor. There are three subcategories of contextual elements: clinical factors, relational factors, and environmental factors.
  - a. Specific clinical factors: severity of illness, ICU length of stay (LOS), in-ICU mood and acute stress symptoms, sedation practices (particularly, benzodiazepines), delirium, memories and recall, mechanical ventilation, and physical restraints.
  - b. Relational factors: the nature and quality of clinician or nurse-patient interactions (e.g., patient-centered approach, degree of empathy, communication).
  - c. Environment factors: lighting, odors, sounds, temperature, privacy, and sleep disruption.
3. To conduct a comprehensive review of selected literature addressing interventions introduced in the ICU that aim to mitigate or prevent development of medical trauma secondary to a stay in the ICU, including interventions that target: sleep disturbances, sedation practices, delirium, delusional memories, treatment with mechanical ventilation, and distress/agitation/sense of safety.



4. To offer implications from findings, including suggestions for clinical practice with individuals who experience adverse psychological impacts secondary to ICU-related medical trauma.
5. To make recommendations for future practical and research directions.

### **Chapter 3: Review and Analysis Methods**

This dissertation examined medical trauma in adult ICU survivors and specifically explored factors that may contribute to, prevent, or mitigate the experience or development of PTSD in this population. This chapter presents the research methods utilized in the critical analysis of the literature as well as the rationale for this approach.

#### **Rationale for Use of the Critical Review Approach**

To date, there is no unified construct within the medical or psychological community that captures the phenomenon of medical trauma in adults in general or in adult ICU survivors in particular. The phenomenon itself is unique and complex in how it emerges and how it affects an individual's life. The literature related to the experience of traumatic stress reactions following an ICU stay is unsystematic and dimensions of the contributing factors span multiple domains within and outside of an individual. A deeper understanding of the experience of medical trauma in ICU survivors can inform the care provided to a critical care patient both during their hospital stay and/or after discharge in a medical setting, a mental health setting, or at home with caregivers. Information related to this phenomenon is currently inadequate and synthesis of existing data is lacking. A critical review offers an opportunity to adopt a broad scope and to deeply understand the phenomenon through comprehensive exploration and analysis of literature across disciplines and domains. This format allows for the inclusion and consideration of multiple perspectives, including quantitative, qualitative, conceptual, and narrative frameworks, which parallels the multidimensional quality of the phenomenon itself. This approach also offers potential to integrate findings from medical and mental health disciplines and offer theoretical, conceptual, and practical benefits to researchers and practitioners.

#### **Inclusion/Exclusion Criteria for Literature Review**

##### ***Topics and Keywords***

The general topic areas researched in this comprehensive literature review were medical trauma and ICU experiences. The review examined PTSD secondary to an ICU stay related to

any critical presentation/diagnosis and did not specifically seek to examine ICU psychosis, Post Intensive Care Syndrome (PICS), or post-psychosis PTSD. Although important and worthy of research attention, this review did not include the following: vicarious trauma in individuals in the patient's social support network (e.g., family, friends present during an ICU stay); traumatic experiences primarily related to gross negligence in healthcare staff (e.g., an ICU stay following amputation of the wrong limb), or trauma-inducing criminal acts perpetrated by a member of a healthcare staff (e.g., sexual assault). Due to the time and setting parameters in scope, this review did not examine: psychological interventions for medical trauma after discharge or the effect of medical trauma on caregivers or the family system after discharge. This review did not specifically examine broader macrosystem-level (e.g., hospital or healthcare system) influences on medical trauma in ICU survivors, but these are referenced in the discussion of findings. Finally, this review focused on literature related to ICU survivors prior to the COVID-19 pandemic; however, observations are made in the discussion section related to how information yielded from the review may or may not apply to the clinical picture of a COVID-19 ICU survivor.

Prior to conducting searches, broad domains were established then subdivided. First, three broad categories were designated: personal, contextual, and intervention-related. Personal variables were named "patient-specific factors." Contextual variables were divided into three subcategories designated as "clinical factors," "relational factors," and "environment factors." Factors related to intra-ICU interventions that targeted variables related to PTSD were captured under the broad "intervention" domain.

Initially, two primary keywords were used in all database searches. The first primary keyword was "medical trauma" and synonyms included medical traumatic stress, medical posttraumatic stress, medical traumatic stress, medical PTSD, medical post-traumatic stress disorder, medical posttraumatic stress disorder, and medical post-traumatic stress disorder. However, given the lack of an adult medical trauma construct, this keyword and its synonyms yielded very few results. As such, this was replaced by "posttraumatic stress disorder" and

synonyms included, PTSD, post-traumatic stress disorder, posttraumatic stress, and post-traumatic stress. Posttraumatic stress disorder was selected because it is an established and well researched syndrome with symptoms that most closely resemble the adverse psychological effects of medical trauma. The next primary keyword was “intensive care unit” and synonyms included ICU, critical care, critical care unit, CCU, intensive treatment unit, and ITU. All searches utilized these words in combination (i.e., posttraumatic stress disorder AND intensive care unit). Additional searches utilized this combination with another variable of interest, such as age, sex, gender, race, ethnicity, socioeconomic status (SES) or socioeconomic circumstance, education, income, employment or unemployment, psychiatric history or mental health history or psychological difficulties or preexisting mental health illness, history of depression, history of trauma, history of anxiety, social support, illness severity or disease severity, length of stay, distress or agitation, in-ICU mood or state, sedation or sedative, benzodiazepines, delirium, delusions, hallucinations, psychosis, mechanical ventilation (MV), physical restraints or restraints, memory, recall, experiences, environment or setting, clinical setting, sensory, architecture, lights or lighting, sounds, noise, alarms, odors, smells, temperature, privacy, agency or autonomy, sleep disturbance or sleep disruption, medical staff, healthcare staff, healthcare workers, nurses, doctors, practitioners, communication or communication style, warmth, empathy, perceived empathy, vicarious trauma, patient-centered approach, stress level, emotional intelligence, holistic, humanized care, interventions, prevention, treatment, therapy, diary or diaries, music, calming, relaxing, eye masks, ear plugs, massage, non-pharmacologic, pharmacologic, cortisol, hydrocortisone, glucocorticoids, and therapeutic.

### **Databases and Dates of Publication**

The searches were conducted using both psychology and medical resources. The review of the literature included sources accessible through primary research tools and academic electronic databases such as PsychINFO, EBSCOhost, PubMed, Academic Search Elite, Scopus, Research Library, JSTOR, WorldCat, Literature Resource Center, and

Dissertations & Theses. The literature review did not exclude any documents based on date of publication.

### **Types of Documents**

Sources were mainly derived from psychological journals and medical journals. The sources were primarily empirical and peer reviewed but included some theoretical and conceptual resources. The empirical sources included qualitative, quantitative, and mixed methods studies. Systematic reviews and meta-analysis were more available for individual, clinical, and intervention factors, while qualitative studies were more available for examination of relational factors.

### **Critical Analysis Approach**

The critical analysis included a review and integrative analysis of the literature related to the selected factors within the personal, contextual, and intervention domains and their impact on medical trauma (particularly PTSD) in an ICU survivor. Literature was reviewed separately for each specific factor within the established domains (e.g., ICU sedation practices and PTSD; ICU nurse empathy and impact on ICU patient experience). To incorporate the ecological perspective, the author developed an adapted ecological model for medical trauma in the ICU and utilized it in analyzing findings from the literature review. Patterns and trends in the theory and research were identified. The manner in which the literature was discussed aimed to integrate the findings as they related to factors that may contribute to the development of medical trauma or PTSD secondary to an ICU stay. Methodological and theoretical limitations were discussed. This review presented possible implications for treatment of medical trauma in ICU survivors and/or in individuals likely to be psychologically impacted by their contact with the healthcare system. Considerations regarding the applicability of findings to COVID-19 was presented. The author made suggestions for future practical and research directions.

It is important to note that the lens through which this author reviewed the literature was informed in part by her own first- and second-hand experiences of adverse or distressing

medical experiences. The author's personal history includes a distressing ICU stay and she has also worked in the medical malpractice field wherein she was exposed to a high volume of plaintiffs' complaints of traumatic stress secondary to medical treatment experiences. The author made efforts to hold awareness of this and mitigate bias, however the literature that was selected, viewed, and interpreted may have been impacted by this lens.

## **Chapter 4: Results**

This section presents the findings of the critical review of literature which aimed to enhance understanding of individual, clinical, relational, and environmental factors in an ICU that may impact the experience of medical trauma in adult ICU survivors, as well as any interventions introduced in the ICU that may prevent or mitigate this phenomenon. These domains were selected with an ecological perspective in mind given its nested-system organization and the dynamic relationship between and among the elements and systems. The results will be presented in order from the domains most proximal to a patient to more distal, in terms of immediate, direct impact and degree of interaction. Thus, first the results from the review of the patient-specific factors will be presented. Next, results will be shared from the clinical factors domain, which contains the most elements. Findings related to the relational dimensions of patient care (i.e., ICU staff-patient interactions) are presented, followed by results related to the impacts of the environment or setting. Lastly, results are presented from the review of intra-ICU trauma interventions, grouped according to the risk factor they target. Although a few factors are consistently identified as having a potent and direct impact on the development of PTSD in adult ICU survivors, many factors show indirect, intermediary, or inconsistent associations with PTSD.

### **Patient Factors**

The patient-specific factors that were examined for this review included demographic features (age, gender, race/ethnicity, SES), psychiatric history, and social support. Age, gender, and psychiatric history were commonly included in studies whereas race/ethnicity, SES, and levels of social support were not.

#### ***Age and Gender***

Consistent with general trauma and stress research (Brewin et al., 2000), associations have been found between younger age and/or female gender and higher post-ICU risk of PTSD, but the data has been inconsistent. Some studies identified female sex as a risk factor (Boer et

al., 2007; Girard et al., 2007; McKinley et al., 2012; Samuelson et al., 2007; Schandl et al., 2012; Toien, et al., 2010) while many others did not find an association (Cuthbertson et al., 2004; Garrouste-Orgeas et al., 2012; Myhren, et al., 2009; Paparrigopoulos et al., 2014; Rattray et al., 2005; Wade et al., 2012; Wallen et al., 2008) and meta-analyses have shown mixed results (Davydow et al., 2008, 2009, 2013; Parker et al., 2015).

Similarly, some studies have identified younger age as a risk factor (Boer et al., 2007; Cuthbertson et al., 2004; Girard et al., 2007; Wallen et al., 2008) while older age was identified as a risk factor in one (Myhren, et al., 2009), and many other studies found no relationship or inconsistent results (Davydow et al., 2008; Parker et al., 2015). Parker et al.'s 2015 meta-analysis represents this inconsistency, as their data found no association between age and PTSD symptoms in nine of 16 studies.

### ***Race/Ethnicity and Socioeconomic Circumstances***

Race/ethnicity and socioeconomic circumstances were often not included as variables in studies exploring PTSD in adult ICU survivors. In fact, in Wade and colleagues' 2013 systematic review comparison study which reviewed 26 high-quality papers (13 from 1999-2007 and 13 from 2008-2013) with the purpose of identifying psychological risk factors for PTSD in ICU survivors, none of the studies in the earlier period and very few studies in that latter period investigated the role of ethnicity or socio-economic circumstances. When latter studies did include race/ethnicity or SES, they were not found to have a meaningful association with post-ICU development of PTSD or post traumatic stress symptoms (Davydow 2008, 2009). However, Wade and colleagues' 2012 study found that lower socio-economic position predicted anxiety, depression, and emotional quality of life after ICU, but not PTSD. They posited that depression or anxiety symptoms may be impacted by socioeconomic factors once the patients return home and noted that none of the prior studies examining post-ICU psychological outcomes included a valid measure of SES, despite evidence that it does predict mortality in ICU patients (Hutchings et al., 2004; Wade et al., 2012; Welch et al., 2010). On a few occasions studies have included



characteristics related to SES, such as unemployment or level of education and these variables were found to be occasionally, but not consistently, linked with the presence of PTSD, depressive, and anxiety symptoms at various follow-up time points after discharge from an ICU (Myhren et al., 2009; Schandl et al., 2013).

### ***Psychiatric History: Previous Depression, Anxiety, Trauma***

Findings from research related to chronic stress and aversive life experiences indicates that previous psychiatric difficulty consistently predicts new, stress-related psychiatric difficulties (McGiffin et al., 2016; Ozer et al., 2003). Indeed, prior psychopathology is a known risk factor for the development of posttraumatic stress in trauma-exposed adults in general (Brewin et al., 2010) and this is reflected in many studies examining PTSD in ICU survivors. Evidence of prior depression, anxiety, PTSD, and/or trauma exposure prior to ICU admission (Bienvenu et al., 2013; Davydow et al., 2009; McGiffin et al., 2016; Parker et al., 2015) or treatment-seeking behaviors for psychological distress in the time period prior to ICU admission (Cuthbertson et al., 2004) consistently predict eventual development of PTSD. These findings are present across populations, including general ICU patients (Bienvenu et al., 2013), traumatic injury ICU patients (Davydow et al., 2009), and civilian and/or veteran ICU patients (Patel et al., 2016).

Additionally, in two studies—one systematic review (Davydow et al., 2008), and one prospective observational study (Jones et al., 2007)—prior psychiatric history was found to influence in-hospital variables that have been independently associated with post-ICU PTSD, such as memories, sedation practices, delirium, agitation, and physical restraint use. Specifically, a history of anxiety and/or depressive disorders preceding critical care have been found to predict post-ICU memories of in-ICU psychotic experiences (Davydow et al., 2008), while prehospital depression has been found to predict receipt of increased amounts of benzodiazepine sedatives (Jones et al., 2007). Pre-ICU anxiety has been associated with in-ICU states of agitation or distress (Nikayin, et al., 2016), which is linked with increased sedation and restraint (Davydow et al., 2008).

In addition to common methodological limitations (e.g., variance in assessment measures, foci of study, parameters of inclusion), some authors have called for readers to exercise caution in interpreting these findings, as they can underinflate or overinflate estimates. For example, authors of a robust systematic review that identified psychiatric history as a risk factor for development of PTSD noted that because several of the studies analyzed had excluded patients with psychiatric history, the prevalence estimates they found were likely underestimates for the population of all ICU survivors (Davydow et al., 2008). Others have noted that the impacts of state of mind during recall or endorsement of symptoms should be considered in interpreting results. The majority of the studies referenced above relied upon retrospective accounts, which may have been impacted by state anxiety or distress at the time of recall (McGiffin et al., 2016), influencing the responses of the subjects.

### ***Social Support***

Social support has received substantial research attention in the stress and health literature in general and evidence indicates it may play a valuable protective role against development of PTSD (Brewin et al., 2000). The relationship between social support and PTSD in general medical populations has been examined, as has the impact of social support on more general adverse physical or psychological outcomes in ICU patients (Zeilani & Seymour, 2010), but only a handful of studies have examined associations between social support and PTSD in the ICU setting (e.g., Deja et al., 2006; Jones et al., 2003). When this was examined, social support was found to have a protective or buffering effect. One study found that social support had a significant, negative association with PTSD symptoms in a sample of acute respiratory distress syndrome ARDS ICU patients (Deja et al., 2006) while another found social support reduced anxiety and distress in ICU patients undergoing a coronary artery bypass graft (CABG). Similarly, the perceived lack of social support was found to be a risk factor for post-ICU PTSD (Deja et al., 2006). It was hypothesized that social support played an intermediary role in its

reduction of acute emotional distress for the ICU patient (Deja et al., 2006; Schnyder et al., 2000).

Most literature involving social support in the ICU is related to: after-discharge home/recovery features (Langerud et al., 2018; Maddox et al., 2001; Tilburgs et al., 2015), vicarious trauma or distress in the family members related to their fear of patients' severe health status/risk of death, witnessing the ICU patient's delirious states, or frustrations related to lack of communication from the healthcare team (Anderson et al., 2008; Azoulay et al., 2005; Petrinec & Daly, 2016), or the importance of social support for ICU nurses (Mealer et al., 2012).

### **Clinical Factors**

Clinical factors that were reviewed for this section include illness type, length of ICU stay, and therapies or interventions utilized to manage a patient's course while in an ICU. As is true with most variables examined throughout this review, many of these factors have a dynamic and mutually influencing relationship. Factors reviewed include: admission diagnosis, length of ICU stay (LOS), severity of illness, in-ICU mood and acute stress, sedation practices, delirium, memories and recall, mechanical ventilation (MV), and physical restraints.

### ***ICU Diagnosis***

Some of the most common ICU admission diagnoses included in studies are post-elective or post-emergency surgery, stroke or other neurological diseases or episodes, acute myocardial infarction, acute lung infection, acute respiratory distress, and sepsis. There was no association found between admission diagnosis and PTSD symptoms in most studies reviewed. In a rigorous meta-analysis (Parker et al., 2015), seven of seven studies that included this factor found no significant relationship. Other studies have found that patients admitted after elective surgery as opposed to admission secondary to trauma or clinical disease have lower incidences of PTSD (da Costa et al., 2019) while other studies have found that patients admitted with sepsis, acute lung infection (ALI), or acute respiratory distress syndrome (ARDS) are at higher risk for PTSD after ICU discharge (Davydow et al., 2008; Hauer et al., 2009). The latter has

been posited to be related to the required therapies and/or secondary effects of the clinical disease, such as sedation, delirium, pharmacologic side effects, or MV, rather than the disease itself (Davydow et al., 2008).

### ***ICU Length of Stay and Severity of Illness***

Broader trauma literature has established an association between trauma severity and the development of PTSD and some suggest a dose-response relationship between exposure to traumatic stimuli and the development of PTSD (Brewin et al., 2000); however, this relationship was rarely found in ICU survivors as measured by the variables severity of illness (i.e., intensity of threat) and length of stay (LOS; i.e., duration of traumatic threat).

**Length of Stay.** In Parker and colleagues' 2015 meta-analysis, ICU LOS was not significantly associated with PTSD symptoms in 12 of 14 studies. Similarly, Davydow and colleagues' (2008) systematic review found that only one of the nine studies evaluating LOS identified a relationship between LOS and PTSD. The studies that have reported a relationship between ICU LOS and the development of PTSD or depression were found more often in the ARDS patient populations (Davydow et al, 2008; Hauer et al., 2009), suggesting but not substantiating the hypothesis that it may be the specific pathophysiology and treatments associated with ARDS (i.e., feelings of suffocation, requirement of MV, hypoxemia) that lead to higher rates of psychological morbidity following ICU discharge. Rather than duration of stay in general, there is evidence to suggest that it is the duration of specific events or interventions that occur while a patient is in the ICU (e.g., length of MV, length of sedation, length of time with physical restraints) that may be associated with outcomes, as they may better reflect the experiences of ICU patients (Cuthbertson et al., 2004; Wade et al., 2012).

**Severity of Illness.** The majority of studies that included illness severity in examining risk factors for ICU-related PTSD consistently found minimal support for a direct significant association (Davydow et al., 2008; Griffiths et al., 2007; Wade et al., 2013), including a robust 2015 meta-analysis wherein illness severity was not significantly associated with PTSD

symptoms in 11 of 12 studies (Parker et al., 2015). Some authors have questioned this finding (McGiffin et al., 2016), suggesting that the measurement of the construct of illness severity as related to PTSD may be flawed. In the United States, illness severity is typically measured with the Acute Physiology and Chronic Health Evaluation II (APACHE II) system, which is “designed to facilitate comparison of different medical therapies for groups of similarly ill individuals and to better predict mortality rates in the hospital” (Knaus et al., 1985; McGiffin et al., 2016, p. 124). The validity and reliability of this instrument has been called into question, as rigorous studies have found both striking overestimates and underestimates of its accuracy and wide variability in its implementation in everyday ICU clinical practice (Polderman et al., 2001), and has led critics to advise against application for predicting outcomes at an individual level (McGiffin et al., 2016; Wong et al., 1996).

### ***In-ICU Mood & Acute Stress Symptoms***

Acute stress symptoms and in-ICU mood have been consistently and strongly associated with ICU-related PTSD in individual studies, meta-analyses, and systematic reviews (Davydow et al., 2008; Samuelson et al., 2007; Wade et al., 2012). As a variable, in-ICU mood is intended to capture symptoms, reactions, and presentations such as anger, nervousness, low mood, confusion, agitation, or stress as either subjectively reported by patients or as observed and documented by ICU staff. Agitation or distress may be due to pain, delirium, hypoxemia, sleep disturbance, medication side effects, or other experiences an ICU patient may have. Consistent with other variables, in-ICU mood or in-ICU agitation is confounded by variables such as personality (e.g., high neuroticism), prior psychiatric morbidity (e.g., preexisting depression or anxiety, prior trauma history), and pharmacologic or therapeutic interventions that may contribute to distress (e.g., benzodiazepines, MV) but nonetheless represents a significant risk factor for ICU-related PTSD (Hall & Hall, 2014; McGiffin et al., 2016).

Wade and colleagues’ prospective cohort study (2012) that investigated risk factors for psychiatric difficulties in ICU survivors found that in fully adjusted models, “mood in ICU” was

one of the strongest independent risk factors for PTSD at three months follow-up. The identification of the powerful role of “in-ICU mood” led the authors to conclude that “emotional stress reactions in intensive care may be a trigger for, or early manifestation of, future psychological morbidity” and that stress in the ICU contributed to future psychological morbidity regardless of preexisting psychological difficulties (Wade et al., 2012; p. 13). The authors also found that a patient’s acute psychological reaction influenced clinical factors, such as duration of sedation, which has itself been associated with post-ICU PTSD. They suggested that mitigating acute stress reactions in an ICU may promote positive psychosocial outcomes and may represent one of the strongest modifiable risk factors for psychiatric morbidity after ICU.

A 2008 systematic review (Davydow, et al.) found episodes of agitation and use of restraints were associated with PTSD, while a longitudinal study (Davydow et al., 2013) examining symptoms of PTSD and depression in the year following an ICU stay determined in-hospital acute stress was significantly and independently associated with greater severity of both PTSD and depressive symptoms. More specifically, they found that patients who experienced stress, fear, a reduced sense of control, and a significantly reduced ability to communicate their wishes (which often manifested as “agitation”) were at greater risk for PTSD than patients who did not experience these circumstances (Davydow et al., 2013). Furthermore, patients who reported more in-hospital acute stress symptoms did not remain in the study to completion, leading the authors to believe that the association they found was likely an underestimate.

### ***Sedation Practices***

Sedation practices in the ICU primarily function to increase comfort and mitigate distress for patients. Historically, sedation has been achieved predominantly through use of benzodiazepines (such as lorazepam and midazolam) but has begun to include alternatives, such as propofol. Deep sedation was commonly practiced up through the early-to-mid 90s due to the presumption that it was more humane to induce an amnestic state in ICU patients than to

allow them to be lucid enough to remember their experiences. In addition to being more humane, sedation also promotes the type of rhythmic and relaxed breathing facilitated by ventilators and reduces oxygen demands in MV patients (Davydow et al., 2008; Jacobi et al., 2002). After empirical evidence increasingly linked excessive sedation with adverse clinical, medical, and psychiatric outcomes, however, new guidelines were established and modified that favored adequate rather than deep sedation, promoted sedation vacations, and advocated for weighing the immediate benefits of sedation and pain management against the potential downstream negative effects. Despite shifts in sedation and analgesic practices, many medical and psychological risks remain.

### ***Benzodiazepines***

Sedation in ICUs is most commonly achieved through benzodiazepines, which represents one of the most commonly researched variables in the literature reviewed. Despite the extent of research on benzodiazepines, causal factors remain unknown, the mechanisms through which they operate remain unclear, and results from studies examining the relationship between PTSD and benzodiazepines in the ICU are variable (McGiffin et al., 2016; Parker et al., 2015; Wade et al., 2012). This is in part due to the variable of benzodiazepine sedation being operationalized in different ways, including type (lorazepam or midazolam), exposure (categorical versus maximum daily doses), receipt/dose, whether sedation was interrupted (and if so, how frequently and for how long), the total duration of sedation, and the degree of sedation (light versus deep; McGiffin et al., 2016; Parker et al., 2015; Wade et al., 2012). Many studies have found significant associations between benzodiazepine sedation and PTSD in ICU survivors; however, it is unclear whether the relationship is causal or if receipt of higher doses more likely reflects other factors, such as preexisting psychological morbidity, in-ICU mood/agitation, secondary disease processes, and/or delirium (McGiffin et al., 2016; Parker et al., 2015; Wade et al., 2012).

A robust study conducted in a large general ICU (Wade et al., 2012) that investigated the relative contributions of demographics, illness, pharmacologic and nonpharmacologic interventions, and patients' psychological reactions on psychological morbidity after discharge led to a few significant findings. Amongst other determinations, the authors found: the use of benzodiazepines and duration of sedation were associated with symptoms of PTSD; the strongest clinical risk factor for PTSD was longer duration of sedation; and, in fully adjusted models, the patients' acute psychological reactions in the ICU mediated this relationship.

A 2015 meta-analysis examining PTSD in critical care survivors found that almost half of the studies that examined the relationship between benzodiazepine sedation and PTSD indicated benzodiazepines represented a risk factor. Modifications in sedation that were found to decrease the severity of PTSD symptomatology included: light vs. deep sedation, analgesia-based sedation, and interrupted sedation (Parker et al., 2015).

Delirium, amnestic states, and/or development of non-factual memories are correlated with post-traumatic stress symptoms (particularly intrusive memories) and are all independently linked with benzodiazepine sedation (Granja et al., 2008; Parker et al., 2015; Samuelson et al., 2007). For example, patients with heavy sedation have been found to have more delusional memories of their ICU stay, which has been found to be strongly associated with PTSD (Jones et al., 2007). A 2018 systematic review (Kok et al., 2018) that sought to parse the current evidence linking administration of benzodiazepines in the ICU with adverse psychiatric effects indicated a causal relationship between benzodiazepines and delirium and that benzodiazepines were associated with post-ICU PTSD (Boehm et al., 2021). This review also found that receipt of any amount of benzodiazepines was associated with a higher number of PTSD symptoms in two of four studies and that higher total dose also predicted greater PTSD symptoms in one of two studies. These results led the authors to hypothesize that delirium may represent an intermediate variable between benzodiazepine administration and PTSD.



Conversely, other studies have found no such relationship. For example, amongst mechanically ventilated patients, no significant relationship was found between sedation intensity score and PTSD symptomatology (Weinert & Sprenkle 2008) but the authors noted a relationship could have been obscured by aggregation methods. Additionally, in a recent robust study examining ICU-related PTSD, neither benzodiazepine dose, duration of delirium, and/or opiate dose was found to be associated with PTSD (Patel et al., 2016). This led the authors to conclude that a relationship between ICU-related PTSD and the analgesedative classes has not yet been clearly determined (Marra et al., 2017; Patel et al., 2016). Some authors (Marra et al., 2017) suggest that despite the lack of clarity regarding the impact that minimizing or interrupting sedation in ICU patients may have on the development of posttraumatic stress symptoms, the potential benefits of a protocol-driven approach seem to outweigh the potential harm and that goal-directed approaches to sedation should be adopted.

Overall, data related to the type and/or duration of sedation used in critical care and the association with post-ICU PTSD has been conflicting and non-confirmatory, however there is some evidence that aspects or effects of sedation contribute to the development of PTSD symptoms. Furthermore, many authors have observed that while the mechanism may be unclear, it is probable that benzodiazepine use reflects an attempt to manage a patient's anxious or agitated state, which, as noted above, has been found to be potently and independently associated with post-ICU PTSD symptoms. Furthermore, the mutually influencing and dynamic relationship between variables is underscored once again, as Jones and colleagues (2007) found that patients with pre-ICU anxiety and depression (which was apparently unknown to nursing staff at the time) were administered greater amounts of benzodiazepines in the ICU, indicating that exposure to more benzodiazepines during critical care may indicate the presence of a patient's pre-existing psychiatric illness or acute distress more than as a discreet risk factor.

## ***Delirium***

Delirium is one of the most commonly occurring presentations of acute neurocognitive dysfunction in ICUs (Pinkas & Horowitz, 2020) and is a debilitating and distressing condition for patients undergoing critical care. According to the DSM-5, delirium includes: a disturbance of attention and awareness; develops over a short period of time and fluctuates during its course; may compromise one's memory, orientation, language, and perceptual abilities, and is not due to another neurocognitive disorder (e.g., dementia), another medical condition, or substance intoxication or withdrawal (APA, 2013). As such, delirium often compromises an ICU patient's ability to process events during their stay and can lead to experiences of delusions, hallucinations, or paranoia (Svenningsen, et al., 2015). These contribute to the development of nonfactual or frightening memories, which itself has been strongly associated with PTSD in ICU survivors (Parker et al., 2015; Pinkas & Horowitz, 2020). Notably, delirium research in ICU survivors often includes the impact on family members of patients, as delirium not only causes distress in the patient experiencing it, but also those who are witness to secondary effects of the state.

Because of methodological and terminological variances (e.g., acute brain dysfunction, acute confusional state, ICU psychosis, encephalopathy) as well as a reduced communication ability during an episode of delirium (Pinkas & Horowitz, 2020; Williams et al., 2020), the true prevalence, magnitude, and nature of delirium in ICUs remains somewhat unclear; however, it is estimated that 60%-80% of mechanically ventilated critical care patients and 50%-70% of non-mechanically ventilated critical care patients experience delirium in the ICU (Kok et al., 2018; Pinkas & Horowitz, 2020). In ICU populations, delirium is associated with increased mortality risk, longer ICU stays, increased length of MV, and prolonged neuropsychological difficulties (Ely et al., 2004; Jackson et al., 2003; Lin et al., 2004; Marra et al., 2017; Mibrandt et al., 2004). Many of the risk factors associated with delirium are present in ICU environments and ICU patients, including older age, sleep and light deprivation, psychoactive drugs, MV, protracted

immobilization, anemia, sepsis, heart failure, abnormal blood pressure, malnutrition, restraints, and/or poorly managed pain (Marra et al., 2017; Pinkas & Horowitz, 2020).

Studies that have explored the association between ICU-delirium and PTSD in ICU survivors have yielded inconsistent findings. For example, Svenningsen et al.'s 2015 prospective observational cohort study that evaluated the relationship between ICU-related delirium and symptoms of PTSD in patients after discharge found the relationship was “weak and insignificant” and that delirium in the ICU did not increase the risk of PTSD. Conversely, findings of a 2020 prospective cohort study (Bulic et al.) indicated, after regression analysis, that delirium was independently associated with long-term PTSD symptoms at 12 months. What has been well established is that delirium, with its associated psychotic experiences, may be an intermediate mechanism for post-ICU PTSD. Specifically, authors have suggested that since psychotic symptoms and nightmares are common in delirious patients, and post-ICU memories of in-ICU psychotic experiences is a strong predictor of PTSD, delirium may be a true risk factor for PTSD in the ICU setting, but plays an intermediary role (Boehm et al., 2021; Davydow et al., 2008; Parker et al., 2015; Pinkas & Horowitz, 2020).

The primary physiological process of delirium is one facet of the condition, and the secondary process involves the emotional experience and consequence, which has been characterized as “delirium related distress”. A 2020 narrative review (Williams et al., 2020) described delirium-related distress as a “primarily emotional experience” and a 2021 (Boehm et al.) qualitative meta-synthesis of patients’ and families’ perspectives and experiences of delirium in ICU survivors sought to elucidate the nature of the experience. The authors determined that delirium frequently contributes to suffering in critical care patients and their family members and identified fear, anger, perplexity, and shame as the predominant emotions that patients experience during and/or after delirium. In addition to the emotional distress it caused, authors found the experience affected the “whole person,” causing cognitive, emotional, physical, relational, and spiritual suffering. The patients reported that the perceptual distortions and

impaired comprehension they experienced made it difficult to understand their sensations and the environment and compromised their ability to connect and communicate with staff and family. Notably, this qualitative study unexpectedly yielded the identification of patient- and family-reported mediators of distress secondary to delirium, which included communication and information from clinicians, humane interpersonal approaches to care, and family member involvement in the patient's care (Boehm et al., 2021).

The quality of cognitive processing during a traumatic situation has been posited to contribute to the development of PTSD and people who report feelings of confusion and/or overwhelm during a traumatic event are more likely to suffer from PTSD (Ehlers & Clark, 2000). The experience of delirium impacts this significantly and indeed, delusional, frightening, or nonfactual experiences in an ICU – and memories or recall of these experiences – are strongly associated with PTSD after discharge (Girard et al., 2007; Jones et al., 2007; Samuelson et al., 2006, 2007; Schelling et al., 1998; Wade et al., 2012; Warlan & Howland, 2015).

### ***Memories and Recall***

The problematic experiences or memories of an ICU survivor that are associated with PTSD are referred to in the literature as frightening or psychotic experiences, hallucinations, delusional memories, nonfactual memories, memories of frightening experiences, aversive memories, upsetting memories, or memories of “unreal experiences” (Girard et al., 2007; Jones et al., 2007; Samuelson et al., 2007; Wade et al., 2012). These are most often caused by or associated with delirium, pharmacologic side effects, infections and high fever, ventilator support, low S-hemoglobin level, sleep deprivation, renal failure, and/or surgery prior to admission (Ringdal et al., 2006; Rundshagen et al., 2002; Samuelson et al., 2006). There is significant variability in studies regarding the proportion of ICU survivors who report delusional memories. The combination of factors a patient may experience that may contribute to the experience of delusional memories as well as methodological factors contributes to this variation. The percentage of ICU survivors who report delusional memories appears to range

from about 26%-73% and has been hypothesized to be underreported due to patient fears that others may perceive them as mentally unstable if they share such memories (Granberg-Axéll et al., 1998; Kiekkas et al., 2010). Patients' memories of frightening or nonfactual experience can threaten subsequent psychological recovery after ICU discharge (Samuelson et al., 2007; Schelling et al., 1998), have potential to cause suffering for several months following discharge (Löf et al., 2008) and characterize the intrusion symptoms of PTSD found in ICU survivors (i.e., flashbacks or nightmares; Girard et al., 2007; Wade et al., 2012). With regard to memory formation, a potential mechanism for the development of PTSD has been posited to occur through "overstimulation of the endogenous stress-responsive hormones and neuromodulators by a traumatic event, resulting in the formation and overconsolidation of a deeply engraved traumatic memory, which subsequently manifests itself in the conditioned emotional response and intrusive recollections of PTSD" (Pitman, 1989; Roberts et al., 2018, p. 1329).

The nature of memories for ICU survivors appears to be unsettling delusional memories of their hospitalizations; includes respiratory distress, anxiety/panic, pain, and vivid nightmares and/or hallucinations, (Schelling et al., 1998; Weinert & Sprenkle, 2008; Yakobson, 2018); often incorporate real (i.e., "factual") events interwoven with delusional or nonfactual events from that time (Girard et al., 2007; Wade et al., 2012); are often persecutory (Jones et al., 1994) and fragmentary (Jones et al., 2000) in nature; and are often recalled vividly (Jones et al., 1994). They also appear to last longer. A multicenter follow-up study of 238 mechanically ventilated critical care survivors found that recall of delusional memories rather than factual traumatic memories (Jones et al., 2007) was related to PTSD development and that the delusional memories had higher and longer retention rates (Jones et al., 2007). Emotional salience has been hypothesized to play a role in this (Jones et al., 2007; Warlan & Howland, 2015), as memories associated with reduced safety, increased threat, and/or experiences of confusing "unreality" leads to richer encoding and extended length of retention. As such, delusional memories comprise the main recollections of the ICU experience (Jones et al., 2007; Warlan &

Howland, 2015). Amnesia or lack of any memory of one's ICU stay (factual or nonfactual) does not appear to be protective either, as a large multicenter study (Granja et al., 2008) found that almost half of the patients did not have any memory of their ICU admission or stay and there was still a strong association between "amnesia of early events" of the hospital stay and intensity of PTSD (Bienvenu et al., 2013; Girard et al., 2007; Warlan & Howland, 2015).

With regard to the relationship between ICU-related memories and PTSD after discharge, Parker and colleagues (2015) found results similar to prior studies (Davydow et al., 2008) in their robust systematic review and reinforced a strong association. They found that patients who recalled memories of ICU-related frightening or psychotic experiences had an elevated risk of PTSD in the majority of studies (80%) that explored this dimension. In addition to the overall association between memories of frightening experiences or lack of memory, particular subgroups and qualifiers have been examined. A higher number and earlier recall of delusional memories, as well as the absence of factual memories, have been associated with increased risk for development of PTSD and greater severity of trauma-related symptoms (Jones et al., 2001; Marra et al., 2017; Schelling et al., 1998). Kiekkas and colleagues (2010) sought to examine and synthesize the existing empirical evidence regarding the relationship between psychological distress and delusional memories in ICU survivors after discharge. Their critical review of the literature found that: PTSD symptoms were associated with delusional memories at multiple time points following ICU discharge; older studies (Jones et al., 2001) indicated factual memories may serve a protective function, but this was not corroborated by more recent studies; and, establishment of a sense of safety in the ICU may mitigate the adverse emotional consequences of delusional and/or stressful factual ICU memories (Kiekkas et al., 2010).

### ***Mechanical Ventilation***

Mechanical ventilation (MV) is the facilitation of artificial respiration through an external, mechanized device. In ICUs it is used for patients who are unable to breathe independently due

to critical illness and is accomplished by an endotracheal tube placed through the mouth into the trachea that facilitates rhythmic breathing. As such, it is often physically uncomfortable or painful and also reflects the severity of a patient's condition. The majority of PTSD literature on ICU patients with MV support includes populations of individuals who are severely critically ill and are no longer able to breathe without support and/or patients suffering from Acute Respiratory Distress Syndrome (ARDS) or acute lung injury (ALI) due to the nature of their medical issues and the treatment required.

While the data has been mixed, MV has been recognized as a risk factor for development of post-ICU psychiatric difficulties in ICU survivors (McGiffin et al., 2016). Additionally, state anxiety has been found to be higher on average for patients receiving MV than those not mechanically ventilated (Elliott et al., 2016). Various studies and systematic reviews (Bienvenu et al., 2013; Davydow et al., 2008; Wade et al., 2012; Wade et al., 2013) have identified an association between MV and signs and symptoms of PTSD in mixed diagnosis ICU patients. A direct correlation between duration of MV and risk for PTSD has been found in ALI and ARDS patients (Davydow et al., 2008). The relationship between number of days spent on MV and PTSD symptomatology has been conflictual, as some have found that a higher number of days on MV predicted increased number and severity of PTSD symptoms in general ICU survivors, (Cuthbertson et al., 2004), while others did not find that number of days significantly predicted greater incidence of PTSD symptomatology in general ICU survivors (Girard et al., 2007).

### ***Physical Restraint***

Physical restraints are utilized in ICUs to prevent patients from falls or removal of supportive devices (e.g., endotracheal tube, IVs). How often and how liberally they are used varies from hospital to hospital, with divergent views worldwide about the appropriateness of physical restraints (Bray et al., 2004; Maccioli et al., 2003). The reasons for physical restraints use, type of restraint, timing/duration of restraint use, whether restraint involves chemical

sedation or not, and availability of restraint policies are all variables associated with physical restraints in ICUs that have been examined. An international study (Benbenbishty et al., 2010) examining use in European countries found that the prevalence in general of restraint use in individual units at any time point varied from 0-100% of patients. Of the 669 patients examined, about 33% were physically restrained during their ICU stay. Patients with restraints were more likely to have care that involved MV, sedation, a larger unit, and/or a unit with a lower daytime nurse-to-patient ratio (Benbenbishty et al., 2010).

A 2021 systematic review and meta-analysis (Franks et al., 2021) that examined the relationship between physical restraint use and PTSD in ICU survivors found that most studies explored the relationships between physical restraint use and PTSD, delirium, MV hours, and/or physical injury. Like others (Benbenbishty et al., 2010; Micek et al., 2005), the authors found a significant relationship between physical restraint use and delirium (Franks et al., 2021) but data related to associations between restraint use and PTSD was less clear. While three of the four studies that met inclusion criteria did find an association between restraint use and PTSD, the results could not be pooled for analysis and the authors concluded that physical restraints may contribute to PTSD in ICU survivors, but more studies are needed (Franks et al., 2021). One study that examined specific qualifiers of physical restraint use and the relationship to PTSD in ICU survivors found that physical restraint without sedation predisposed patients to develop PTSD (Jones et al., 2007) and that recall of the experience was not associated with symptomatology. Furthermore, while other factors (LOS, age, number of hours ventilated) were not associated with restraint use, the length of time a patient was agitated was associated, suggesting that restraint use may play an intermediary role between agitation and PTSD (Franks et al., 2021).

Overall, authors have concluded that while the intention of restraints is for patient safety, the application may unwittingly lead to physical or psychological harm and many have identified the importance of development and application of an evidence-based guideline for restraint



practices (Benbenbishty et al., 2010) and nursing education (Franks et al., 2021) to mitigate adverse outcomes.

### **Relational Factors**

The clinician-patient relationship is critical in an ICU setting (Wilkin & Slevin, 2004). During an ICU stay a patient will receive a number of therapies and will require attentive care to fight a critical illness. The people that perform such duties make up the relational environment of an ICU patient and include nursing staff and specialists, though patients may also encounter other healthcare personnel or maintenance/custodial crew members. The majority of interpersonal interactions are with nursing staff who administer interventions and monitor the patient's condition.

Some of the aspects that make up the relational/interpersonal domain of this review include dimensions of care that are subsumed under broader paradigms such as psychosocial care, patient-centered care, person-centered care, holistic care, whole-person care, humanistic care, and/or humanized care, amongst others. Psychosocial care closely aligns with the broader dimensions in this domain, as it refers to “the emotional and social support aimed to protect the patient from adverse emotional reaction due to physical condition of self-vis-à-vis the intimidating environment” (Chivikula et al., 2014, p. 313). The Institute of Medicine (IOM; 2001) describes psychosocial interventions as those that take a holistic approach, facilitate the handling of individuals who are bearing the burden of disease, and help to return them to normal or optimal functioning. Patient-centeredness (one of IOM's six main goals of a 21<sup>st</sup> century health system) describes an approach to care that is empathic, compassionate, and responsive to each patient's unique needs, values, and preferences (IOM, 2001).

Compared to clinical and patient-specific factors, little research is available that examines direct associations between ICU healthcare staff and posttraumatic stress responses in ICU survivors (Papathanassoglou, 2010). Because patients' critical conditions are often accompanied by sedation, delirium, and/or reduced ability to communicate and because many

ICU survivors have little factual recall of their time in the ICU, a good portion of the research on relational factors in the ICU focuses on the interactions between healthcare staff and a patient's support system (i.e., family and friends; Adams et al, 2017). There is also a high volume of literature in this realm related to nurse burnout, vicarious trauma, or compassion fatigue (Epp, 2012; Karanikola & Mpouzika, 2018; Karanikola et al., 2015; O'Mahony, 2011; van Mol et al., 2015), which allows for inferences to be made on how some effects of these phenomena (e.g., stress, irritability, reduced compassion) may impact the quality of interactions with patients. Given the nature of the variables, outcomes are difficult to measure quantitatively and thus most literature reviewed herewith is qualitative in nature and examines patients' perceptions and recollections of their stay (Almerud et al., 2007; Hupcey, 2001). Notably, most literature examining the relational impacts of ICU care on patients' experiences was produced by European, Scandinavian, and Asian contributors.

The psychological experiences of patients that the relational dimensions impact most include patients' confrontations with death, encounters with forced dependency, experience of inhabiting an incomprehensible environment, and "the ambiguity of being an object of clinical vigilance but invisible at the personal level" (Almerud et al., 2007). Patients describe feeling afraid, alienated, marginalized, dehumanized, embarrassed, and feeling cared for by a stranger (Almerud et al., 2007), which may be mitigated by actions or attitudes in healthcare staff. Communication and empathic, compassionate and/or individualized care make up the relational characteristics identified as most salient to ICU patients' experiences based upon the literature reviewed.

In the specific population of cardiac ICU patients who underwent coronary artery bypass grafting (CABG) surgery, a correlational study (Chivukula et al., 2014) that examined the impact of psychosocial care on "ICU trauma" and "hospital well-being" found there was a "significant contribution of psychosocial care in ICU in enhancing hospital well-being as well as minimizing ICU trauma" (p. 640) and, after multiple regressions, results "clearly indicated that psychosocial

care was a powerful predictor of hospital well-being and ICU trauma” (Chivukula et al., 2014, p. 640). This led the authors to conclude that psychosocial care had a cushioning effect on trauma while simultaneously enhancing feelings and experiences of well-being in the ICU patients. Across a broad range of ICU populations (both general and specific subpopulations), studies have found that patients feel better and ICU experiences trend towards more positive when healthcare staff have a caring attitude (Hintistan et al., 2009; Meriläinen et al., 2013; Moen & Nåden, 2015; Rotondi et al., 2002; Wang et al., 2018), that social and emotional support by nursing staff reduces fear and anxiety in ICU patients (Hupcey, 2001; Koivula et al., 2002), and that positive behavior increases patient trust in healthcare staff (Samuelson, 2011).

With regard to communication, some of the practices most valued by patients included obtaining verbal consent prior to performing procedures, explaining procedures prior to initiating them, responding to a patient’s nonverbal communication, and acting as a liaison between patient and family (Chivukula et al., 2017). Similarly, Granberg-Axèll and colleagues (1998) found that patients evaluated those nurses who rarely communicated and practiced administered interventions without any explanations as “bad,” while nurses who consistently cared for them, talked to them, and treated them with kindness were described as “good.” A study on mechanically ventilated ICU patients (Rotondi et al., 2002) found that some verbal and non-verbal communication techniques eased patients’ pain and helped them feel better.

With regard to compassion/empathy, supportive interventions identified by patients as beneficial include providing emotional warmth, providing explanations/rationale for interventions, reassuring and raising faith and hope, bolstering self-esteem, giving advice, empathic touch, empathic listening, tending to patients’ emotional world, and spending extra time with patients (Frazier et al., 2002). These interventions have been found to have a positive effect on patients by “providing the cushion for absorbing the adverse impact of ICU” (p. 644) and minimizing distress both during and after a stay (Chivukula et al., 2017). When these aspects were missing, patients experienced increased anxiety, uncertainty, disorientation, vulnerability, feelings of

neglect, degradation, helplessness, and/or depression (Chivukula et al, 2017; Moen & Nåden, 2015).

### **ICU Setting/Environmental Factors**

The ICU setting includes the architectural and sensory dimensions of the ICU ward and patient room, as well as the impacts of these on patient sleep and privacy. The reviewed features include sound, odor, lighting, sleep disturbance, and privacy.

ICU wards and patient rooms are organized to optimize patient medical observation and treatment. As such, nursing stations are located near patient rooms, lights are bright to enhance visibility, and the environment is technologically dense. The atmosphere of an ICU in general has been described as consisting of “a large room, with artificial lighting, beeps of monitoring machines, sounds of ventilators, mourns of patients, constant movement of highly skilled doctors and nursing staff, and the absence of family” (Chivikula et al., 2017, p. 640). These extreme environmental conditions can create sensory deprivation and/or sensory overload and induce stress in patients. Broadly speaking, excessive noise, isolation, and restraints of free movement have been associated with psychological trauma and these are all highly present in ICUs (Chivikula et al., 2017).

### **Sound/Noise**

Studies of sound in ICUs often focus more precisely on the presence and effects of “noise,” defined as any sound that is undesirable or that interferes with chosen tasks or conversation (Hall & Hall, 2017). Most literature that includes ICU noise is either qualitative accounts wherein noise is endorsed by patients as being a factor of discomfort related to their stay (van de Leur, et al., 2004) or the disruptive impact on sleep (Pinkas & Horowitz, 2020).

In ICUs, sounds include alarms, conversations, administrative functions, medical equipment (beeping monitors or ventilators), other patient mourns, and other sources (e.g., TVs, bathrooms). The adverse impacts of noise on patients have been recognized by the World Health Organization (WHO), which has stipulated guidelines for noise levels in hospital settings

(Berglund et al., 1999; World Health Organization, 1999). The recommendations indicate that noise levels should be less than 35 dB in patient rooms; however, some studies have found that noise inside a patient's room exceeds 35 dB 70%-90% of the time (Pinkas & Horowitz, 2020). Patients' sensitivity to sounds vary from person to person, and a patient's psycho-physiological state can influence one's level of sensitivity (i.e., sensitivity increases with stress or vigilance to threat). Furthermore, general trauma literature observes that one's ability to inhibit responses to stimuli in the environment can be impaired with trauma (Stewart & White, 2008). Thus, an ICU patient's sensitivity may be heightened while a nurse's may be diminished due to both habituation secondary to high exposure and one's relationship to the noise (e.g., signaling their attention is needed rather than signaling danger or death; Chivikula et al., 2017). Strong lighting and noise have been found to affect physiological variables, such as heart rate, blood pressure, and sleep (Ryherd et al., 2008) which themselves have been found to contribute to the incidence of ICU delirium (Chivikula et al., 2017; Grandberg-Axell et al., 2001, 2002).

The role of noise, and in particular an ICU patient's perception and meaning-making related to noise, was highlighted by Baker (1984). In her analysis of noise in the ICU and its impact on psychological responses of patients, she found primary factors that influenced a patient's annoyance or arousal level included whether the source of the noise directly impacted care and well-being; whether the people creating the noise seemed to care about the patient's well-being; if the patient had beliefs or expectations about how noisy or quiet hospitals *should* be; and whether the patient perceived themselves as having any control over the noise. Further, she found that prolonged exposure tended to increase annoyance or stress levels (Baker, 1984; Hall & Hall, 2017).

### ***Odor***

Little quantitative research exists examining the effects of odor in ICU patients, however common smells identified by patients qualitatively include cleaners, antiseptics, food, and bodily fluids (Hall & Hall, 2017) and patients have identified unpleasant smells in studies related to

patient experiences of discomfort in ICUs (Granberg-Axèll et al., 1998; Meriläinen et al., 2013; Novaes et al., 1997.) Like other sensory factors, odors may be encoded into the trauma picture and can be a powerful trigger for traumatic memories (Rothschild, 2000). This may be especially impactful for patients who experience a medical trauma (or series of microtraumas) and remain in the ICU or hospital for longer periods of time, as ambient scents that were present during an especially distressing moment can act as a potent psychological trigger through the rest of stay and during follow-up medical visits (Hall & Hall, 2017).

### ***Lighting***

In an ICU, lighting is often full-spectrum and/or cool-white fluorescent. Lighting in general can influence both physical and emotional wellbeing, as it has been found to impact stress, psychological arousal, and sleep. Two of the most common lighting conditions found in ICUs (i.e., cool-white fluorescent and full-spectrum lighting) have been implicated in studies examining such parameters. For example, a study that examined differences in arousal levels under several lighting conditions, (Basso, 2001) found that higher arousal levels were detected under cool-white fluorescent conditions (whether dim or bright) and that even dim conditions for full-spectrum lighting were associated with higher arousal levels. The lighting in an ICU must be such that it is sufficient for medical staff to perform important duties but does not exacerbate a patient's stress or impair sleep, and this balance can be difficult to strike. The majority of studies found in this review explored the relationship between lighting and sleep in ICU patients, given that an individual's circadian rhythm (the body's internal clock that functions to promote and regulate sleep at night) is most prominently influenced by light. For example, studies using both simulated (Hu et al., 2010) and actual ICU environments (Le et al., 2012) found that lighting adversely impacted sleep in both populations.

### ***Sleep Disturbances***

Sleep's restorative and health-promoting function is especially important in ICU patients whose bodies are in a constant state of stress and who are combatting a critical illness. Sleep in

ICUs has been studied for over 30 years and studies have shown that sleep quality is poor and intermittent due to pain, delirium, stress, bright lights, environmental noise, staff interventions, medication side effects, depression, and anxiety (Pinkas & Horowitz, 2020). These may all contribute to acute confusion, increased LOS, and increased complications, such as delirium and infection. Thus, complications of sleep deprivation in an ICU population are much more significant than for healthy individuals and may represent an intermediary variable for post-ICU PTSD, as some adverse effects (e.g., acute distress, agitation, delirium) have been independently and directly linked with PTSD in ICU survivors. Indeed, a 2018 systematic review of sleep disturbance in ICUs found disordered sleep was common in all articles analyzed and a 2020 review (Pinkas & Horowitz) that explored interventions to reduce the severity of PTSD in ICU survivors indicated that “lack of quality sleep in ICU setting is traumatogenic and is a driving factor in influencing ICU PTSD” (p. 300).

Many of the conditions and therapies present in an ICU may significantly interfere with both quality of sleep and the number of hours of uninterrupted sleep a patient may get. A review study (Tamburri et al., 2004) on ICU “nocturnal care interactions” over the span of 147 nights found that many nursing practices such as assessing vitals, dispensing medications, taking blood samples, and tending to patient hygiene took place between 7:00 PM and 6:00 AM. These often require continuous light in nurses’ stations or in patient’s rooms, have accompanying noises, and physically disrupt sleep. A World Health Organization study that investigated the impact of noise on total sleep time in critical care unit patients determined that 11.5% to 17% of awakenings and fragmented sleep was due to environmental noise (Berglund et al., 1999; Pinkas & Horowitz, 2020; World Health Organization, 1999) and prompted a guideline for reduced noise thereafter.

### ***Privacy***

Environmental elements present in ICUs such as lighting, acoustics, and temperature may be manipulated, however, the nature of medical experiences for patients in ICUs requires

that they compromise some of their privacy in order to receive needed care. Some elements related to privacy include sharing healthcare information, exposing one's body to staff, being minimally covered in front of staff, other patients and family/visitors, and having limited control over the frequency and duration of interactions with others. Some types of ICU settings may have a higher volume of strangers participating in their care, such as at academic medical centers, where doctors are often accompanied by medical students. Single occupancy rooms have been encouraged to be adopted as an industry standard in construction of new hospitals and are preferred by patients and nurses alike to enhance agency and privacy and improve care due to reduced distractions (Chaudhury et al., 2006). In private rooms patients may have private interactions between staff and family/visitors, can ambulate more freely, and are able to have more agency over their surroundings (e.g., lighting, noise, temperature; Hall & Hall, 2017). Very few studies that examine PTSD in ICU survivors include privacy, except in qualitative assessments of patient perceptions or experiences, wherein patients cite lack of privacy as contributing to the distress of their stay (Topçu, et al., 2017).

### **Trauma-Related ICU Interventions**

For purposes of this review, trauma-related ICU interventions refers to any intervention initiated or completed while a patient is in the ICU that aims to prevent or mitigate posttraumatic stress outcomes. The prior patient-specific, clinical, relational, and environmental domains have identified a number of factors associated with the development of medical trauma in an ICU patient. Some of these are modifiable and some are not. The interventions reviewed aim to target modifiable factors and while some may involve only one domain (e.g., benzodiazepine use: clinical factor) others may involve multiple domains (e.g., sleep disturbance: clinical, environmental, and relational). The nature of medical trauma in ICU survivors is such that it often involves a high number of stressors that can have a cumulative adverse effect, which can make it burdensome. However, it is also unique because the traumatic stressors—though sometimes influenced by extra-ICU variables—predominantly take place in a highly controlled,



time-limited environment, which is different than most other civilian or military traumas. Although many questions remain, research has enhanced understanding of the multiple variables associated with ICU medical trauma, elucidating how, where and why it occurs. As such, interventions can take place while a stressor is occurring. As Hatch and colleagues (2011) posited,

The approach to the overall psychological care of these patients should surely be proactive (rather than reactive) and should begin during ICU admission, demonstrating the residual symptoms and signs of psychological disturbance in ICU survivors once they have been discharged from hospital may reflect a missed opportunity of earlier and potentially more effective intervention. (p. 3)

Indeed, a 2018 systematic review (Roberts et al.) of early interventions for the prevention of PTS symptoms in ICU survivors indicated that interventions introduced earlier (i.e., at admission) may offer more impact and benefit than interventions initiated post-discharge.

Despite high prevalence of ICU-related PTSD, there have been few quality studies examining nonpharmacologic interventions (Peris et al., 2011) and currently there is no standardized protocol to manage acute stress in ICUs (Jackson et al., 2016). Modifiable factors that may have been associated with post-ICU PTSD and represent targets of interventions that will be reviewed include: sleep disturbances, sedation practices, delirium, delusional memories, treatment with MV, and distress/agitation/sense of safety. In general, a psychosocial and patient-centered approach to care when administering interventions related to any of these variables should be adopted to optimize positive outcomes.

### ***Sleep Disturbances***

As identified previously, sleep quality and duration in an ICU may be compromised by secondary disease effects, secondary pharmacologic effects, noise, light, and nurse/staff disruptions. To decrease sleep disturbances, it is recommended that ICU staff take steps to minimize light and noise intensity in the evening and aggregate nursing care to decrease sleep disruption (Pinkas & Horowitz, 2020). This includes dimming lights in patient rooms and nearby hallways, offering sleep masks, limiting overhead paging, minimizing talking, adjusting monitors

and alarms during designated evening quiet hours, and encouraging specialists and physicians to collaborate with ICU nurses to administer as many interventions as possible (including routine lab work) during waking hours (Pinkas & Horowitz, 2020). Eye masks and ear plugs have been suggested to help assist patients block out noise and light during the night (Pinkas & Horowitz, 2020). A randomized controlled trial (Hu et al., 2010) that examined how use of earplugs and eye masks with relaxing background music affected sleep pattern and quality, cortisol levels, and melatonin levels in ICU patients found significant differences between the control and intervention groups in “depth of sleep, falling asleep, awakenings, falling asleep again after awakening, overall sleep quality... [and] perceived sleep quality” (p.1). While these results were promising, most authors cite a paucity of evidence for efficacy of practices related to sleep enhancement in ICU patients. A 2015 Cochrane review that reviewed 30 trials with over 1,500 participants to assess the efficacy of nonpharmacological interventions (e.g., relaxation strategies, earplugs, eye masks, acupressure) for sleep promotion in critically ill adult ICU patients concluded that the existing evidence was insufficient and called for future research to increase the evidence base (Hu et al., 2010). Similarly, the authors (Miller et al.) of a 2019 systematic review of non-pharmacological sleep interventions for adult ICU patients indicated specific interventions could not be recommended due to limited availability of quality studies and the Society of Critical Care Medicine’s 2018 Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adults Patients in the ICU (PADIS Guidelines) identified the need for large randomized trials to assess sleep-enhancing approaches in ICUs (Devlin et al., 2018).

### ***Delirium***

The review of clinical factors identified the significant relationship between delirium’s associated psychotic experiences and impacts on memory/recall in ICU survivors, both independently associated with post-ICU PTSD. As such, targeting interventions to variables associated with delirium may mitigate the development of posttraumatic stress symptoms. Risk

factors associated with delirium may be separated into predisposing baseline (e.g., demographic, comorbidities) and hospital-related factors, (i.e., modifiable versus nonmodifiable risk factors) and it has been proposed that delirium prevention in ICU patients should focus on reducing the number and duration of any identified risk factors that carry potential to be modified or prevented (Marra et al., 2017). Such factors include benzodiazepines, length of MV, choosing appropriate sedation, spontaneous breathing trials (daily, especially for mechanically ventilated patients), spontaneous awakening trials, early mobility, increasing mobility, minimizing physical restraint use, assessing and managing pain, monitoring and managing delirium through validated tools (e.g., CAM-ICU, ICDSC), reducing sleep interruptions, reorientation, cognitive stimulation, and including a patient's support system in order to both help recognize the needs of the patient and provide support to the family (Brummel & Girard, 2013; Marra et al., 2017; Pinkas & Horowitz, 2020). When these strategies are applied in some combination (Devlin et al., 2018), include early cognitive and physical therapy interventions, or when there is combined focus on symptom assessment, prevention, and management (Pun et al., 2019), delirium is significantly reduced and/or outcomes are improved in clinically significant ways (e.g., reduced mortality, reduced MV use, reduced delirium, and increased restraint-free care) in ICU patients (Devlin et al., 2018; Pinkas & Horowitz, 2020).

### ***Sedation Practices***

Sedation is utilized for patient safety and comfort, but may lead to delirium, development of delusional memories, and other adverse outcomes. Decisions related to prescription, administration, and eventual weaning of sedation in ICU patients involves a collaboration between physicians, specialists, and ICU nurses. Parameters related to sedation include type (e.g., analgesia-based, benzodiazepines, non-benzodiazepines), level (deep vs. light), exposure (receipt/dose), and duration (continuous versus interrupted). Minimizing sedation in general, and benzodiazepine use in particular, has been identified as a priority for decreasing adverse side effects (including PTSD) in ICU patients and can be done through both pharmacologic and

nonpharmacologic interventions (Pinkas & Horowitz, 2020). Some of the most researched and evidenced include: sedation vacations, light versus deep sedation, adequate versus deep sedation, interruption of sedation paired with spontaneous breathing trials, and utilizing analgesia-based sedation (Pinkas & Horowitz, 2020; Warlan & Howland, 2015). Increasing awareness and reorientating to surroundings in between sedated states are also recommended, which may be accomplished with reorientation strategies, music therapy, and/or having familiar objects or people in the room (Parker et al., 2015; Pinkas & Horowitz, 2020).

In general, practicing with systematic guidelines or protocols that favor, promote, and advocate for weighing the immediate benefits of sedation and pain management against the potential downstream negative effects is recommended (McGiffin et al., 2016).

### ***Memories***

The fragmentary nature of memories and the large proportion of delusional memories recollected predict worse PTSD outcomes and make it difficult for patients to make sense of what they have gone through (Jones et al., 2000). Delusional memories are associated with delirium, sedation (particularly benzodiazepines), secondary disease or pharmacologic effects, and poor sleep. Increasing the incidence of the protective factor of ICU memory and minimizing occurrence of delusional memories in the ICU creates a substantial clinical challenge (Long et al., 2014). Most in-roads involve intervening on variables discussed above (i.e., delirium, sedation, and sleep-related factors), pharmacologically altering a mechanism of memory formation, or enhancing recall of memory through records of the experience.

Because endogenous stress-response hormones and neuromodulators have been identified as contributing to the development of PTSD's intrusive memories (Pitman, 1989; Roberts et al., 2018), administration of glucocorticoids (particularly hydrocortisone) during ICU admission has been explored as a potential intervention due to its effect on memory formation (i.e., enhancing and/or impairing memory consolidation; Roozendaal, 2002). While intra-operative administration of hydrocortisone has shown favorable results in preventing or

mitigating PTSD in cardiac surgery patients (Schelling et al., 2004; Weis et al., 2006), outcome studies for ICU patients has yielded mixed results. For example, increased amounts of glucocorticoids administered in-ICU was correlated with higher traumatic memories at six months in one study (Schelling et al., 2003), while others found that receipt of hydrocortisone during ICU admission reduced PTSD symptom development (Delahanty et al., 2013; Roberts et al., 2018; Schelling et al., 2001, 2004; Weis et al., 2006). The authors of a 2018 systematic review (Roberts et al.) that examined the existing evidence of efficacy of this intervention cited the need for further research prior to recommending use of hydrocortisone as a prevention method for development of PTSD in critically ill patients.

Non-pharmacologic methods have been proposed that focus on improving a patient's understanding of events that transpire during their ICU stay, and some have exhibited promising results (Long et al., 2014). For example, even in heavily sedated patients, explaining all procedures to patients and family members and reorienting patients prior to any physical intervention is recommended (Marra et al., 2017). Additionally, providing psychoeducation in the ICU to both patients and family members about both the nature of delusional memories and how common it is to have them – especially after longer stays (Kiekkas et al., 2010; Ringdal et al., 2006) – can reduce distress related to memories.

ICU diaries have been identified as a potentially promising, low-cost, low-risk intervention that may assist ICU survivors with increasing accurate recall, reducing non-factual or delusional memories, and improving sleep quality (due to reduction of nightmares related to delusional memories). An ICU diary is a trauma experience tool that functions to record a patient's experience during their ICU stay. While patient charts are often written in medical jargon, an ICU diary is written in patient-friendly language and adopts a second-person perspective, as it is authored by healthcare workers and/or loved ones. The exact mechanism which reduces the incidence of PTSD is unclear, but there are a number of factors that have been identified as likely contributing to favorable outcomes. Firstly, ICU memory is typically a

protective factor for PTSD following discharge and ICU diaries can help to fill in the gaps of a patient's memory by incorporating more factual information into autobiographical memories (Nielsen & Angel, 2016; Sun et al., 2021). Secondly, because ICU survivors who retain factual memories of their experience may avoid recall due to fear, diaries may act as a trauma exposure mechanism (Lognoul et al., 2020; Sun et al., 2021). Thirdly, diaries may allow a patient to understand and appreciate how ill they actually were, which may help them understand why they may continue to feel weak, have a longer recovery, or are more psychologically distressed than expected (Bienvenu & Gerstenblith, 2017). Additionally, diaries can facilitate creation of a more cohesive narrative, which can be an important feature in healing from trauma. And finally, by reading ICU diaries, ICU survivors can have a better sense of the care they received, which may strengthen their trust in the healthcare system (Glimelius et al., 2018).

Some variations in execution of the diary intervention, which make results difficult to pool or generalize, include authors (whether diary entries are medical staff- or family-authored), media (just narratives or narratives and photographs), content/detail of the record (patient's ICU experience, ICU scene, interventions and treatment, vital sign data, disease course, and/or emergency procedures) and timing of delivery/reading of the diary (immediately at discharge, or weeks or months later). The risk of inadvertent retraumatization of patient or family member has been cited but needs more studies to enhance understanding (Ullman et al., 2015). Findings related to the efficacy of ICU diaries in preventing or mitigating PTSD are promising, but mixed. The pooled results from a robust 2021 systematic review and meta-analysis (Sun et al.) that reviewed high-quality studies from the last twenty years indicated that ICU diaries could effectively reduce the incidence of PTSD in ICU survivors post-discharge, which diverges from previous study findings (McIlroy et al., 2019; Nydahl et al., 2019; Sayde et al., 2020).

### ***Distress/Agitation/Sense of Safety***

Agitation, perceived threat, and acute psychological distress are strongly associated with development of PTSD in ICU survivors; therefore, reducing acute psychological stress during an

ICU stay may assist in preventing or mitigating the development of PTSD symptoms. ICU experiences associated with agitation and distress include fear of impending death, perceived threat/reduced sense of safety, feelings of isolation, uncertainty, pain, delirium (with accompanying psychotic experiences), and sleep disturbance. Thus, research indicates that health care professionals should aim to reduce distress and enhance a patient's sense of safety through clinical practices such as properly managing pain, properly managing sedation, reducing sleep disturbance, and decreasing use of physical restraints when possible (Warlan & Howland, 2015). A psychosocial and patient-centered approach to care is exceedingly important in influencing the agitation/distress/sense of safety dimension. Interventions such as speaking in a calm and empathic voice, having a caring touch, explaining the need for painful practices, rationalizing interventions, and seeking to obtain consent for procedures have been found to decrease anxiety and distress and increase a sense of safety in ICU patients (Berntzen et al., 2020; Kiekkas et al., 2010). Nurse-led relaxation and guided imagery interventions have been found to improve vital signs, sleep, and patient satisfaction and decrease anxiety, pain ratings, rate of complications, and overall LOS (Papathanassoglou, 2010), while in-ICU mind-body interventions (i.e., receiving a 60-minute massage from a trained family member; reflexology, valerian acupressure and foot massage) have also been found to improve vital signs and reduce stress.

In-ICU interdisciplinary, collaborated, and patient-centered approaches completed by clinical psychologists have been found to be beneficial. Psychotherapy initiated in the ICU or psychological interventions (e.g., stress management, cognitive and emotional restructuring, enhancing family-centered decision making) have been found to be successful in reducing severity and number of posttraumatic stress symptoms, decreasing incidence of PTSD diagnosis, and increasing post-hospital subjective perception of quality of life, though results have not been completely consistent (Birk et al., 2019; Jackson et al., 2016; Roberts et al., 2018).

## ***Mechanical Ventilation***

MV is a required medical intervention in some critically ill patients but frequently produces major distress and anxiety. The “sensation of breathlessness, frequent suctioning, inability to talk, uncertainty regarding surroundings or condition, discomfort, isolation from others and fear” (Bradt & Dileo, 2014, p. 6) contribute to increased difficulty breathing and further distress. MV in general is associated with higher state anxiety and post-ICU psychopathology and longer duration on MV in ARDS and ALI patients predicts worse PTSD outcomes (Davydow et al., 2008). As such, primary interventions to mitigate the adverse effects include increasing comfort, promoting relaxation, and intervening on the duration of exposure parameter. In addition to adequate pain management, music interventions (both patient-led or music therapist-led; relaxing music or nature sounds) have been found to be effective in reducing anxiety and agitation in ventilated patients (Bradt & Dileo, 2014; Wade et al., 2016). Interventions that have empirical support for decreasing length of MV and promoting earlier extubation are similar to some cited in delirium and/or sedation sections and include early mobilization, lighter levels of sedation, and spontaneous breathing trials (Warlan & Howland, 2015).



## **Chapter 5: Discussion**

The review of literature examined variables in individual, clinical, relational, environmental and intervention domains to better understand the phenomenon of medical trauma in ICU survivors. This discussion will provide a summary of the most salient findings, introduce an adaptation of Bronfenbrenner's ecological systems model for ICU medical trauma, and apply it in a hypothetical case example inspired by results from the critical review. The role and impact of ICU healthcare staff and burnout is discussed. Implications for treatment with this population are presented, followed by general observations, limitations, considerations for COVID-19 applicability, and suggestions for future directions.

### **Summary of Key Findings and Themes**

The findings indicated that the variables most consistently and significantly associated with PTSD in ICU survivors include: pre-ICU psychopathology; in-ICU distress, agitation, or acute stress states; post-ICU memories of in-ICU frightening or psychotic experiences (Davydow et al., 2008); MV; and lack of quality sleep. Female sex and younger age were less consistently or significantly associated with post-ICU PTSD and appear to be general risk factors for PTSD (Brewin et al., 2000). Severity of critical illness and length of stay were consistently not significantly associated factors, and race/ethnicity and SES were rarely included in studies and showed inconsistent associations when examined. The following factors were consistently associated with post-ICU PTSD, but appeared to play intermediary roles between other, more strongly associated factors: higher levels of benzodiazepines, delirium, and physical restraints. Sensory features often disrupt sleep or increase agitation levels and architectural features diminish privacy and increase distress. A patient's actual or perceived level of social support and ICU staff's psychosocial, holistic, and/or patient-centered approaches to care appeared to have a cushioning effect on the experience of trauma in the ICU and later development of PTSD. Results indicated that interventions provided during an ICU stay may be especially effective in intervening on immediate, ongoing stressors and may assist in

attenuating adverse outcomes. These include interventions in general that increase comfort, promote a sense of safety, decrease distress/agitation, and reduce delirium-related psychotic experiences, including the development of delusional or nonfactual memories. Interventions with the most research support were found to include effective and proper management of clinical variables (i.e., pain, sedation, MV, and restraint use). Effects of the use of ICU diaries, use of corticosteroids, and interventions that aim to improve quality of sleep have shown promise but require more robust evidence prior to meeting thresholds for clinical recommendation.

Results from the critical review of the literature highlight the sheer volume of stressors to which an ICU patient may be exposed. They also underscore the complexity of ICU-related medical trauma and reveal a pervasive theme of reciprocal influence between variables. The relationship between and among the different factors and domains is consistent with one of the main principles of the ecological perspective (EP) and systems theory: that there is often a multiplicity of factors, both from within an individual and from their environment, that influence their experiences, thoughts, feelings, and actions.

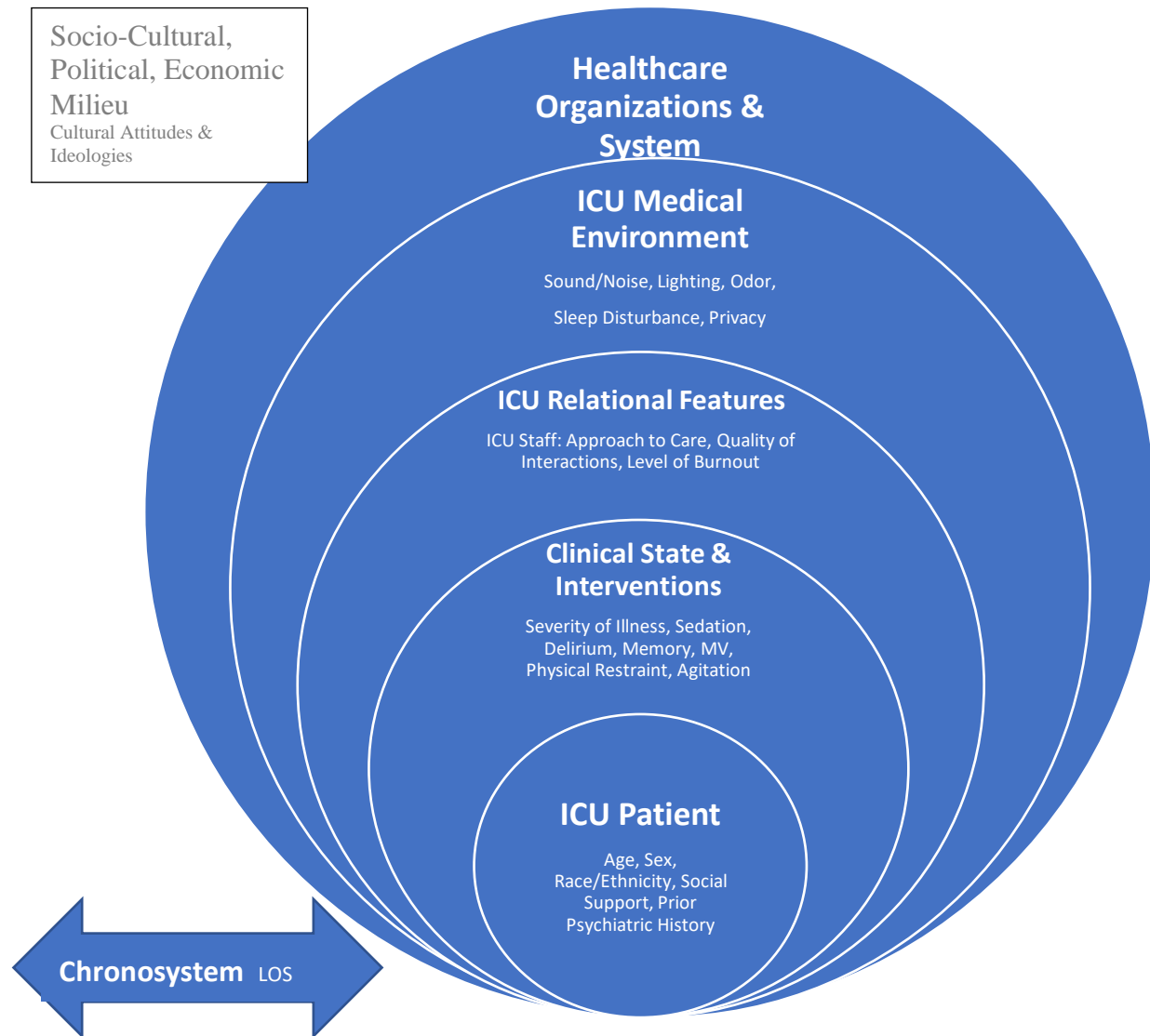
## **Ecological Perspective Revisited**

### ***Adaptation of Bronfenbrenner's Model for ICU Medical Trauma***

This author developed an adaptation of the ecological model for medical trauma in an ICU survivor as reviewed in this dissertation, which is depicted and described below (see Figure 2). While the model is meant to reflect the spirit of Bronfenbrenner's ecological systems theory, the narrow application and the nature of the ICU medical trauma phenomenon compels alterations and thus is not a one-to-one correspondence to the original. The adaptation depicts two dimensions of individual levels (patient and clinical factors), two dimensions of microsystems (staff and environment factors), an exosystem (healthcare organizations and system) the macrosystem (broader sociocultural milieu), and chronosystem (time). While the

**Figure 2**

*Ecological Model of ICU Medical Trauma*



mesosystem is not visually depicted in the model, the essence of its function as a system within which interactions between domains occurs is pertinent and will be referenced.

Consistent with the original model, the domains (or, levels) are represented in nested systems, using concentric circles, wherein the innermost circles represent domains most proximal to the individual and proceed in fashion to the most distal. The ICU Patient (i.e., individual) lies at the center. The patient's demographics, social support and psychiatric history

status comprise this domain. The next level in this model (i.e., Clinical State and Interventions) represents additional individual experiences that occur within the ICU context and are dependent upon the patient's critical illness and/or disease course. These include the severity of illness, the patient's in-ICU mood or state (e.g., agitation/acute distress), specific therapies or medical interventions administered to manage their disease (e.g., sedation, MV, physical restraints), and some effects of these therapies or medical interventions (e.g., delirium, effects on memory/recall).

The next level (i.e., ICU Relational Features) contains the ICU healthcare staff and represents an adaptation of the microsystem. In this system, the patient has ongoing dyadic interactions with ICU healthcare staff who closely monitor and manage the patient's clinical state, and the nature and quality of these interactions have direct impact on the patient. The second microsystem, ICU Medical Environment—the immediate setting within which the patient resides and the staff function—is shown next. This domain includes distinct architectural, technological, and sensory dimensions (e.g., lighting, sounds, odors, temperature) and some of the effects of these on a patient's privacy and sleep. This ICU environment exists within a hospital, a concrete entity of the broader healthcare system, which represents an exosystem. At an organizational level, the hospital itself and healthcare system in general will influence the type and quality of medical technology, support, and approach to care and will impact patients, their families, and staff. All of these factors are influenced by a broader sociocultural milieu—the macrosystem— which, for the United States, includes democratic, capitalistic, individualistic principles and institutions, cultural attitudes and ideologies. The chronosystem reflects time elements and includes the length of ICU stay (LOS) but may also apply to temporal elements of clinical variables, like duration of sedation, MV, or restraint use. Though not visually depicted in the model, the mesosystem in this adaptation would be the system wherein the patient's social support network interacts with healthcare staff.

### ***Nature of EP Process: Reciprocal and Dynamic***

Placing the ICU-related medical trauma variables inside of the ecological systems model assists in organizing and understanding this complex phenomenon's nature and process. The findings from the critical review of the literature show EP's reciprocal, dynamic process whereby the individual, clinical, relational, and environmental factors interact within and across dimensions and have potential to cumulatively and exponentially impact a patient's ICU experience—either positively or negatively. For illustrative purposes, the following extended example will take variables identified in the review as contributing most significantly to adverse outcomes and combine them with features of the enduring somatic threat (EST) model (Edmondson, 2014) in a hypothetical case example to demonstrate the phenomenon of ICU-related medical trauma. The example is informed by the results of the critical analysis and highlights the strongest findings related to risk for PTSD.

### **Illustration: Applied Hypothetical Case Example**

A young female with a pre-existing history of generalized anxiety disorder develops acute respiratory disease syndrome (ARDS) and is admitted to the ICU. Her prior psychiatric history predisposes her to have higher levels of distress or agitation in the ICU and her disease requires endotracheal intubation and MV. In order to manage the patient's agitation, promote optimal breathing, and prevent the patient from removing the breathing tube, her nurse follows established protocols and administers high levels of benzodiazepine sedation and uses physical restraints. The breathing tube, sedation, and restraints restrict the patient's ability to communicate and move freely and are physically uncomfortable, which increases her agitation and distress. Furthermore, these therapies require more frequent hands-on interventions from staff and acute monitoring from machines that beep frequently, sound alarms, and have confusing and distressing displays. The frequent interventions, bright lights required for procedures, and noise all disrupt the patient's sleep and, along with the side-effects of the benzodiazepines, cause her to experience delirium. The patient's delirium makes her confused

and disoriented, is accompanied by hallucinations and delusions, and further compromises her ability to communicate. Her hallucinations and delusions incorporate some of the environmental features and the patient begins to fear that the nurses are trying to harm her, which increases her agitation and distress and leads her to begin forcefully resisting the nurses' interventions. All of these emotionally salient events are being experienced and consolidated in the patient's memory in an altered manner; as such, she will deeply encode and retain vivid, fragmented, nonfactual, and frightening memories.

Furthermore, while the patient is agitated and delirious, she writhes in bed, screams out for help, and does not recognize her loved ones who come to visit. The family members of the patient were already concerned about her critical condition, but these behaviors deeply distress them and may lead to a vicarious trauma response. The agitated, delirious patient and distressed family members require more attention, communication, and hands-on support from the nursing staff, who are already providing extra monitoring of the medications and therapies needed for the patient's optimal and expedient return to health. The lead nurse is working her third 12-hour shift this week and begins to feel strained and overwhelmed by the demands from the environment, the patient, and the family. As a result, she is less attentive in providing the recommended sedation vacations and spontaneous breathing trials, less likely to make beneficial environmental modifications (e.g., dimming lights, closing doors, silencing alarms quickly) and/or practice sleep-enhancing interventions, and finds it increasingly difficult to maintain a calm, empathic, and warm approach to care.

When the patient is discharged home, her fragmented and frightening memories re-emerge in the form of nightmares and flashbacks, but the patient avoids talking about them because she is confused and ashamed by them. Further, because the memories still feel so real, the patient worries that either she is crazy, or that people will think she is crazy if she tries to share them. She is still recovering physically and is exhausted all the time, so she doesn't feel she has the energy to begin to process and sort out these memories. Her family is trying to

help care for her but are struggling with their own secondary traumatic stress and everyone – the patient and her family – are now on edge and hypervigilant in acutely tracking her physical symptoms for fear that she might end up in the hospital again. Whenever she coughs or experiences any shortness of breath, the patient fears her ARDS symptoms are returning and she begins to panic, which exacerbates her shortness of breath, initiates a cascade of stress response hormones, and creates more psychological distress. The patient wants to rest and recover, but she is keyed up and is afraid to sleep because of the nightmares that come. She tries to avoid upsetting thoughts, but her intrusive memories, the anxiety she senses in her caregivers, and her ongoing somatic symptoms feel inescapable and continue to feed her feelings of fear and unsafety. The patient's discharge instructions list her medications and instruct her to follow up with her specialist, but there is nothing that pertains to her psychological well-being. Although the patient rationally understands that she needs to present for a follow-up appointment with her doctor, the thought of this makes her nervous and agitated in a way she has never experienced before, and tries to reschedule the appointment until after she is feeling better. Her body feels different to her now, she is easily startled, cannot function like she used to, and has the dull but pervasive experience of feeling confused, afraid, and alone.

The above example combines some of the most significant risk factors into one scenario in order to bring the phenomenon to life. It illustrates EP's principle that a person's experience is embedded in multiple levels of context that all mutually influence each other. The different levels and the repeated, reciprocal, and dynamic influence between them was seen throughout. For example, the patient's (individual level) preexisting anxiety influenced her in-ICU level of distress, which influenced the nurses' behaviors (microsystem level) in managing her condition. The nurses followed protocols for sedation and physical restraint practices created by professional boards and organizations (exosystem level). The duration of deep sedation (chronosystem level) then had side effects that influenced the patient's mental state (back to the individual level) and caused her to be combative with her nursing staff (microsystem level). This

added stress to the nurse who worked long hours and did not have adequate support (influenced by the exosystem level and chronosystem), which resulted in the nurse having less empathic and warm interactions with the family members (mesosystem level). The dynamic and reciprocal nature of the variables saturates the entire picture. Carrying the example further in time to after the patient is discharged home illustrates the phenomenon more completely and illuminates features of Hall and Hall's (2017) and Edmondson's (2014) models of medical trauma and EST. The entirety of this patient's experience, from admission, ICU course, discharge, and home recovery illustrates the core features of Hall and Hall's model, which describes medical trauma as a subjective and cumulative phenomenon that exists on a continuum, is contextual and relational in nature, and has biopsychosocialspiritual effects. The depiction of the patient's intrusive symptoms, hypervigilance and hyperarousal to somatic cues, the ongoing nature of the internal threat, and the nature of the avoidance symptoms are consistent with the EST model.

This hypothetical case example synthesizes the results from the critical review of the literature with the EP model and re-introduces the person inside the data. The findings of the review and application in the case example reveal an additional, important through-line in the phenomenon of ICU medical trauma: the critical role of the people responsible for providing care to the patient.

## **ICU Healthcare Professionals: Essential and Burnt Out**

### ***Essential and Influential Role***

Once a patient enters the ICU with their individual features, the nursing staff influences every single dimension of the patient's primary experience thereafter. Given that ICU patients are fighting critical illnesses, their care requires acute attention to detail, advanced knowledge of diseases and disease processes, and skill in administering life-saving therapies (Warlan & Howland, 2015). Furthermore, they are the typically the only other human nearby in a technologically dense, sensory rich, and overwhelming environment that is often confusing and



overwhelming to patients and their family members (Almerud et al., 2007). Thus, nurses not only play the most significant role in managing the moment-to-moment clinical dimensions of a patient's care, but they also act as intermediaries between the patient and the patient's family members (i.e., mesosystem level function), providing valued communication and support (Chivikula et al., 2014). What is more, they are asked to attend to each patient in a grounded, calm, and compassionate manner that honors each patient's individuality and humanity and promotes dignity (IOM, 2001).

### ***Stressful Work Conditions***

ICU healthcare workers—particularly nurses—themselves operate within a context that includes stressful environmental and psychological conditions. ICU healthcare professionals often do not receive sufficient support to allow them to perform their jobs optimally and/or to maintain their own physical and psychological wellbeing. This was emphasized in a World Health Organization report in 2006 entitled “Working Together for Health” which revealed worldwide shortages of staff in healthcare settings, particularly nurses, due to stressful conditions (Guilbert, 2006). Despite awareness of the issue and decades of research related to the immensely stressful environment of ICUs, implementation of meaningful changes has been minimal, and nurses are still exposed to a variety of psychosocial hazards in their workplace.

The nature of such work-related stressors most commonly identified in research include the suffering, death, fear, and uncertainty of the patients, end of life issues, futile care, ethical challenges, caring for individuals who are suffering, augmented burdens of patients' relatives, the technical proficiency required for advanced life-sustaining care, high workload, managing the burnout of advanced care physicians, low level of personal effectiveness or accomplishment, and feeling devalued or undervalued by employers, higher-ranking medical colleagues, patients, and patients' families (Epp, 2012; Karanikola & Mpouzika, 2018; O'Mahony, 2011; van Mol et al., 2015). The combination of these stressors has led to increased levels of burnout, vicarious trauma, compassion fatigue, moral distress and burnout syndrome in

ICU healthcare workers, particularly the nurses (Alexandrova-Karamanova et al., 2016; Austin et al., 2017; Beck, 2011; Dominquez-Gomez & Rutledge, 2009; Montgomery et al., 2015; Mooney et al., 2017).

The fundamental indicators of burnout are energy depletion, depersonalization, emotional exhaustion, feeling ineffective at work detachment, and/or cynicism (Bakker et al., 2005; Bühler & Land, 2003; Lederer et al., 2008; Leiter & Maslach, 2009; McFeely, 2007; Peterson et al., 2008; Schaufeli & Greenglass, 2001; Spence Laschinger & Leiter, 2006). The consequences of burnout greatly impact patients' experiences and include work absenteeism, decreased quality of care, increased medical errors, increased irritability, and low satisfaction rates in patients and their support systems. Thus, neglecting the well-being of ICU healthcare workers hurts everyone: patients, families, and these individuals who are relied upon to provide critical care.

The findings of the critical review make it clear that ICU-related medical trauma is a complex phenomenon that may be mitigated by targeted interventions administered in the ICU by skilled, educated, and empathic healthcare providers. After discharge, treatment of individuals who suffer traumatic stress symptoms related to their stay will be best served by clinicians who share these characteristics.

### **Implications for Mental Health Treatment**

The destabilization of a patient's physical and mental well-being both during and after an ICU stay is a meaningful part of ICU-related medical trauma. Even after the primary threat to life (the critical injury or illness) has been stabilized, one's physical and mental well-being can continue to be challenged. Medical protocols that target patients' physical health are well established, but because there is not a construct or model of adult medical trauma that has been established within the psychological community, there is not a specific evidence-based protocol for its treatment. Treatment considerations for the phenomenon of ICU-related medical

trauma in the adult population are informed by general trauma literature, the model of pediatric medical traumatic stress (PMTS), and results of the critical review.

### ***Format, Setting, Modalities***

While there is opportunity and benefit for treatments to be provided in inpatient settings and delivered in dyadic, family, or group therapy formats, this section will focus primarily on considerations for individual outpatient psychotherapy treatment initiated for a survivor after discharge. However, because a patient is embedded in multiple systems that mutually influence each other and because an ICU stay—and the potential traumatic stress related to it—often impacts patients and their social support system significantly, some considerations for family treatment are important to note.

**Family.** The most applicable literature in this area comes from research related to caregiver and/or family distress wherein caregivers or family members are supporting a loved one currently in or recently discharged from an ICU, is terminally ill, or experiencing age-related health decline. For ease of communication, “family” is meant to represent all forms of supportive intimate relationships, such as one’s social support system, loved ones, family, friends, and/or non-professional caregivers. Family treatment should include support for distress secondary to the events experienced during the ICU hospitalization as well as distress related to post-discharge, home circumstances. The most common stressors for family while in the ICU include witnessing a loved one suffer, fear for a loved one’s life, feelings of powerlessness or confusion related to lack of communication or understanding the nature of the critical illness or medical course, burden of decision making, and delirium-related impacts, such as not being recognized and/or witnessing a loved one’s delirium-related psychosis (Jo et al., 2019; Kentish-Barnes et al., 2009; McAdam & Puntillo, 2009; Naef et al., 2021). Post-ICU psychological distress in family members most commonly includes symptoms related to depression, anxiety, PTSD, caregiver burden, complicated grief, and reduced quality of life (Halain et al., 2022; Kanmani et al., 2019; McAdam & Puntillo, 2009; Naef et al., 2021). The most common stressors for family members

and caregivers post-discharge include: management of medical care (e.g., follow-up appointments, medications, physical therapy, etc.); financial stress/strain, including support expenses and medical billing/insurance stressors; time spent on caregiving; impacts on employment status; loss of independence as one's focus becomes tracking and managing another's wellness; navigating multiple roles and integrating a new role and identity; stress related to re-configuration of family system and shift in family system dynamics; and, managing worry and stress related to concerns that a loved one may return to the hospital (Bahari, 2022; Borges et al., 2017; Davidson et al., 2012; Lee & Lau, 2003; Naef et al., 2021). Although there is not yet research on the EST model related to secondary EST symptoms for family members of patients struggling with enduring somatic threat distress, it is likely that caregivers may mimic a patient's hyperarousal and hypervigilance symptoms in vigilantly tracking somatic cues and experiencing exaggerated stress responses to perceived signals that a re-hospitalization may be imminent (Edmondson, 2014). This is reflected by Lewis and Taylor's study (2017) which also points to the reduced threshold associated with multiple traumas, as its findings indicated family members of ICU patients who had a prior ICU experience within the previous two-year period were significantly more likely to endorse higher levels of anxiety, depression, or acute stress symptoms.

With regard to treatment, family members would benefit from individual, dyadic therapy (with the ICU survivor), family therapy, and/or group therapy formats. Three overarching types of interventions have been found to have an evidence base showing efficacy: psychoeducation and skill building, psychotherapy, and multicomponent (combining multiple approaches, such as psychoeducation, family meetings, and/or development of coping skills; Coon & Evans, 2009). In addition to consideration and inclusion of features presented below, family treatment should include appreciation of cultural differences, particularly surrounding family commitment and involvement in care.

**Individual.** Many existing evidence-based, evidence-supported, or promising practices for the treatment of nonmedical trauma may be adapted for efficacy with individual survivors suffering from ICU-related medical trauma. These include, amongst others, cognitive behavioral therapy (CBT), subtypes of CBT like cognitive processing therapy (CPT) and prolonged exposure (PE), Eye Movement Desensitization and Reprocessing therapy (EMDR), somatic therapies (e.g., somatic experiencing), insight-oriented therapies, and mindfulness-based therapies. Regardless of setting, format, or modality, optimal treatment and outcomes should involve experienced and knowledgeable clinicians who understand the unique features of the phenomenon of medical trauma, are familiar with the nature and volume of stressors in the ICU context, and understand the multidimensional impacts an ICU stay may have on one's physical, mental, relational, and spiritual wellbeing.

***Key Features and Effects of ICU-Related Medical Trauma.*** Features of ICU-related medical trauma that set it apart from nonmedical trauma and are important for practitioners to understand include: the involvement of one's own body system as both a source of threat (i.e., the critical illness) and the bearer of therapies that may have been invasive, painful or frightening (e.g., intubation, MV); the number and different types of traumatic stressors to which a person may have been exposed (e.g., painful interventions, physical restraint, mind altering medications, noxious sensory stimuli); the mutually influencing relationship between stressors and the cumulative nature of the trauma; the fact that the trauma occurred in a patient-provider context; and awareness the trauma occurred in a highly controlled medical environment with unique architectural and sensory features. Some of the effects of the above features that may be relevant to the clinical picture of this population and should be considered include: the feelings of destabilization and unsafety within one's body, in medical settings, and with clinical practitioners; the possibility of nonfactual, frightening, or delusional memories or nightmares to be sources of distress; the likelihood of hypervigilance to somatic symptoms; and the nature of

avoidance behaviors, which may include avoidance of important medications, doctor's appointments, or activities that may lead to distressing somatic cues.

***Safety and Stabilization.*** As is consistent with most trauma therapy models, treatment with this population should begin with an emphasis on safety and stabilization (Bloom, 1999; Herman, 1997). For an ICU-medical trauma patient, the stability of one's physical and emotional state were compromised by the critical illness and the requisite therapies. The sense of one's body as safe may be altered and a shift in one's relationship to their body and body sensations may have occurred, wherein the body has become suspect and somatic symptoms are experienced as signs of danger. Because the trauma occurred in a medical facility and many of the distressing interventions were administered by healthcare professionals entrusted to provide care, establishing safety and trust within the therapy environment (i.e., a type of clinical setting with a clinical care provider) will be important and may be more difficult than with other populations.

***Psychoeducation.*** This sense of safety and trust can be aided by a clinician who is experienced as empathic, sturdy, knowledgeable, and able to communicate effectively. Inclusion of psychoeducation as a component of treatment is likely to be extremely beneficial for this population. The National Child Traumatic Stress Network publishes and administers informational packets and brochures about PMTS for parents. These materials include narratives and outlines of expectations in the days and weeks after hospital discharge, common behavioral and emotional reactions after discharge, signs that indicate additional support may be needed, and ways to cope after the patient returns home from the hospital. Some of the coping recommendations are relevant only to the pediatric population, but many would be equally applicable for adults, such as being patient and allowing time to readjust, encouraging the expression of feelings and worries, slowly increasing independence, and encouraging social interactions with friends. Providing verbal and written psychoeducation as part of treatment may benefit both the patient and any family members or caregivers assisting the patient with

recovery. Such information can assist in normalizing and validating traumatic stress reactions and can enhance a sense of safety, agency, and empowerment in patients.

***The Role of the Body.*** The involvement of one's body in the trauma(s) endured and the utilization of the body as a resource for healing are relevant to treatment for this population. Firstly, clinicians should understand that a patient may have a prolonged physical recovery accompanied by weakness, discomfort, or pain secondary to their critical illness. This may lead to frustration and feelings of hopelessness, especially if they interfere with a patient's ability to return to social or occupational functioning.

Additionally, inclusion of diaphragmatic breathing and other techniques to relax the body may assist patients in managing their stress responses by reducing cortisol levels, slowing their heart rate, improving affect, and promoting a sense of safety and resilience (Hopper et al., 2019). Similarly, body-based or somatic therapies may offer benefit in their use of one's own body as a resource for healing. Somatic therapies may interrupt the reciprocal cycle described in the enduring somatic threat model (Edmondson, 2014), wherein one's body sensations trigger a stress response, which in turn exacerbates the problematic somatic sensations, and so forth. Body-based modalities may encourage a shift in the relationship to one's somatic sensations from enemy to ally while also offering exposure elements that may reduce HPA axis reactivity.

***Distressing Memories.*** The presence of nonfactual, frightening, or fragmented memories may be a significant source of distress in this population. These are most likely to occur in patients who experienced delirium during their stay, either due to effects of the primary disease process, side effects from medications (particularly benzodiazepines), or sleep deprivation. Normalizing and destigmatizing this experience can allow patients to process the memories and the feelings of distress, confusion, and shame that may accompany them. Creation of more accurate and cohesive narratives may benefit a patient, and this may be aided

by an ICU diary if one was kept. Clinicians should be mindful of risk of retraumatization and make sure to include relaxation techniques and pace the exposure accordingly.

***Integration of Experience and Exploration of Meaning.*** Given the subjective nature of medical trauma, treatment that involves space for a patient to explore the meaning of—and relationship to—their experience is likely to be beneficial. Some patients will experience elements of their ICU stay as more traumatic than others based upon a number of variables including sociocultural context and psychological variables particular to the patient (Elliott & Urquiza, 2006; Knight, 2015). This will be especially important for individuals who have experience prior traumas, as their threshold for future traumas is often reduced.

Consistent with broader trauma populations, alterations in one's beliefs and belief systems are likely to be a part of the clinical picture. After experiencing a medical trauma, patients may feel abandoned or confused and may question their sense of feeling protected and safe, their belief in a loving, all-powerful force, or the relationship between creator and humankind (Hall & Johnson, 2001). Including space for exploration of existential themes and facilitating integration of the patient's experience into broader understanding of one's self and the world may enhance well-being.

### **COVID-19 Considerations**

The scope of this dissertation excluded data specific to the COVID-19 pandemic. However, the phenomenon of medical trauma in ICU survivors is extremely relevant for this population. The nature of the COVID-19 disease warrants important considerations in areas of clinical, relational, environmental, and broader sociocultural domains. Survivorship rates, length of stay (LOS), rates and duration of MV and heavy sedation, isolation due to visiting restrictions, nurse burnout, and sociopolitical climate represent the most significant differences. Survivorship rates in general ICU patients is about 80%-90%, but this was significantly decreased for COVID-19 patients in the ICU, especially early on in the pandemic prior to enhancement of therapeutics and management of the disease (e.g., mortality rates of 41.6% prior to June, 2020; Armstrong et



al., 2020). The higher mortality rates means the burden of adverse mental health outcomes fell more on family members of patients. There was also significant variability in mortality rates amongst low income and nonwhite populations (particularly Black and Hispanic individuals), which points to both biophysiological factors and sociocultural factors such as disparities in access and quality of health care. For those who did survive, the nature of the disease required increased LOS and the patients who had more severe presentations required longer MV and sedation than the general ICU survivor population. As results from the critical review indicated, MV, duration of MV, duration of sedation, and intensity of sedation are all clinical risk factors for PTSD in ICU survivors, meaning that COVID-19 ICU survivors are likely to have higher rates and increased severity of medical trauma. Furthermore, these patients did not have the protective factor of loved ones and social support in their hospital rooms to cushion the effects of their distress.

The collective level of stress—and sometimes panic—that surrounded the pandemic, especially early on, is likely to have contributed to increased agitation and feelings of unsafety for patients, which represents another significant risk factor. The mutually influencing variables and importance of broader context is particularly salient. Especially in the first 6-12 months of the pandemic, ICU healthcare workers were operating in a field of significantly increased stress given the unknowns of the disease and its highly contagious nature. The required personal protective equipment (PPE) meant that the staff tending to the patients were covered completely. This not only compromised opportunities for coregulation or comfort via warm touch, smile, and/or gaze, but may also have contributed to frightening experiences and memories for patients, who, given the requisite therapies of MV and heavy sedation, likely experienced increased levels of delirium accompanied by hallucinations or delusions. Healthcare staff themselves experienced unprecedented levels of vicarious trauma, compassion fatigue, and burnout while also being deprived of the important cushions of social support, especially early on in the pandemic when workers were isolating from their families. Scholars noted that in

addition to the above, the phenomenon of moral distress—which occurs when “an individual believes he or she knows the right thing to do, but institutional or community constraints make it difficult to do what is right...” (Dean et al., 2019, p. 923)—was particularly relevant during the COVID-19.

Given the known impacts of burnout, the nature and quality of interactions between staff and patients was likely compromised. Additionally, there are likely increased rates of vicarious trauma or secondary stress amongst family members of patients secondary to the reduced communication with ICU personnel and restrictions on visitation with patients. The sociopolitical context within which the pandemic occurred in the United States (especially in the first six months) was significant and noteworthy for its extreme division amongst political parties and the explosion of social unrest. Returning again to the ecological systems model adapted for ICU medical trauma (above), it can be seen that the dynamic and reciprocal influence between and amongst variables at each level was not only present for the COVID-19 pandemic, but significantly heightened. More research is needed to flesh out all of the above considerations, but the data suggests that medical trauma in this population is likely to be more prevalent and more severe.

### **Observations and Limitations**

Towards the objective of better understanding the experience of medical trauma in ICU patients, over 150 resources were examined, and this review yielded some general observations and limitations.

#### ***Observations***

Firstly, most of the articles that address ICU-related medical trauma are produced by the medical journals (e.g., critical care medicine, critical care nursing, biomedical care, general hospital psychiatry, intensive care medicine, surgical care, anesthesiology, respiratory care, and nursing journals, amongst others) and few were from the social work or psychological community. The medical community utilizes different terminology and methodology that may

obscure a more nuanced understanding of ICU medical trauma, especially given that it is a phenomenon that is influenced by a complicated matrix of endogenous and exogenous factors and affects a “whole person.” An example of this was found in searching for and reviewing patient specific factors. While age and sex/gender were frequently included in studies, race/ethnicity, perceived social support, SES, and resilience factors were rarely included. One reason may be that age and sex/gender are quantifiable and categorical variables that are often included in medical records for patients. Macrosystem level influences are also likely contributory. For example, literature related to particular populations and outcomes (e.g., marginalized, low-income patients and their experiences after discharge) is influenced by interest, funding, access to data, language barriers, and utilization of therapy services, amongst other factors. While scholars have written about the role of racism in medical care, identified racial disparities in health outcomes (Brandolo et al., 2009) and even discussed racism in health research (Paradies, 2006), many academic and research communities continue to focus their studies on majority populations.

Few studies examined the direct impact of actual or perceived social support on the development of PTSD in this population. Some authors did include this variable when exploring vicarious trauma in a patient’s family or examining the important protective role that a social support system may serve. These contributors were most often from Taiwan, Nigeria, India, Thailand, China, and Jordan (Aliche et al., 2020; Ayudhaya, 2021; Chang et al., 2021; Zeilani & Seymour, 2010), which are countries that tend to share a more collectivistic orientation and have high affiliation value.

The variables that yielded the most results for review were those that examined clinical dimensions of care. For example, there was a high volume of quantitative literature available to review on sedation practices, MV, and delirium, along with highly focused examinations of specific features and interventions within each variable, and how these relate to PTSD in an ICU survivor. Comparatively, the volume of literature available for review of relational factors was

low, was predominantly comprised of qualitative studies, and/or examined nurse experiences that required reviewer inferences to be made about patient experiences. This discrepancy may point to another macrosystem-level influence. The medical community tends to be guided predominantly by the biomedical model that prizes hard, easily quantifiable data markers and tends to be outcome-oriented rather than process-driven.

### ***Limitations***

The most significant limitation in this critical review is the lack of consensus in literature as it relates to the phenomenon of medical trauma for ICU patients. There is no consensus construct or definition across medical or psychological disciplines. In describing post-ICU psychological difficulties, the medical community often includes these in syndromes (e.g., Post Intensive Care Syndrome 'PICS') that have broader parameters and include cognitive, neurological, physical and psychological dimensions. Furthermore, when examining trauma outcomes and relationships, researchers often included only full-blown PTSD and excluded subthreshold symptoms or ASD. This may exclude individuals who suffer from medical trauma but do not meet criterion A of the DSM-5 diagnosis.

There is also significant variability in methodology. Variable measurement techniques are utilized that examine different causal and predicative factors, and different methodologies in design study, timing of inquiry, and outcomes of interest were used which makes results difficult to aggregate or synthesize. The validity of measurement tools was also a concern, as some authors utilized self-report screening instruments while others used expert clinicians or interviews.

A paucity of literature limited the ability to review and synthesize data regarding the following variables: race/ethnicity, SES, and impacts on patient outcomes related to perceived empathy and communication style in nurses.

## **Suggestions for Future Directions**

### ***Practical***

The most significant practical application and implication of the results of this review would be the establishment of a consensus construct of medical trauma with an associated conceptual framework for understanding negative responses to distressing medical experiences in adults. The positive impact of this is seen in the PMTS model, which has conceptual clarity, standardized measures, and established protocols for interventions at multiple time points and levels of care for patients and support systems. An additional example that may be used as a guiding model is the National Comprehensive Cancer Network's definition for cancer-related distress, which "delineates its multifactorial and holistic nature and extends along a continuum from common (i.e., 'normal') and mildly unpleasant feelings, to crisis" (Boehm et al., 2021, p11; National Comprehensive Cancer Network, 2020). Based on this definition, the network developed guidance for patients and clinicians to assist in early detection and treatment for cancer-related distress (e.g., screening via the "Distress Thermometer" and interventions for cancer-related distress; National Comprehensive Cancer Network, 2020; Partridge et al., 2019). Development of a similar construct for adult medical traumatic stress and subsequent enterprises would ideally be a shared undertaking by international hospital or ICU associations (Boehm et al., 2021).

Additional suggestions for practice include increased integration of multidisciplinary, collaborative, and diverse health care teams who understand the value of a person-centered approach to care and appreciate the whole-person nature of medical and mental health. Including mental health providers as standard practice on ICU teams would assist in identifying and supporting vulnerable patients while providing relief to nursing staff. Fair compensation, manageable workloads and schedules, and increased support that promotes collaborative and humane work environments for staff can minimize burnout and maximize positive impacts on patient care. Providing psychoeducation about the phenomenon of medical trauma to all

healthcare staff may result in increased tracking of the patient's psychological state, increased compliance with sedation and ventilator protocols, and administration of beneficial interventions when indicated. Development of screening tools that have loaded point values may enhance early identification of higher-risk patients and facilitate supportive intervention. An example may be a screener that has weighted numerical values drawn from research evidence on risk and protective factors (i.e., female sex = 1 point, heavy sedation = 3 points, MV = 3 points, supportive family = -2). Such a tool could theoretically offer benefit but would require rigorous development and testing prior to application. Additional screening tools may be used at discharge to identify and triage patients who may benefit from mental health support, such as the one developed by Milton and colleagues (2020), which aimed to predict psychological problems in ICU survivors at discharge.

Modifications of the hospital environment that can increase a sense of safety, agency, and empowerment in patients and family members could have substantial benefit. One of the most compelling approaches to care in an ICU comes from a model developed and proposed recently in Spain (Nin Vaeza et al., 2020), the "Humanized Model of ICU Care." For the authors' purposes, "humanizing" is defined as "everything that has to be done to promote and protect health, cure diseases and guarantee an environment that favors a healthy and harmonious life on a physical, emotional, social and spiritual level in people" (p. 385). A truly holistic, psychosocial, and person-centered approach is called for in this model, which "demands the intrinsic dignity of every human being and the rights that derive from it... and makes it a necessity of vital importance and transcendence"(Higuera, 2014, p. 12). This model spells out its philosophy and mission along with practical, actionable strategies for implementation. Their model includes eight core features in their care design: (a) open ICU visiting policies, (b) communication, (c) wellbeing of the patient, (d) presence and participation of relatives in the ICU, (e) caring for the healthcare professionals, (f) prevention, management, and monitoring of Post ICU Syndrome (PICS), (g) humanized architecture and infrastructure, and (h) end-of-life

care. Application of a similar model could influence each domain of variables reviewed in the critical analysis and significantly improve ICU patient, family, and staff experiences.

Another application that may alleviate ICU nurse burden is a model recently established by the healthcare system organization of the Department of Family Medicine of the University of Colorado called “Ambulatory Process Excellence” (APEX). This model places “medical assistants” who receive vigorous training and structured protocols to operate semi-autonomously and collect data, manage medications, develop patient visitation agendas, and assess preventive care necessities. This allows ICU nurse practitioners, doctors, and specialists to focus on data synthesis, physical evaluation and workup, and clinical decision-making with fewer distractions and stressors in the environment. Six months after implementation of the model, the rate of burnout symptoms in clinicians went from 53% to 13% (Wright & Katz, 2018).

There have been significant advancements in personal health technology and mobile applications for both medical and mental health and wellness that may be incorporated into ICU medical trauma management. Including tablets (e.g., iPads) in patient rooms that display vital signs, medications, nurse schedules, upcoming procedures or physician/specialist visits, and/or offer platforms for video chats with loved ones outside the hospital, for example, may provide some valuable information and grounding to patients and their families. Wearable health monitoring devices have surged in recent years as live-time tracking of physical data markers and could offer a number of benefits if incorporated into hospital care. When appropriate, wearable devices could measure vital signs, sleep, and even indicate distress levels (i.e., heart rate, heart rate variability) in patients. If they are interfaced with in-room displays and nursing stations, they could reduce the amount of wires that connect patients to machines, reduce interruptions from the nurses (benefitting both patients and nursing staff), collect meaningful data for research, and facilitate communication by providing valuable information to patients and family members. Furthermore, they could assist in decreasing distress, promoting relaxation, and enhancing a sense of agency for patients. As envisioned and described in Hall and Hall

(2017), if a patient with a wearable heart monitor began experiencing increased anxiety, a signal could be sent to the nursing station and also activate a prompt to be displayed on a tablet near their bedside that inquires if the patient would like to try a relaxation activity. If the patient agrees, options could be displayed for relaxation, such as playing soothing music or nature sounds, a guided diaphragmatic breathing exercise, a guided meditation, or perhaps a pre-recorded supportive message from a loved one. When a patient elects to use one of these, a staff member could be prompted to check in to see if any additional mental health support could be offered, such as aromatherapy, reflexology, massage, or time with a mental health professional.

Information and psychoeducation throughout a patient's hospital course, and especially at discharge would be quite useful for patients and family members in identifying and managing medical trauma in this population. Incorporating aspects from the pediatric medical traumatic stress model, such as provision of informational brochures and materials for patients and caregivers that include a description of what to expect after returning home, coping strategies, indicators that additional support may be needed, and resources for mental health support is recommended.

### ***Research***

The information yielded from the critical review of the literature reveals some gaps in existing research and points to areas that may benefit from further attention. Firstly, research on minority and low-income populations is significantly lacking and is needed in order to understand not only the extent of the problem of medical trauma, but also how medical trauma may arise, manifest, and impact populations differently. This is especially important considering the well-documented significant inequities in access to medical care and in quality of care delivered to such patients (Williams & Cooper, 2019). Minority populations, particularly Black Americans, experience discrimination and inequities in quality of care provided at multiple levels, including relational factors such as attitude (warmth and respect) and communication



from healthcare staff and clinical factors, such as how pain complaints are managed (Hausmann et al., 2011; Meghani et al., 2012). Low-income individuals are more likely to be uninsured or underinsured, which creates additional stress for patients who develop medical conditions requiring advanced care. Medical and insurance systems can be intimidating to highly educated, financially stable individuals who have insurance provided through their employers; for individuals who do not have insurance or are underinsured, the stressors related to navigating a medical system oriented around insurance companies, finding appropriate and trustworthy physicians, and considering whether the care needed is even affordable are all significantly magnified (Hall & Hall, 2017). Financial strain may also result in patients foregoing preventative or primary care, which may ultimately lead to more significant medical conditions that are both more life-threatening and more expensive. Increased research is needed that includes how these inequities may impact the development of medical trauma in ICU patients. Diversity considerations should also be explored for treatment of the phenomenon in different populations. The role of social support in development and/or mitigation of medical trauma requires more research. Additional qualitative studies are needed to understand the themes that are most common in both general ICU patients and specific subpopulations (e.g., stroke survivors, ARDS patients, etc.) in order to guide prevention and treatment protocols. As indicated above, additional research is needed particularly on the subpopulation of COVID-19 survivors and their families given the unique circumstances surrounding their experiences in the ICU.

Increased research is needed in examining what manipulations could be made to the environment of an ICU room or ward that could promote healing and enhance a sense of safety and security for both patients and family. Pediatric hospitals have adapted their setting to enhance the fit between the population served and the environment, and more research is needed to explore ways in which cues can be taken from this model and applied for adults. Similarly, the pediatric model for traumatic stress has developed screeners, assessment tools,

models for risk factors, and treatment protocols that have robust evidence bases. Research on adult populations that uses these as guides will be important in establishing or refining measures and protocols. For example, Hall (2015) developed an ecological assessment tool called The Experience of Medical Trauma Scale (EMTS) meant for use in acute care settings to screen for patient distress that requires further research prior to widespread application.

Additional research is needed on Edmondson's EST model that strengthens the evidence base and examines applications for different populations. For example, more research is needed on the nature and course of symptoms associated with EST, particularly the intrusion and avoidance elements, including long-term impacts of avoidance behaviors. More research is also needed on treatment for EST or medical trauma, including the different modalities and what modalities to utilize at different time points. For ICU patients in particular, more research is needed from American contributors about efficacy of ICU diaries and supportive interventions for family members. In addition to treatment research, additional RCTs of early PTSD prevention interventions should be conducted using a standardized patient-oriented outcome measure.

Lastly, most research for this population explores pathology, risk factors, or external variables. Few studies have examined endogenous psychological factors that could elucidate how a patient may cope with ICU-related stress. Research examining protective factors that have been established to promote resilient responses in other stress-response contexts is substantially lacking for ICU patients. Application from general trauma literature suggests that emotion regulation, expressive flexibility, and regulatory flexibility would be important qualities given the variables present and the stressful demands of the ICU (Hall & Hall, 2013; McGiffin et al., 2016), but more research is needed.

## **Conclusion**

The literature reviewed in this dissertation illustrates the phenomenon of medical trauma in adult ICU survivors. The review aimed to enhance knowledge and understanding about

contributing factors and influences of variables at multiple system levels (i.e., individual, clinical, relational, environmental, and interventional) while keeping the humanity of the patient alive. The ecological model provided a framework that allowed for appreciation of the multidimensional nature of this unique medical-psychological phenomenon that involves both the physical body and the embodied mind. While “cold” clinical variables such as prolonged sedation, MV, and sleep deprivation were found to predict worse outcomes, “warm” humanistic elements like empathic support from caring practitioners or loved ones were found to be meaningful influences that could cushion the impacts of traumatic stressors. This review highlights the importance of finding a balance in managing both physical and emotional wellness of patients and appreciating the “whole-person” of all ICU residents: patients, families, and healthcare workers.

## REFERENCES

- Adams, A. M. N., Mannix, T., & Harrington, A. (2017). Nurses' communication with families in the intensive care unit—a literature review. *Nursing in Critical Care*, 22(2), 70-80.  
<https://doi-org.lib.pepperdine.edu/10.1111/nicc.12141>
- Alexandrova-Karamanova, A., Todorova, I., Montgomery, A., Panagopoulou, E., Costa, P., Baban, A., Davas, A., Milosevic, M., & Mijakoski, D. (2016). Burnout and health behaviors in health professionals from seven European countries. *International Archives of Occupational and Environmental Health*, 89(7), 1059–1075.  
<https://doi.org/10.1007/s00420-016-1143-5>
- Aliche, J. C., Ifeagwazi, C. M., & Eze, J. E. (2020). Emotional reactivity and surgical anxiety. The protective nature of perceived social support. *Psychology, Health & Medicine*, 25(4), 434-445.
- Almerud, S., Alapack, R. J., Fridlund, B., & Ekebergh, M. (2007). Of vigilance and invisibility--being a patient in technologically intense environments. *Nursing in Critical Care*, 12(3), 151–158. <https://doi.org/10.1111/j.1478-5153.2007.00216.x>
- Alonzo, A. (2000). The experience of chronic illness and Post-Traumatic Stress Disorder: The consequences of cumulative adversity. *Social Science & Medicine*, 50(2000), pp. 1475-1484. [http://dx.doi.org/10.1016/S0277-9536\(99\)00399-8](http://dx.doi.org/10.1016/S0277-9536(99)00399-8)
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3<sup>rd</sup> ed., revised).
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4<sup>th</sup> ed.).
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5<sup>th</sup> ed.).

- Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., Perry, B. D., Dube, S. R., & Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood. *European Archives of Psychiatry & Clinical Neuroscience*, 256(3), 174–186. <https://doi-org.lib.pepperdine.edu/10.1007/s00406-005-0624-4>
- Anderson, W. G., Arnold, R. M., Angus, D. C., & Bryce, C. L. (2008). Posttraumatic stress and complicated grief in family members of patients in the intensive care unit. *Journal of General Internal Medicine*, 23(11), 1871-1876.
- Angus, D. C., Carlet, J., & 2002 Brussels Roundtable Participants (2003). Surviving intensive care: A report from the 2002 Brussels Roundtable. *Intensive Care Medicine*, 29(3), 368–377. <https://doi.org/10.1007/s00134-002-1624-8>
- Angus, D. C., Linde-Zwirble, W. T., Sirio, C. A., Rotondi, A. J., Chelluri, L., Newbold, R. C., 3rd, Lave, J. R., & Pinsky, M. R. (1996). The effect of managed care on ICU length of stay: Implications for Medicare. *JAMA*, 276(13), 1075–1082.
- Armstrong, R. A., Kane, A. D., & Cook, T. M. (2020). Outcomes from intensive care in patients with COVID-19: A systematic review and meta-analysis of observational studies. *Anaesthesia*, 75(10), 1340–1349. <https://doi.org/10.1111/anae.15201>
- Austin, C. L., Saylor, R., & Finley, P. J. (2017). Moral distress in physicians and nurses: Impact on professional quality of life and turnover. *Psychological Trauma: Theory, Research, Practice and Policy*, 9(4), 399–406. <https://doi.org/10.1037/tra0000201>
- Ayudhaya, P. (2021). *Decisional conflicts, social support, and psychological distress among Thai family caregivers of end-of-life patients in the ICU* (Publication No. 28499130) [Doctoral dissertation, Saint Louis University]. ProQuest Dissertations & Theses Global. <https://lib.pepperdine.edu/login?url=https://www.proquest.com/dissertations-theses/decisional-conflicts-social-support-psychological/docview/2554396443/se-2?accountid=13159>

- Azoulay, E., Pochard, F., Kentish-Barnes, N., Chevret, S., Aboab, J., Adrie, C., Annane, D., Bleichner, G., Bollaert, P. E., Darmon, M., Fassier, T., Galliot, R., Garrouste-Orgeas, M., Goulenok, C., Goldgran-Toledano, D., Hayon, J., Jourdain, M., Kaidomar, M., Laplace, C., Larché, J., FAMIREA Study Group (2005). Risk of post-traumatic stress symptoms in family members of intensive care unit patients. *American Journal of Respiratory and Critical Care Medicine*, 171(9), 987–994.  
<https://doi-org.lib.pepperdine.edu/10.1164/rccm.200409-1295OC>
- Bahari, G. (2022). Caregiving burden, psychological distress, and individual characteristics among family members providing daily care to patients with chronic conditions. *Perspectives in Psychiatric Care*. <https://doi.org/10.1111/ppc.13026>
- Baker C. F. (1984). Sensory overload and noise in the ICU: Sources of environmental stress. *CCQ. Critical Care Quarterly*, 6(4), 66–80.
- Baker, C. F., Garvin, B. J., Kennedy, C. W., & Polivka, B. J. (1993). The effect of environmental sound and communication on CCU patients' heart rate and blood pressure. *Research in Nursing & Health*, 16(6), 415–421. <https://doi.org/10.1002/nur.4770160605>
- Bakker, A. B., Le Blanc, P. M., & Schaufeli, W. B. (2005). Burnout contagion among intensive care nurses. *Journal of Advanced Nursing*, 51(3), 276–287.  
<https://doi.org/10.1111/j.1365-2648.2005.03494.x>
- Barrett, M. L., Smith, M. W., Elixhauser, A., Honigman, L. S., & Pines, J. M. (2014). *Utilization of intensive care services, 2011* (Statistical brief No. 185). Agency for Healthcare Research and Quality. <https://www.hcup-us.ahrq.gov/reports/statbriefs/sb185-Hospital-Intensive-Care-Units-2011.pdf>

- Başıoğlu M. (2009). A multivariate contextual analysis of torture and cruel, inhuman, and degrading treatments: Implications for an evidence-based definition of torture. *The American Journal of Orthopsychiatry*, 79(2), 135–145.  
<https://doi-org.lib.pepperdine.edu/10.1037/a0015681>
- Basso, M. R. (2001). Neurobiological relationships between ambient lighting and the startle response to acoustic stress in humans. *International Journal of Neuroscience*, 110(3-4), 147-157.
- Bauldry, S., Shanahan, M. J., Boardman, J. D., Miech, R. A., & Macmillan, R. (2012). A life course model of self-rated health through adolescence and young adulthood. *Social Science & Medicine*, 75(7), 1311–1320.  
<https://doiorg.lib.pepperdine.edu/10.1016/j.socscimed.2012.05.017>
- Beck, J. S. (2011). Cognitive-behavioral therapy. *Clinical Textbook of Addictive Disorders*, 491, 474-501.
- Benbenbishty, J., Adam, S., & Endacott, R. (2010). Physical restraint use in intensive care units across Europe: The PRICE study. *Intensive & Critical Care Nursing*, 26(5), 241–245.  
<https://doi.org/10.1016/j.iccn.2010.08.003>
- Berglund, B., Lindvall, T., Schwela, D. H., & World Health Organization. ((1999. *Guidelines for community noise*. Occupational and Environmental Health Team. World Health Organization. <https://apps.who.int/iris/handle/10665/66217>
- Berntzen, H., Bjørk, I. T., Storsveen, A. M., & Wøien, H. (2020). “Please mind the gap”: A secondary analysis of discomfort and comfort in intensive care. *Journal of Clinical Nursing*, 29(13-14), 2441-2454.
- Berry P. (2001). From detached concern to empathy: Humanizing medical practice. *British Medical Journal*, 323(7325), 1373.

- Bick, J., & Nelson, C. A. (2016). Early adverse experiences and the developing brain. *Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology*, 41(1), 177–196. <https://doi-org.lib.pepperdine.edu/10.1038/npp.2015.252>
- Bienvenu, O., Gellar, J., Althouse, B., Colantuoni, E., Sricharoenchai, T., Mendez-Tellez, P., Shanholtz, C., Dennison, C.R., Pronovost, P.M. & Needham, D. (2013). Post-traumatic stress disorder symptoms after acute lung injury: A 2-year prospective longitudinal study. *Psychological Medicine*, 43(12), 2657-2671. <https://doi.org/10.1017/S0033291713000214>
- Bienvenu, O. J., & Gerstenblith, T. A. (2017). Posttraumatic stress disorder phenomena after critical illness. *Critical Care Clinics*, 33(3), 649–658. <https://doi-org.lib.pepperdine.edu/10.1016/j.ccc.2017.03.006>
- Bienvenu, O. J., & Neufeld, K. J. (2011). Post-traumatic stress disorder in medical settings: Focus on the critically ill. *Current Psychiatry Reports*, 13(1), 3–9. <https://doi.org/10.1007/s11920-010-0166-y>
- Birk, J. L., Sumner, J. A., Haerizadeh, M., Heyman-Kantor, R., Falzon, L., Gonzalez, C., Gershengoren, L., Shapiro, P., Edmondson, D., & Kronish, I. M. (2019). Early interventions to prevent posttraumatic stress disorder symptoms in survivors of life-threatening medical events: A systematic review. *Journal of Anxiety Disorders*, 64, 24-39.
- Bloom, S. L. (1997). *Creating Sanctuary: Toward the Evolution of Sane Societies*: Routledge.
- Bloom, S. L. (1999). *Trauma theory abbreviated* [Final action plan]. Community Works. <http://iheartenglish.pbworks.com/f/Trauma+Theory+Explained+14+pages.pdf>



- Boehm, L. M., Jones, A. C., Selim, A. A., Virdun, C., Garrard, C. F., Walden, R. L., Wesley Ely, E., & Hosie, A. (2021). Delirium-related distress in the ICU: A qualitative meta-synthesis of patient and family perspectives and experiences. *International Journal of Nursing Studies*, 122, 104030. <https://doi.org/10.1016/j.ijnurstu.2021.104030>
- Boer, K. R., Mahler, C. W., Unlu, C., Lamme, B., Vroom, M. B., Sprangers, M. A., Gouma, D.J., Reitsma, J.B., De Borgie, C.A. & Boermeester, M.A., (2007). Long-term prevalence of post-traumatic stress disorder symptoms in patients after secondary peritonitis. *Critical Care*, 11(1), 1-10.
- Bonomi, A. E., Cannon, E. A., Anderson, M. L., Rivara, F. P., & Thompson, R. S. (2008). Association between self-reported health and physical and/or sexual abuse experienced before age 18. *Child Abuse & Neglect*, 32(7), 693-701.
- Borges, E. L., Franceschini, J., Costa, L. H., Fernandes, A. L., Jamnik, S., & Santoro, I. L. (2017). Family caregiver burden: The burden of caring for lung cancer patients according to the cancer stage and patient quality of life. *Journal Brasileiro de Pneumologia*, 43(1), 18–23. <https://doi-org.lib.pepperdine.edu/10.1590/S1806-37562016000000177>
- Bradt, J., & Dileo, C. (2014). Music interventions for mechanically ventilated patients. *The Cochrane Database of Systematic Reviews*, 2014(12), CD006902. <https://doi.org/10.1002/14651858.CD006902.pub3>
- Bray, K., Hill, K., Robson, W., Leaver, G., Walker, N., O'Leary, M., Delaney, T., Walsh, D., Gager, M & Waterhouse, C. (2004). British Association of Critical Care Nurses position statement on the use of restraint in adult critical care units. *Nursing in Critical Care*, 9(5), 199-212.
- Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, 68(5), 748–766. <https://doi.org/10.1037//0022-006x.68.5.748>

- Brewin, C. R., Gregory, J. D., Lipton, M., & Burgess, N. (2010). Intrusive images in psychological disorders: Characteristics, neural mechanisms, and treatment implications. *Psychological review*, 117(1), 210.
- Brondolo, E., Gallo, L. C., & Myers, H. F. (2009). Race, racism and health: Disparities, mechanisms, and interventions. *Journal of Behavioral Medicine*, 32(1), 1-8.
- Bronfenbrenner, U. (1975). Reality and research in the ecology of human development. *Proceedings of the American Philosophical Society*, 119(6), 439-469.
- Brummel, N. E., & Girard, T. D. (2013). Preventing delirium in the intensive care unit. *Critical Care Clinics*, 29(1), 51-65.
- Bühler, K. E., & Land, T. (2003). Burnout and personality in intensive care: An empirical study. *Hospital Topics*, 81(4), 5–12. <https://doi.org/10.1080/00185860309598028>
- Bulic, D., Bennett, M., Georgousopoulou, E. N., Shehabi, Y., Pham, T., Looi, J. C., & van Haren, F. M. (2020). Cognitive and psychosocial outcomes of mechanically ventilated intensive care patients with and without delirium. *Annals of Intensive Care*, 10(1), 1-10. <https://doi.org/10.1186/s13613-020-00723-2>
- Caiuby, A. V., Andreoli, P. B., & Andreoli, S. B. (2010). Post-traumatic stress disorder in intensive care unit patients. Transtorno de estresse pós-traumático em pacientes de unidade de terapia intensiva. *Revista Brasileira de Terapia Intensiva*, 22(1), 77–84.
- Carr, J. (2007). Psychological consequences associated with intensive care treatment. *Trauma*, 9(2), 95–102. <https://doi.org/10.1177/1460408607083963>
- Chang, P. Y., Chang, T. H., & Yu, J. M. (2021). Perceived stress and social support needs among primary family caregivers of ICU patients in Taiwan. *Heart & Lung*, 50(4), 491-498.

- Chaudhury, H., Mahmood, A., & Valente, M. (2006). Nurses' perception of single-occupancy versus multioccupancy rooms in acute care environments: An exploratory comparative assessment. *Applied Nursing Research*, 19(3), 118-125.  
<https://doi.org/10.1016/j.apnr.2005.06.002>
- Chivukula, U., Hariharan, M., Rana, S., Thomas, M., & Andrew, A. (2017). Enhancing hospital well-being and minimizing intensive care unit trauma: Cushioning effects of psychosocial care. *Indian Journal of Critical Care Medicine: Peer-reviewed, Official Publication of Indian Society of Critical Care Medicine*, 21(10), 640.
- Chivukula, U., Hariharan, M., Rana, S., Thomas, M., & Swain, S. (2014). Role of psychosocial care on ICU trauma. *Indian Journal of Psychological Medicine*, 36(3), 312–316.  
<https://doi.org/10.4103/0253-7176.135388>  
[https://doi-org.lib.pepperdine.edu/10.4103/ijccm.IJCCM\\_468\\_14](https://doi-org.lib.pepperdine.edu/10.4103/ijccm.IJCCM_468_14)
- Cook, E. P. (2012). *Understanding people in context: The ecological perspective in counseling*. American Counseling Association.
- Coon, D. W., & Evans, B. (2009). Empirically based treatments for family caregiver distress: What works and where do we go from here?. *Geriatric Nursing*, 30(6), 426–436.  
<https://doi.org/10.1016/j.gerinurse.2009.09.010>
- Cordova, M. J., Riba, M. B., & Spiegel, D. (2017). Post-traumatic stress disorder and cancer. *The Lancet. Psychiatry*, 4(4), 330–338. [https://doi.org/10.1016/S2215-0366\(17\)30014-7](https://doi.org/10.1016/S2215-0366(17)30014-7)
- Coulehan, J. L. (1995). Tenderness and steadiness: Emotions in medical practice. *Literature and Medicine*, 14(2), 222–236. <https://doi.org/10.1353/lm.1995.0027>
- Cuthbertson, B. H., Hull, A., Strachan, M., & Scott, J. (2004). Post-traumatic stress disorder after critical illness requiring general intensive care. *Intensive Care Medicine*, 30(3), 450-455. <https://doi.org/10.1007/s00134-003-2004-8>

- Cyr, S., Guo, X., Marcil, M. J., Dupont, P., Jobidon, L., Benrimoh, D., Guertin, M. C., & Brouillette, J. (2021). Posttraumatic stress disorder prevalence in medical populations: A systematic review and meta-analysis. *General Hospital Psychiatry*, 69, 81–93.  
<https://doi.org/10.1016/j.genhosppsych.2021.01.010>
- da Costa, J. B., Taba, S., Scherer, J. R., Oliveira, L. L. F., Luzzi, K. C. B., Gund, D. P., Sartori, G., Porto, I. R. P., Jorge, A. C., & Duarte, P. A. D. (2019). Psychological disorders in post-ICU survivors and impairment in quality of life. *Psychology & Neuroscience*, 12(3), 391-406. doi:10.1037/pne0000170
- Darbyshire, J. L., Greig, P. R., Vollam, S., Young, J. D., & Hinton, L. (2016). "I can remember sort of vivid people...but to me they were plasticine." Delusions on the intensive care unit: What do patients think is going on? *PloS One*, 11(4), e0153775.  
<https://doi.org/10.1371/journal.pone.0153775>
- Davidson, J. E., Harvey, M. A., Schuller, J., & Black, G. (2013). Post-intensive care syndrome: What it is and how to help prevent it. *American Nurse Today*, 8(5), 32-37.
- Davidson, J. E., Jones, C., & Bienvenu, O. J. (2012). Family response to critical illness: Postintensive care syndrome–family. *Critical Care Medicine*, 40(2), 618-624.  
40(2), 618-624.
- Davidson, J. R. T., & Foa, E. B. (1991). Diagnostic issues in posttraumatic stress disorder: Considerations for the DSM-IV. *Journal of Abnormal Psychology*, 100(3), 346–355.  
<https://doi-org.lib.pepperdine.edu/10.1037/0021-843X.100.3.346>
- Davydow, D. S., Gifford, J. M., Desai, S. V., Bienvenu, O. J., & Needham, D. M. (2009). Depression in general intensive care unit survivors: A systematic review. *Intensive Care Medicine*, 35(5), 796-809. <https://doi.org/10.1007/s00134-009-1396-5>

- Davydow, D. S., Gifford, J. M., Desai, S. V., Needham, D. M., & Bienvenu, O. J. (2008). Posttraumatic stress disorder in general intensive care unit survivors: A systematic review. *General Hospital Psychiatry, 30*(5), 421-434.  
<https://doi.org/10.1016/j.genhosppsych.2008.05.006>
- Davydow, D. S., Zatzick, D., Hough, C. L., & Katon, W. J. (2013). A longitudinal investigation of posttraumatic stress and depressive symptoms over the course of the year following medical–surgical intensive care unit admission. *General Hospital Psychiatry, 35*(3), 226-232.
- Dean, W., Talbot, S., & Dean, A. (2019). Reframing clinician distress: Moral injury not burnout. *Federal Practitioner: For the Health Care Professionals of the VA, DoD, and PHS, 36*(9), 400–402.
- Deja, M., Denke, C., Weber-Carstens, S., Schröder, J., Pille, C. E., Hokema, F., Falke, K. & Kaisers, U. (2006). Social support during intensive care unit stay might improve mental impairment and consequently health-related quality of life in survivors of severe acute respiratory distress syndrome. *Critical Care, 10*(5), 1-12.
- Delahanty, D. L., Gabert-Quillen, C., Ostrowski, S. A., Nugent, N. R., Fischer, B., Morris, A., Pitman, R. K., Bon, J., & Fallon, W. (2013). The efficacy of initial hydrocortisone administration at preventing posttraumatic distress in adult trauma patients: A randomized trial. *CNS Spectrums, 18*(2), 103-111.
- Department of Health and Human Services. (2021, May 12). *COVID-19 Reported Patient Impact and Hospital Capacity by State Timeseries*.  
<https://healthdata.gov/Hospital/COVID-19-Reported-Patient-Impact-and-Hospital-Capa/anag-cw7u>

- Devlin, J. W., Skrobik, Y., Gélinas, C., Needham, D. M., Slooter, A. J., Pandharipande, P. P., Watson, P. L., Weinhouse, G. L., Nunnally, M. E., Rochweg, B., Balas, M. C., van den Boogaard, M., Bosma, K. J., Brummel, N. E., Chanques, G., Denehy, L., Drouot, X., Fraser, G. L., Harris, J. E., Joffe, A., & Alhazzani, W. (2018). Clinical practice guidelines for the prevention and management of pain, agitation/sedation, delirium, immobility, and sleep disruption in adult patients in the ICU. *Critical Care Medicine*, 46(9), e825-e873.
- Doherty, E. M., Cronin, P. A., & Offiah, G. (2013). Emotional intelligence assessment in a graduate entry medical school curriculum. *BMC Medical Education*, 13(38).  
<http://dx.doi.org/10.1186/1472-6920-13-38>
- Doka, K. J. (2008). *Disenfranchised grief in historical and cultural perspective*. In M. S. Stroebe, R. O. Hansson, H. Schut, & W. Stroebe (Eds.), *Handbook of Bereavement Research and Practice: Advances in Theory and Intervention* (p. 223–240). American Psychological Association. <https://doi.org/10.1037/14498-011>
- Dominquez-Gomez, E. & Rutledge, D. (2009). Prevalence of secondary traumatic stress among emergency nurses. *Journal of Emergency Nursing*, 35(3), 199-204.
- Donahue, M. J. (1985). Intrinsic and extrinsic religiousness: Review and meta-analysis. *Journal of Personality and Social Psychology*, 48, 400-419.
- Dowdy, D. W., Eid, M. P., Sedrakyan, A., Mendez-Tellez, P. A., Pronovost, P. J., Herridge, M. S., & Needham, D. M. (2005). Quality of life in adult survivors of critical illness: A systematic review of the literature. *Intensive Care Medicine*, 31(5), 611-620.  
<https://doi.org/10.1007/s00134-005-2592-6>
- Edmondson D. (2014). An enduring somatic threat model of posttraumatic stress disorder due to acute life-threatening medical events. *Social and Personality Psychology Compass*, 8(3), 118–134. <https://doi.org/10.1111/spc3.12089>
- Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, 38(4), 319-345.

- Elliott, D. E., Bjelajac, P., Fallot, R. D., Markoff, L. S., & Reed, B. G. (2005). Trauma-informed or trauma-denied: Principles and implementation of trauma-informed services for women. *Journal of Community Psychology*, 33(4), 461–477. <https://doi-org.lib.pepperdine.edu/10.1002/jcop.20063>
- Elliott, K., & Urquiza, A. (2006). Ethnicity, culture, and child maltreatment. *Journal of Social Issues*, 62, 787–809.
- Elliott, R., McKinley, S., Fien, M., & Elliott, D. (2016). Posttraumatic stress symptoms in intensive care patients: An exploration of associated factors. *Rehabilitation Psychology*, 61(2), 141.
- Ely, E. W., Baker, A. M., Dunagan, D. P., Burke, H. L., Smith, A. C., Kelly, P. T., Johnson, M. M., Browder, R. W., Bowton, D. L., & Ely, E. W., Shintani, A., Truman, B., Speroff, T., Gordon, S. M., Harrell, F. E., Jr, Inouye, S. K., Bernard, G. R., & Dittus, R. S. (2004). Delirium as a predictor of mortality in mechanically ventilated patients in the intensive care unit. *JAMA*, 291(14), 1753–1762. <https://doi.org/10.1001/jama.291.14.1753>
- Epp, K. (2012). Burnout in critical care nurses: a literature review. *Dynamics*, 23(4), 25-31.
- Eriksson, M., Ghazinour, M., & Hammarström, A. (2018). Different uses of Bronfenbrenner's ecological theory in public mental health research: What is their value for guiding public mental health policy and practice? *Social Theory & Health*, 16(4), 414–433. <https://doi.org/10.1057/s41285-018-0065-6>
- Esposito, J. (2016). *Understanding unpredictable chronic illness and its links to posttraumatic stress and growth: The case of multiple sclerosis* (Order No. 10182122) [Doctoral dissertation, Columbia University]. ProQuest Dissertations & Theses Global. <https://lib.pepperdine.edu/login?url=https://www.proquest.com/dissertations-theses/understanding-unpredictable-chronic-illness-links/docview/1850508840/se-2?accountid=13159>

- Falsetti, S. A., Resick, P. A. & Davis, J. L. (2003). Changes in religious beliefs following trauma. *Journal of Traumatic Stress*, 16, 391-398.
- Fanfulla, F., Ceriana, P., Lupo, N. D. A., Trentin, R., Frigerio, F., & Nava, S. (2011). Sleep disturbances in patients admitted to a step-down unit after ICU discharge: The role of mechanical ventilation. *Sleep*, 34(3), 355-362. <https://doi.org/10.1093/sleep/34.3.355>
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, 14(4), 245–258. [https://doi.org/10.1016/s0749-3797\(98\)00017-8](https://doi.org/10.1016/s0749-3797(98)00017-8)
- Fontana, A., & Rosenheck, R. (2004). Trauma, change in strength of religious faith, and mental health service use among veterans treated for PTSD. *The Journal of Nervous and Mental Disease*, 192(9), 579–584. <https://doi.org/10.1097/01.nmd.0000138224.17375.55>
- Franks, Z. M., Alcock, J. A., Lam, T., Haines, K. J., Arora, N., & Ramanan, M. (2021). Physical restraints and post-traumatic stress disorder in survivors of critical illness: A systematic review and meta-analysis. *Annals of the American Thoracic Society*, 18(4), 689–697. <https://doi.org/10.1513/AnnalsATS.202006-738OC>
- Frazier, S. K., Moser, D. K., Riegel, B., McKinley, S., Blakely, W., Kim, K. A., & Garvin, B. J. (2002). Critical care nurses' assessment of patients' anxiety: Reliance on physiological and behavioral parameters. *American Journal of Critical Care*, 11(1), 57-64. <https://doi.org/10.4037/ajcc2002.11.1.57>
- Garrouste-Orgeas, M., Coquet, I., Périer, A., Timsit, J. F., Pochard, F., Lancrin, F., Philippart, F., Vesin, A., Bruel, C., Blel, Y., Angeli, S., Cousin, N., Carlet, J., Misset, B. (2012). Impact of an intensive care unit diary on psychological distress in patients and relatives. *Critical Care Medicine*, 40(7), 2033-2040. <https://doi.org/10.1097/CCM.0b013e31824e1b43>



Gibney, Paul (2006, May) The double bind theory: Still crazy-making after all these years.

*Psychotherapy in Australia*, 12(3).

<https://web.archive.org/web/20110706111135/http://www.psychotherapy.com.au/TheDoubleBindTheory.pdf>

Girard, T. D., Shintani, A. K., Jackson, J. C., Gordon, S. M., Pun, B. T., Henderson, M. S.,

Dittus, R.S., Bernard, G.R. & Ely, E. (2007). Risk factors for post-traumatic stress disorder symptoms following critical illness requiring mechanical ventilation: A prospective cohort study. *Critical Care*, 11(1), 1-8.

Glimelius Petersson, C., Ringdal, M., Apelqvist, G., & Bergbom, I. (2018). Diaries and memories following an ICU stay: A 2-month follow-up study. *Nursing in Critical Care*, 23(6), 299-307.

Gone, J. P., & Kirmayer, L. J. (2010). On the wisdom of considering culture and context in psychopathology. In T. Millon, R. F. Krueger, & E. Simonsen (Eds.), *Contemporary directions in psychopathology: Scientific foundations of the DSM-V and ICD-11*. (pp. 72–96). The Guilford Press.

Granberg-Axèll, A., Bergbom, I., & Lundberg, D. (2001). Clinical signs of ICU syndrome/delirium: An observational study. *Intensive & Critical Care Nursing*, 17(2), 72–93. <https://doi.org/10.1054/iccn.2000.1539>

Granberg-Axèll, A., Engberg, I. B., & Lundberg, D. (1998). Patients' experience of being critically ill or severely injured and cared for in an intensive care unit in relation to the ICU syndrome. Part I. *Intensive and Critical Care Nursing*, 14(6), 294-307.

Granberg-Axèll, A., Malmros, C. W., Bergbom, I. L., & Lundberg, D. B. (2002). Intensive care unit syndrome/delirium is associated with anemia, drug therapy and duration of ventilation treatment. *Acta Anaesthesiologica Scandinavica*, 46(6), 726–731. <https://doi.org/10.1034/j.1399-6576.2002.460616.x>

- Granja, C., Gomes, E., Amaro, A., Ribeiro, O., Jones, C., Carneiro, A., Costa-Pereira, A., & JMIP Study Group (2008). Understanding posttraumatic stress disorder-related symptoms after critical care: The early illness amnesia hypothesis. *Critical Care Medicine*, 36(10), 2801–2809. <https://doi-org.lib.pepperdine.edu/10.1097/CCM.0b013e318186a3e7>
- Granja, C., Lopes, A., Moreira, S., Dias, C., Costa-Pereira, A., & Carneiro, A. (2005). Patients' recollections of experiences in the intensive care unit may affect their quality of life. *Critical Care*, 9(2), 1-14. <https://doi.org/10.1186/cc3026>
- Greenfield, E. A. (2010). Child abuse as a life-course social determinant of adult health. *Maturitas*, 66(1), 51-55. <https://doi.org/10.1016/j.maturitas.2010.02.002>
- Griffiths, J., Fortune, G., Barber, V., & Young, J. D. (2007). The prevalence of post traumatic stress disorder in survivors of ICU treatment: A systematic review. *Intensive Care Medicine*, 33(9), 1506-1518.
- Guilbert J. J. (2006). The World Health Report 2006: Working Together for Health. *Education for Health*, 19(3), 385–387. <https://doi.org/10.1080/13576280600937911>
- Guite, J. W., & Kazak, A. E. (2010). Anxiety symptoms and disorders. In R. J. Shaw & D. R. DeMaso (Eds.), *Textbook of Pediatric Psychosomatic Medicine* (pp. 101–119). American Psychiatric Publishing, Inc.
- Halain, A. A., Tang, L. Y., Chong, M. C., Ibrahim, N. A., & Abdullah, K. L. (2022). Psychological distress among the family members of intensive care unit (ICU) patients: A scoping review. *Journal of Clinical Nursing*, 31(5-6), 497–507. <https://doi.org/10.1111/jocn.15962>
- Hall, M. (2015). *Experience of Medical Trauma Scale (EMTS)*. <https://safehealthcareforeverywoman.org/wp-content/uploads/2-Response-Experience-of-Medical-Trauma-Scale-MFHall.pdf>
- Hall, M. F., & Hall, S. E. (2013). When treatment becomes trauma: Defining, preventing, and transforming medical trauma. *America Counseling Association*, 73.

- Hall, M. F., & Hall, S. E. (2017). *Managing the psychological impact of medical trauma: A guide for mental health and health care professionals*. Springer Publishing Co.
- Hall, M. E. L., & Johnson, E. L. (2001). Theodicy and therapy: Philosophical/theological contributions to the problem of suffering. *Journal of Psychology and Christianity*, 20(1), 5–17.
- Hapke, U., Schumann, A., Rumpf, H. J., John, U., & Meyer, C. (2006). Post-traumatic stress disorder: The role of trauma, pre-existing psychiatric disorders, and gender. *European Archives of Psychiatry and Clinical Neuroscience*, 256(5), 299–306.  
<https://doi.org/10.1007/s00406-006-0654-6>
- Härkönen, U. (2007, October). *The Bronfenbrenner ecological systems theory of human development*. [Keynote address]. International Conference Person Color Nature Music, Saule, Latvia.  
<http://inabook.co.za/wp-content/uploads/2016/08/Bronfenbrenner-ecological-systems.pdf>
- Hatch, R., McKechnie, S., & Griffiths, J. (2011). Psychological intervention to prevent ICU-related PTSD: Who, when and for how long?. *Critical Care*, 15(2), 141.  
<https://doi.org/10.1186/cc10054>
- Hathaway, L. M., Boals, A., & Banks, J. B. (2010). PTSD symptoms and dominant emotional response to a traumatic event: An examination of *DSM–IV* Criterion A2. *Anxiety, Stress, and Coping*, 23, 119–126. 10.1080/10615800902818771
- Hauer, D., Weis, F., Krauseneck, T., Vogeser, M., Schelling, G., & Roozendaal, B. (2009). Traumatic memories, post-traumatic stress disorder and serum cortisol levels in long-term survivors of the acute respiratory distress syndrome. *Brain Research*, 1293, 114–120.

- Hausmann, L. R., Hannon, M. J., Kresevic, D. M., Hanusa, B. H., Kwoh, C. K., & Ibrahim, S. A. (2011). Impact of perceived discrimination in healthcare on patient-provider communication. *Medical Care*, 49(7), 626–633.  
<https://doi.org/10.1097/MLR.0b013e318215d93c>
- Herman, J. L. (1997). *Trauma and Recovery* (2<sup>nd</sup> Edition). Basic Books.
- Herman, J. L. (1992) Complex PTSD: A syndrome in survivors of prolonged and repeated trauma. *Journal of Traumatic Stress*, 5, 377–391
- Higuera, J. C. B. (2014). *Humanizar la asistencia sanitaria*. Desclée De Brouwer.
- Hintistan S., Nural, N., & Öztürk, H. (2009). Yoğun bakım ünitesinde yatan hastaların deneyimleri. *Yoğun Bakım Hemşireliği Dergisi*, 13(1), 40-46.
- Holbrook, T. L., & Hoyt, D. B. (2004). The impact of major trauma: Quality-of-life outcomes are worse in women than in men, independent of mechanism and injury severity. *Journal of Trauma and Acute Care Surgery*, 56(2), 284-290.
- Hopper, S. I., Murray, S. L., Ferrara, L. R., & Singleton, J. K. (2019). Effectiveness of diaphragmatic breathing for reducing physiological and psychological stress in adults: A quantitative systematic review. *JBI Evidence Synthesis*, 17(9), 1855-1876.
- Hu, R. F., Jiang, X. Y., Zeng, Y. M., Chen, X. Y., & Zhang, Y. H. (2010). Effects of earplugs and eye masks on nocturnal sleep, melatonin and cortisol in a simulated intensive care unit environment. *Critical Care*, 14(2), 1-9. <https://doi.org/10.1186/cc8965>
- Hupcey, J. E. (2001). The meaning of social support for the critically ill patient. *Intensive and Critical Care Nursing*, 17(4), 206-212.
- Hutchings, A., Raine, R., Brady, A., Wildman, M., & Rowan, K. (2004). Socioeconomic status and outcome from intensive care in England and Wales. *Medical Care*, 943-951.  
<http://www.jstor.org/stable/4640840>
- Institute of Medicine (US) Committee on Quality of Health Care in America. (2001). *Crossing the Quality Chasm: A New Health System for the 21st Century*. National Academies Press.

- Jackson, J. C., Hart, R. P., Gordon, S. M., Hopkins, R. O., Girard, T. D., & Ely, E. W. (2007). Post-traumatic stress disorder and post-traumatic stress symptoms following critical illness in medical intensive care unit patients: Assessing the magnitude of the problem. *Critical Care (London, England)*, 11(1), R27. <https://doi.org/10.1186/cc5707>
- Jackson, J. C., Hart, R. P., Gordon, S. M., Shintani, A., Truman, B., May, L., & Ely, E. W. (2003). Six-month neuropsychological outcome of medical intensive care unit patients. *Critical Care Medicine*, 31(4), 1226–1234. <https://doi.org/10.1097/01.CCM.0000059996.30263.94>
- Jackson, J., Jutte, J., Hunter, C., Ciccolella, N., Warrington, H., Sevin, C., & Bienvenu, O. J. (2016). Posttraumatic stress disorder (PTSD) after critical illness: A conceptual review of distinct clinical issues and their implications. *Rehabilitation Psychology*, 61(2), 132-140. <https://doi.org/10.1037/rep0000085>
- Jacobi, J., Fraser, G. L., Coursin, D. B., Riker, R. R., Fontaine, D., Wittbrodt, E. T., Chalfin, D. B., Masica, M.F., Bjerke, H. S., Coplin, W. M., Crippen, D. W., Fuchs, B.D., Kelleher, R. M., Marik, P. E., Nasraway, S. A., Murray, M.J., Peruzzi, W. T. & Lumb, P. D. (2002). Clinical practice guidelines for the sustained use of sedatives and analgesics in the critically ill adult. *Critical Care Medicine*, 30(1), 119-141.
- Janoff-Bulman, R. (1992). *Shattered Assumptions: Towards a New Psychology of Trauma*. Free Press.
- Jo, M., Song, M.-K., Knafl, G. J., Beeber, L., Yoo, Y.-S., & Van Riper, M. (2019). Family-clinician communication in the ICU and its relationship to psychological distress of family members: A cross-sectional study. *International Journal of Nursing Studies*, 95, 34–39. <https://doi-org.lib.pepperdine.edu/10.1016/j.ijnurstu.2019.03.020>

- Jones, C., Bäckman, C., Capuzzo, M., Flaatten, H., Rylander, C., & Griffiths, R. D. (2007). Precipitants of post-traumatic stress disorder following intensive care: A hypothesis generating study of diversity in care. *Intensive Care Medicine*, 33(6), 978–985. <https://doi.org/10.1007/s00134-007-0600-8>
- Jones, C., Griffiths, R. D., & Humphris, G. (2000). Disturbed memory and amnesia related to intensive care. *Memory*, 8(2), 79-94.
- Jones, C., Griffiths, R. D., Humphris, G., & Skirrow, P. M. (2001). Memory, delusions, and the development of acute posttraumatic stress disorder-related symptoms after intensive care. *Critical Care Medicine*, 29(3), 573–580. <https://doi-org.lib.pepperdine.edu/10.1097/00003246-200103000-00019>
- Jones, C., Macmillan, R. R., & Griffiths, R. D. (1994). Providing psychological support for patients after critical illness. *Clinical Intensive Care: International Journal of Critical & Coronary Care Medicine*, 5(4), 176–179.
- Jones, C., Skirrow, P., Griffiths, R. D., Humphris, G. H., Ingleby, S., Eddleston, J., Waldmann, C. & Gager, M. (2003). Rehabilitation after critical illness: A randomized, controlled trial. *Critical Care Medicine*, 31(10), 2456-2461. <https://doi.org/10.1097/01.CCM.0000089938.56725.33>
- Jones, C., Skirrow, P., Griffiths, R. D., Humphris, G., Ingleby, S., Eddleston, J., Waldmann, C., & Gager, M. (2004). Post-traumatic stress disorder-related symptoms in relatives of patients following intensive care. *Intensive Care Med*, 30, 456–460 (2004). <https://doi.org/10.1007/s00134-003-2149-5>
- Kanmani, T. R., Thimmappur, R. M., Birudu, R., Reddy, K., & Raj, P. (2019). Burden and psychological distress of intensive care unit caregivers of traumatic brain injury patients. *Indian journal of critical care medicine: Peer-reviewed, official publication of Indian Society of Critical Care Medicine*, 23(5), 220. <https://doi-org.lib.pepperdine.edu/10.5005/jp-journals-10071-23164>

- Karanikola, M., Giannakopoulou, M., Mpouzika, M., Kaite, C. P., Tsiaousis, G. Z., & Papathanassoglou, E. D. (2015). Dysfunctional psychological responses among intensive care unit nurses: A systematic review of the literature. *Revista da Escola de Enfermagem da USP*, 49, 0847-0857.
- Karanikola, M. & Mpouzika, M. (2018). Time to create a healthy work environment in ICU: Review of current evidence and commentary. *The World of Critical Care Nursing*, 12(2), 44.
- Kassam-Adams, N., & Butler, L. (2017). What do clinicians caring for children need to know about pediatric medical traumatic stress and the ethics of trauma-informed approaches?. *AMA Journal of Ethics*, 19(8), 793–801.  
<https://doi.org/10.1001/journalofethics.2017.19.8.pfor1-1708>
- Kazak, A. E., Kassam-Adams, N., Schneider, S., Zelikovsky, N., Alderfer, M. A., & Rourke, M. (2006). An integrative model of pediatric medical traumatic stress. *Journal of Pediatric Psychology*, 31(4), 343–355. <https://doi.org/10.1093/jpepsy/jsi054>
- Kazak, A. E., Schneider, S., & Kassam-Adams, N. (2009). Pediatric medical traumatic stress. In M. C. Roberts & R. G. Steele (Eds.), *Handbook of Pediatric Psychology* (pp. 205–215). The Guilford Press.
- Kelly-Irving, M., Lepage, B., Dedieu, D., Bartley, M., Blane, D., Grosclaude, P., Lang, T., & Delpierre, C. (2013). Adverse childhood experiences and premature all-cause mortality. *European Journal of Epidemiology*, 28(9), 721–734. <https://doi-org.lib.pepperdine.edu/10.1007/s10654-013-9832-9>
- Kentish-Barnes, N., Lemiale, V., Chaize, M., Pochard, F., & Azoulay, É. (2009). Assessing burden in families of critical care patients. *Critical Care Medicine*, 37(10), S448-S456.  
doi: 10.1097/CCM.0b013e3181b6e145

- Kiekkas, P., Theodorakopoulou, G., Spyrtatos, F., & Baltopoulos, G. I. (2010). Psychological distress and delusional memories after critical care: A literature review: Delusional memories and post-ICU distress. *International Nursing Review*, 57(3), 288–296.  
<https://doi.org/10.1111/j.1466-7657.2010.00809.x>
- Knaus, W. A., Draper, E. A., Wagner, D. P., & Zimmerman, J. E. (1985). APACHE II: A severity of disease classification system. *Critical Care Medicine*, 13(10), 818-829.
- Knight, C. Trauma-Informed Social Work Practice: Practice Considerations and Challenges. *Clinical Social Work Journal*, 43, 25–37 (2015).  
<https://doi.org/10.1007/s10615-014-0481-6>
- Koivula, M., Paunonen-Ilmonen, M., Tarkka, M. T., Tarkka, M., & Laippala, P. (2002). Social support and its relation to fear and anxiety in patients awaiting coronary artery bypass grafting. *Journal of Clinical Nursing*, 11(5), 622-633.
- Kok, L., Slooter, A. J., Hillegers, M. H., van Dijk, D., & Veldhuijzen, D. S. (2018). Benzodiazepine use and neuropsychiatric outcomes in the ICU: A systematic review. *Critical Care Medicine*, 46(10), 1673-1680.
- Kubany, E. S., Ralston, T. C., & Hill, E. E. (2010). Intense fear, helplessness, “and” horror? An empirical investigation of *DSM-IV* PTSD Criterion A2. *Psychological Trauma: Theory, Research, Practice, and Policy*, 2, 77–82. 10.1037/a0019185
- Landolt, M. A., Vollrath, M., Ribi, K., Gnehm, H. E., & Sennhauser, F. H. (2003). Incidence and associations of parental and child posttraumatic stress symptoms in pediatric patients. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 44(8), 1199–1207. <https://doi.org/10.1111/1469-7610.00201>
- Langerud, A. K., Rustøen, T., Småstuen, M. C., Kongsgaard, U., & Stubhaug, A. (2018). Health-related quality of life in intensive care survivors: Associations with social support, comorbidity, and pain interference. *PloS One*, 13(6), e0199656.



- Le, A., Friese, R. S., Hsu, C. H., Wynne, J. L., Rhee, P., & O'Keeffe, T. (2012). Sleep disruptions and nocturnal nursing interactions in the intensive care unit. *The Journal of Surgical Research*, 177(2), 310–314. <https://doi-org.lib.pepperdine.edu/10.1016/j.jss.2012.05.038>
- Lederer, W., Kinzl, J. F., Traweger, C., Dosch, J., & Sumann, G. (2008). Fully developed burnout and burnout risk in intensive care personnel at a university hospital. *Anaesthesia and Intensive Care*, 36(2), 208–213. <https://doi.org/10.1177/0310057X0803600211>
- Lee, L. Y., & Lau, Y. L. (2003). Immediate needs of adult family members of adult intensive care patients in Hong Kong. *Journal of Clinical Nursing*, 12(4), 490–500. <https://doi-org.lib.pepperdine.edu/10.1046/j.1365-2702.2003.00743.x>
- Leiter, M. P., & Maslach, C. (2009). Nurse turnover: The mediating role of burnout. *Journal of Nursing Management*, 17(3), 331-339.
- Lemmers, A. L., & van der Voort, P. H. J. (2021). Trust in intensive care patients, family, and healthcare professionals: The development of a conceptual framework followed by a case study. *Healthcare*, 9(2), 208. MDPI AG. <http://dx.doi.org/10.3390/healthcare9020208>
- Levine, P. A. (2010). *In an unspoken voice: How the body releases trauma and restores goodness*. North Atlantic Books.
- Levine, P.A. (2021, May 22). *What is Somatic Experiencing?* SE 101. <https://traumahealing.org/se-101/>
- Lewin, K. (1935). *A dynamic theory of personality*. McGraw-Hill.
- Lewis, C. L., & Taylor, J. Z. (2017). Impact of prior ICU experience on ICU patient family members' psychological distress: A descriptive study. *Intensive and Critical Care Nursing*, 43, 129–135. <https://doi-org.lib.pepperdine.edu/10.1016/j.iccn.2017.09.008>

- Lin, S. M., Liu, C. Y., Wang, C. H., Lin, H. C., Huang, C. D., Huang, P. Y., Fang, Y. F., Shieh, M. H., & Kuo, H. P. (2004). The impact of delirium on the survival of mechanically ventilated patients. *Critical Care Medicine*, 32(11), 2254–2259.  
<https://doi.org/10.1097/01.ccm.0000145587.16421.bb>
- Löf, L., Berggren, L., & Ahlström, G. (2008). ICU patients' recall of emotional reactions in the trajectory from falling critically ill to hospital discharge: Follow-ups after 3 and 12 months. *Intensive and Critical Care Nursing*, 24(2), 108-121.
- Lognoul, M., Nasello, J., & Triffaux, J. M. (2020). La thérapie par exposition en réalité virtuelle pour les états de stress post-traumatiques, les troubles obsessionnels compulsifs et les troubles anxieux: Indications, plus-value et limites. *L'Encéphale*, 46(4), 293-300.
- Long, A. C., Kross, E. K., Davydow, D. S., & Curtis, J. R. (2014). Posttraumatic stress disorder among survivors of critical illness: Creation of a conceptual model addressing identification, prevention, and management. *Intensive Care Medicine*, 40(6), 820-829.
- Maccioli, G. A., Dorman, T., Brown, B. R., Mazuski, J. E., McLean, B. A., Kuszaj, J. M., ... & Peruzzi, W. T. (2003). Clinical practice guidelines for the maintenance of patient physical safety in the intensive care unit: Use of restraining therapies—American College of Critical Care Medicine Task Force 2001–2002. *Critical Care Medicine*, 31(11), 2665-2676. 10.1097/01.CCM.0000095463.72353.AD
- Maddox, M., Dunn, S. V., & Pretty, L. E. (2001). Psychosocial recovery following ICU: Experiences and influences upon discharge to the community. *Intensive and Critical Care Nursing*, 17(1), 6-15.
- Makic M. B. (2016). Recovery after ICU discharge: Post-intensive care syndrome. *Journal of Perianesthesia Nursing: Official Journal of the American Society of Perianesthesia Nurses*, 31(2), 172–174. <https://doi.org/10.1016/j.jopan.2015.12.006>
- Manda, C. (2016). Coping with the trauma of civil war and political violence through spiritual methods. *Pharos Journal of Theology*, 97, 1-15.

- Marra, A., Pandharipande, P. P., & Patel, M. B. (2017). Intensive care unit delirium and intensive care unit-related posttraumatic stress disorder. *The Surgical Clinics of North America*, 97(6), 1215–1235. <https://doi.org/10.1016/j.suc.2017.07.008>
- Martin, C. A., & McGrath, B. P. (2014). White-coat hypertension. *Clinical and Experimental Pharmacology & Physiology*, 41(1), 22–29. <https://doi.org/10.1111/1440-1681.12114>
- McAdam, J. L., & Puntillo, K. (2009). Symptoms experienced by family members of patients in intensive care units. *American Journal of Critical Care*, 18(3), 200-209. <https://doi.org/10.4037/ajcc2009252>
- McCann, I. L., & Pearlman, L. A. (1990). Vicarious traumatization: A framework for understanding the psychological effects of working with victims. *Journal of Traumatic Stress*, 3(1), 131-149.
- McFeely, J.E. (2007). Burnout syndrome in the ICU. *Critical Care Alert*, 15, 37-39. <http://www.ahcmedia.com/public/products/Critical-Care-Alert.html>
- McGiffin, J. N., Galatzer-Levy, I. R., & Bonanno, G. A. (2016). Is the intensive care unit traumatic? What we know and don't know about the intensive care unit and posttraumatic stress responses. *Rehabilitation Psychology*, 61(2), 120-131. <https://doi.org/10.1037/rep0000073>
- McIlroy, P. A., King, R. S., Garrouste-Orgeas, M., Tabah, A., & Ramanan, M. (2019). The effect of ICU diaries on psychological outcomes and quality of life of survivors of critical illness and their relatives: A systematic review and meta-analysis. *Critical Care Medicine*, 47(2), 273–279. <https://doiorg.lib.pepperdine.edu/10.1097/CCM.0000000000003547>
- McKinley, S., Aitken, L. M., Alison, J. A., King, M., Leslie, G., Burmeister, E., & Elliott, D. (2012). Sleep and other factors associated with mental health and psychological distress after intensive care for critical illness. *Intensive Care Medicine*, 38(4), 627-633. <https://doi.org/10.1007/s00134-012-2477-4>

- McNally R.J., (2003). Progress and controversy in the study of posttraumatic stress disorder. *Annual Review of Psychology*, 54:229–252.  
<https://doi.org/10.1146/annurev.psych.54.101601.145112>.
- Mealer, M., Jones, J., & Moss, M. (2012). A qualitative study of resilience and posttraumatic stress disorder in United States ICU nurses. *Intensive Care Medicine*, 38(9), 1445-1451
- Meghani, S. H., Byun, E., & Gallagher, R. M. (2012). Time to take stock: A meta-analysis and systematic review of analgesic treatment disparities for pain in the United States. *Pain Medicine* 13(2), 150–174. <https://doi.org/10.1111/j.1526-4637.2011.01310.x>
- Meriläinen, M., Kyngäs, H., & Ala-Kokko, T. (2013). Patients' interactions in an intensive care unit and their memories of intensive care: A mixed method study. *Intensive & Critical Care Nursing*, 29(2), 78–87. <https://doi.org/10.1016/j.iccn.2012.05.003>
- Merriam-Webster. (n.d.). Trauma. In *Merriam-Webster.com dictionary*. Retrieved March 20, 2021, from <https://www.merriam-webster.com/dictionary/trauma>
- Micek, S. T., Anand, N. J., Laible, B. R., Shannon, W. D., & Kollef, M. H. (2005). Delirium as detected by the CAM-ICU predicts restraint use among mechanically ventilated medical patients. *Critical Care Medicine*, 33(6), 1260–1265.  
<https://doi.org/10.1097/01.ccm.0000164540.58515.bf>
- Milbrandt, E. B., Deppen, S., Harrison, P. L., Shintani, A. K., Speroff, T., Stiles, R. A., Truman, B., Bernard, G. R., Dittus, R. S., & Ely, E. W. (2004). Costs associated with delirium in mechanically ventilated patients. *Critical Care Medicine*, 32(4), 955–962.  
<https://doi.org/10.1097/01.ccm.0000119429.16055.92>
- Miller, M. A., Renn, B. N., Chu, F., & Torrence, N. (2019). Sleepless in the hospital: A systematic review of non-pharmacological sleep interventions. *General Hospital Psychiatry*, 59, 58-66.

- Milton, A., Schandl, A., Soliman, I., Joelsson-Alm, E., van den Boogaard, M., Wallin, E., Brorsson, C., Östberg, U., Latocha, K., Savilampi, J., Paskins, S., Bottai, M., & Sackey, P. (2020). ICU discharge screening for prediction of new-onset physical disability: A multinational cohort study. *Acta Anaesthesiologica Scandinavica*, 64(6), 789–797.  
<https://doi.org/10.1111/aas.13563>
- Misak, C. (2005). ICU psychosis and patient autonomy: Some thoughts from the inside. In *The Journal of Medicine and Philosophy: A Forum for Bioethics and Philosophy of Medicine*, 30(4), 411-430.
- Moen, E. K., & Nåden, D. (2015). Intensive care patients' perceptions of how their dignity is maintained: A phenomenological study. *Intensive and Critical Care Nursing*, 31(5), 285-293.
- Monnat, S. M., & Chandler, R. F. (2015). Long Term Physical Health Consequences of Adverse Childhood Experiences. *The Sociological Quarterly*, 56(4), 723–752.  
<https://doi.org/10.1111/tsq.12107>
- Montgomery, A., Spânu, F., Băban, A., & Panagopoulou, E. (2015). Job demands, burnout, and engagement among nurses: A multi-level analysis of ORCAB data investigating the moderating effect of teamwork. *Burnout Research*, 2(2-3), 71–79.  
<https://doi.org/10.1016/j.burn.2015.06.001>
- Mooney, C., Fetter, K., Gross, B. W., Rinehart, C., Lynch, C., & Rogers, F. B. (2017). A preliminary analysis of compassion satisfaction and compassion fatigue with considerations for nursing unit specialization and demographic factors. *Journal of Trauma Nursing: The Official Journal of the Society of Trauma Nurses*, 24(3), 158–163.  
<https://doi.org/10.1097/JTN.0000000000000284>

- Myhren, H., Tøien, K., Ekeberg, Ø., Karlsson, S., Sandvik, L., & Stokland, O. (2009). Patients' memory and psychological distress after ICU stay compared with expectations of the relatives. *Intensive Care Medicine*, 35(12), 2078-2086. <https://doi.org/10.1007/s00134-009-1614-1>
- Naef, R., von Felten, S., & Ernst, J. (2021). Factors influencing post-ICU psychological distress in family members of critically ill patients: A linear mixed-effects model. *BioPsychoSocial Medicine*, 15. <https://doi-org.lib.pepperdine.edu/10.1186/s13030-021-00206-1>
- National Child Traumatic Stress Network. (n.d.). *Medical trauma*. Retrieved May 22, 2021 from <https://www.nctsn.org/what-is-child-trauma/trauma-types/medical-trauma>
- National Child Traumatic Stress Network. (2014). *National Child Traumatic Stress Network Pediatric Medical Traumatic Stress: A Comprehensive Guide*. <https://www.nctsn.org/resources/pediatric-medical-traumatic-stress-toolkit-health-care-providers>
- National Comprehensive Cancer Network (2020). *NCCN clinical practice guidelines in oncology: distress management. Version 3.2013 [Online]*. <https://www.nccn.org/>
- Needham, D. M., Davidson, J., Cohen, H., Hopkins, R. O., Weinert, C., Wunsch, H., Zawistowski, C., Bemis-Dougherty, A., Berney, S. C., Bienvenu, O. J., Brady, S. L., Brodsky, M. B., Denehy, L., Elliott, D., Flatley, C., Harabin, A. L., Jones, C., Louis, D., Meltzer, W., ... Harvey, M. A. (2012). Improving long-term outcomes after discharge from intensive care unit: Report from a stakeholders' conference. *Critical Care Medicine*, 40(2), 502-509. <https://doi.org/10.1097/CCM.0b013e318232da75>
- Neumann, M. Bensing, J., Mercer, S., Ernstmann, N., Ommen, O. & Pfaff, H. (2009). Analyzing the “nature” and “specific effectiveness” of clinical empathy: A theoretical overview and contribution towards a theory-based research agenda. *Patient Education and Counseling*, 74(3) 339-346. <https://doi.org/10.1016/j.pec.2008.11.013>.

- Nielsen, A. H., & Angel, S. (2016). How diaries written for critically ill influence the relatives: A systematic review of the literature. *Nursing in Critical Care*, 21(2), 88-96.  
<https://doi.org/10.1111/nicc.12158>
- Nikayin. S., Rabiee, A., Hashem, M. D., Huang, M., Bienvenu, O. J., Turnbull, A. E., & Needham, D. M. (2016). Anxiety symptoms in survivors of critical illness: A systematic review and meta-analysis. *General Hospital Psychiatry*, 43, 23-29.  
[10.1016/j.genhosppsych.2016.08.005](https://doi.org/10.1016/j.genhosppsych.2016.08.005)
- Nin Vaeza, N., Martin Delgado, M. C., & Heras La Calle, G. (2020). Humanizing intensive care: Toward a human-centered care icu model. *Critical Care Medicine*, 48(3), 385–390.  
<https://doi.org/10.1097/CCM.0000000000004191>
- Novaes, M. A. F. P., Aronovich, A., Ferraz, M. B., & Knobel, E. (1997). Stressors in ICU: Patients' evaluation. *Intensive Care Medicine*, 23(12), 1282-1285.
- Nydahl, P., Fischill, M., Deffner, T., Neudeck, V., Heindl, P. (2019). Intensivtagebücher senken Risiko für psychische Folgestörungen. *Med Klin Intensivmed Notfmed*, 114, 68–76.  
<https://doi.org/10.1007/s00063-018-0456-4>
- Oates R. K. (1984). Personality development after physical abuse. *Archives of Disease in Childhood*, 59(2), 147–150. <https://doi.org/10.1136/adc.59.2.147>
- O'Donnell, M. L., Creamer, M., Holmes, A. C., Ellen, S., McFarlane, A. C., Judson, R., Silove, D., & Bryant, R. A. (2010). Posttraumatic stress disorder after injury: Does admission to intensive care unit increase risk?. *The Journal of Trauma*, 69(3), 627–632.  
<https://doi.org/10.1097/TA.0b013e3181bc0923>
- Ogden, P., Minton, K., & Pain, C. (2006). *Norton series on interpersonal neurobiology. Trauma and the body: A sensorimotor approach to psychotherapy*. W. W. Norton & Company.
- O'Mahony N. (2011). Nurse burnout and the working environment. *Emergency nurse : the journal of the RCN Accident and Emergency Nursing Association*, 19(5), 30–37.  
<https://doi.org/10.7748/en2011.09.19.5.30.c8704>

- Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin*, 129(1), 52–73. <https://doi.org/10.1037/0033-2909.129.1.52>
- Pandharipande, P., & Ely, E. W. (2006). Sedative and analgesic medications: Risk factors for delirium and sleep disturbances in the critically ill. *Critical Care Clinics*, 22(2), 313-327.
- Paparrigopoulos, T., Melissaki, A., Tzavellas, E., Karaiskos, D., Ilias, I., & Kokras, N. (2014). Increased co-morbidity of depression and post-traumatic stress disorder symptoms and common risk factors in intensive care unit survivors: A two-year follow-up study. *International Journal of Psychiatry in Clinical Practice*, 18(1), 25-31. <https://doi.org/10.3109/13651501.2013.855793>
- Papathanassoglou, E.D. (2010), Psychological support and outcomes for ICU patients. *Nursing in Critical Care*, 15: 118-128. <https://doi.org/10.1111/j.1478-5153.2009.00383.x>
- Paradies, Y. C. (2006). Defining, conceptualizing and characterizing racism in health research. *Critical Public Health*, 16(2), 143-157. <http://dx.doi.org/10.1080/095681590600828881>
- Pargament, K.I. (2007). *Spiritually Integrated Psychotherapy: Understanding and Addressing the Sacred*. The Guilford Press
- Park, C. L. (2005). Religion and Meaning. In R. F. Paloutzian & C. L. Park (Eds.), *Handbook of the psychology of religion and spirituality* (pp. 295–314). The Guilford Press.
- Parker, A. M., Sricharoenchai, T., Raparla, S., Schneck, K. W., Bienvenu, O. J., & Needham, D. M. (2015). Posttraumatic stress disorder in critical illness survivors: A metanalysis. *Critical Care Medicine*, 43(5), 1121–1129. <https://doi.org/10.1097/ccm.0000000000000882>
- Partridge, J. S., Crichton, S., Biswell, E., Harari, D., Martin, F. C., & Dhesi, J. K. (2019). Measuring the distress related to delirium in older surgical patients and their relatives. *International Journal of Geriatric Psychiatry*, 34(7), 1070-1077.



- Patel, M. B., Jackson, J. C., Morandi, A., Girard, T. D., Hughes, C. G., Thompson, J. L., Kiehl, A. L., Elstad, M. R., Wasserstein, M. L., Goodman, R. B., Beckham, J. C., Chandrasekhar, R., Dittus, R. S., Ely, E. W., & Pandharipande, P. P. (2016). Incidence and risk factors for intensive care unit-related post-traumatic stress disorder in veterans and civilians. *American Journal of Respiratory and Critical Care Medicine*, 193(12), 1373–1381. <https://doi.org/10.1164/rccm.201506-1158OC>
- Patient Protection and Affordable Care Act of 2010, 42 U.S.C. §18001 (2010).
- Pereda, N., & Forero, C. G. (2012). Contribution of criterion A2 to PTSD screening in the presence of traumatic events. *Journal of Traumatic Stress*, 25, 587–591. 10.1002/jts.21736
- Peris, A., Bonizzoli, M., Iozzelli, D., Migliaccio, M. L., Zagli, G., Bacchereti, A., Debolini, M., Vannini, E., Solaro, M., Balzi, I., Bendoni, E., Bacchi, I., Trevisan, M., Giovannini, V., & Belloni, L. (2011). Early intra-intensive care unit psychological intervention promotes recovery from post traumatic stress disorders, anxiety and depression symptoms in critically ill patients. *Critical Care*, 15(1), R41. <https://doi.org/10.1186/cc1000>
- Peterson, U., Demerouti, E., Bergström, G., Samuelsson, M., Asberg, M., & Nygren, A. (2008). Burnout and physical and mental health among Swedish healthcare workers. *Journal of Advanced Nursing*, 62(1), 84–95. <https://doi.org/10.1111/j.1365-2648.2007.04580.x>
- Petrinec, A. B., & Daly, B. J. (2016). Post-traumatic stress symptoms in post-ICU family members: Review and methodological challenges. *Western Journal of Nursing Research*, 38(1), 57–78. <https://doi.org/10.1177/0193945914544176>
- Pinkas, J., & Horowitz, A. (2020). Reducing severity of posttraumatic stress disorder in intensive care unit survivors. *Dimensions of Critical Care Nursing*, 39(6), 298-304.
- Pitman R. K. (1989). Post-traumatic stress disorder, hormones, and memory. *Biological Psychiatry*, 26(3), 221–223. [https://doi.org/10.1016/0006-3223\(89\)90033-4](https://doi.org/10.1016/0006-3223(89)90033-4)

- Polderman, K. H., Girbes, A. R. J., Thijs, L. G., & Strack van Schijndel, R. J. M. (2001). Accuracy and reliability of APACHE II scoring in two intensive care units: Problems and pitfalls in the use of APACHE II and suggestions for improvement. *Anaesthesia*, 56(1), 47-50.
- Porges, S. W. (2011). *The polyvagal theory: Neurophysiological foundations of emotions, attachment, communication, and self-regulation*. Norton.
- Price L. H., Kao H. T., Burgers D. E., Carpenter L. L., Tyrka A. R. (2013). Telomeres and early-life stress: An overview. *Biological Psychiatry* 73, 15–23.  
<https://doi.org/10.1016/j.biopsych.2012.06.025>
- Pun, B. T., Balas, M. C., Barnes-Daly, M. A., Thompson, J. L., Aldrich, J. M., Barr, J., Byrum, D., Carson, S. S., Devlin, J. W., Engel, H. J., Esbrook, C. L., Hargett, K. D., Harmon, L., Hielsberg, C., Jackson, J. C., Kelly, T. L., Kumar, V., Milner, L., Morse, A., Perme, C. S. & Ely, E. W. (2019). Caring for critically ill patients with the ABCDEF bundle: Results of the ICU liberation collaborative in over 15,000 adults. *Critical Care Medicine*, 47(1), 3.
- Rattray, J. E., Johnston, M., & Wildsmith, J. A. (2005). Predictors of emotional outcomes of intensive care. *Anaesthesia*, 60(11), 1085–1092. <https://doi.org/10.1111/j.1365-2044.2005.04336.x>
- Rigby, C., Rosa, R. G., da Silva, R., Kochhann, R., Migliavaca, C. B., Robinson, C. C., Teche, S. P., Teixeira, C., Bozza, F. A., & Falavigna, M. (2019). Prevalence of post-traumatic stress disorder symptoms in adult critical care survivors: A systematic review and meta-analysis. *Critical Care (London, England)*, 23(1), 213. <https://doi.org/10.1186/s13054-019-2489-3>
- Ringdal, M., Johansson, L., Lundberg, D., & Bergbom, I. (2006). Delusional memories from the intensive care unit—experienced by patients with physical trauma. *Intensive and Critical Care Nursing*, 22(6), 346-354.

- Roberts, M. B., Glaspey, L. J., Mazzairelli, A., Jones, C. W., Kilgannon, H. J., Trzeciak, S., & Roberts, B. W. (2018). Early interventions for the prevention of posttraumatic stress symptoms in survivors of critical illness: A qualitative systematic review. *Critical Care Medicine*, 46(8), 1328-1333.
- Roozendaal, B. (2002). Stress and memory: Opposing effects of glucocorticoids on memory consolidation and memory retrieval. *Neurobiology of Learning and Memory*, 78(3), 578-595.
- Rosa, E. M., & Tudge, J. (2013). Urie Bronfenbrenner's theory of human development: Its evolution from ecology to bioecology. *Journal of family theory & review*, 5(4), 243-258.
- Rose, L., Nonoyama, M., Rezaie, S., & Fraser, I. (2014). Psychological wellbeing, health related quality of life and memories of intensive care and a specialised weaning centre reported by survivors of prolonged mechanical ventilation. *Intensive & Critical Care Nursing*, 30(3), 145–151. <https://doi.org/10.1016/j.iccn.2013.11.002>
- Rosen, G. M. (2004). Traumatic Events, Criterion Creep, and the Creation of Pretraumatic Stress Disorder. *Scientific Review of Mental Health Practice*, 3(2), 39–42.
- Rothschild, B. (2000). *The body remembers continuing education test: The psychophysiology of trauma & trauma treatment*. WW Norton & Company.
- Rotondi, A. J., Chelluri, L., Sirio, C., Mendelsohn, A., Schulz, R., Belle, S., Im, K., Donahoe, M., & Pinsky, M. R. (2002). Patients' recollections of stressful experiences while receiving prolonged mechanical ventilation in an intensive care unit. *Critical Care Medicine*, 30(4), 746–752. <https://doi.org/10.1097/00003246-200204000-00004>
- Rubin, D. C., Boals, A., & Berntsen, D. (2008). Memory in posttraumatic stress disorder: Properties of voluntary and involuntary, traumatic and nontraumatic autobiographical memories in people with and without posttraumatic stress disorder symptoms. *Journal of Experimental Psychology: General*, 137, 591–614. 10.1037/a0013165

- Rundshagen, I., Schnabel, K., Wegner, C., & am Esch, S. J. (2002). Incidence of recall, nightmares, and hallucinations during analgosedation in intensive care. *Intensive Care Medicine*, 28(1), 38-43.
- Ryherd, E. E., West, J. E., Busch-Vishniac, I. J., & Waye, K. P. (2008). Evaluating the hospital soundscape. *Acoustics Today*, 4(4), 22-29.
- Saakvitne, K.W. (2017). Relational theory: The cornerstone of integrative trauma practice. *APA Handbook of Trauma Psychology: Trauma Practice*, 2, 117-142.
- Samuelson K. A. (2011). Unpleasant and pleasant memories of intensive care in adult mechanically ventilated patients--findings from 250 interviews. *Intensive & critical care nursing*, 27(2), 76–84. <https://doi-org.lib.pepperdine.edu/10.1016/j.iccn.2011.01.003>
- Samuelson, K., Lundberg, D., & Fridlund, B. (2006). Memory in relation to depth of sedation in adult mechanically ventilated intensive care patients. *Intensive Care Medicine*, 32(5), 660–667. <https://doi-org.lib.pepperdine.edu/10.1007/s00134-006-0105-x>
- Samuelson, K. A., Lundberg, D., & Fridlund, B. (2007). Stressful memories and psychological distress in adult mechanically ventilated intensive care patients - a 2-month follow-up study. *Acta Anaesthesiologica Scandinavica*, 51(6), 671–678. <https://doi-org.lib.pepperdine.edu/10.1111/j.1399-6576.2007.01292.x>
- Sayde, G. E., Stefanescu, A., Conrad, E., Nielsen, N., & Hammer, R. (2020). Implementing an intensive care unit (ICU) diary program at a large academic medical center: Results from a randomized control trial evaluating psychological morbidity associated with critical illness. *General Hospital Psychiatry*, 66, 96-102.
- Scaer, R. (2005). *The trauma spectrum: Hidden wounds and human resiliency*. W W Norton & Co.
- Schandl, A., Bottai, M., Hellgren, E., Sundin, Ö., & Sackey, P. (2012). Gender differences in psychological morbidity and treatment in intensive care survivors: A cohort study. *Critical Care*, 16(3), 1-9. <https://doi.org/10.1186/cc11338>

- Schandl, A., Bottai, M., Hellgren, E., Sundin, O., & Sackey, P. V. (2013). Developing an early screening instrument for predicting psychological morbidity after critical illness. *Critical Care*, 17(5), 1-11. <https://doi.org/10.1186/cc13018>
- Schaufeli, W. B., & Greenglass, E. R. (2001). Introduction to special issue on burnout and health. *Psychology & Health*, 16(5), 501–510. <https://doi.org/10.1080/08870440108405523>
- Schelling, G., Briegel, J., Roozendaal, B., Stoll, C., Rothenhäusler, H. B., & Kapfhammer, H. P. (2001). The effect of stress doses of hydrocortisone during septic shock on posttraumatic stress disorder in survivors. *Biological Psychiatry*, 50(12), 978-985.
- Schelling, G., Kilger, E., Roozendaal, B., Dominique, J. F., Briegel, J., Dagge, A., ... & Kapfhammer, H. P. (2004). Stress doses of hydrocortisone, traumatic memories, and symptoms of posttraumatic stress disorder in patients after cardiac surgery: A randomized study. *Biological Psychiatry*, 55(6), 627-633
- Schelling, G., Richter, M., Roozendaal, B., Rothenhäusler, H. B., Krauseneck, T., Stoll, C., Nollert, G., Schmidt, M., & Kapfhammer, H. P. (2003). Exposure to high stress in the intensive care unit may have negative effects on health-related quality-of-life outcomes after cardiac surgery. *Critical Care Medicine*, 31(7), 1971-1980.
- Schelling, G., Stoll, C., Haller, M., Briegel, J., Manert, W., Hummel, T., Lenhart, A., Heyduck, M., Polasek, J., Meier, M., Preuss, U., Bullinger, M., Schüffel, W., & Peter, K. (1998). Health-related quality of life and posttraumatic stress disorder in survivors of the acute respiratory distress syndrome. *Critical care medicine*, 26(4), 651–659. <https://doi-org.lib.pepperdine.edu/10.1097/00003246-199804000-00011>
- Schnyder U, Morgeli H, Nigg C, Klaghofer R, Renner N, Trentz O, Buddeberg C. (2000). Early psychological reactions to life-threatening injuries. *Critical Care Med*, 28: 86-92. [10.1097/00003246-200001000-00014](https://doi.org/10.1097/00003246-200001000-00014)

- Shapiro, F. (2001). *Eye movement desensitization and reprocessing: Basic principles, protocols and procedures (2<sup>nd</sup> ed.)*. Guilford Press.
- Spence Laschinger, H. K., & Leiter, M. P. (2006). The impact of nursing work environments on patient safety outcomes: The mediating role of burnout/engagement. *The Journal of Nursing Administration*, 36(5), 259–267. <https://doi.org/10.1097/00005110-200605000-00019>
- Stewart, L. P., & White, P. M. (2008). Sensory filtering phenomenology in PTSD. *Depression and Anxiety*, 25(1), 38-45.
- Strawbridge, W.J., Shema, S.J., Cohen, R.D., Rogers, R.E. & Kaplan, G.A. (1998). Religiosity buffers effects of some stressors on depression but exacerbates others. *Journal of Gerontology: Social Sciences*, 53B, S118-S126.
- Sun, X., Huang, D., Zeng, F., Ye, Q., Xiao, H., Lv, D., Zhao, P., & Cui, X. (2021). Effect of intensive care unit diary on incidence of posttraumatic stress disorder, anxiety, and depression of adult intensive care unit survivors: A systematic review and meta-analysis. *Journal of Advanced Nursing*, 77(7), 2929–2941. <https://doi.org/10.1111/jan.14706>
- Svenningsen, H., Egerod, I., Christensen, D., Tønnesen, E. K., Frydenberg, M., & Videbech, P. (2015). Symptoms of posttraumatic stress after intensive care delirium. *BioMed Research International*, 2015. <https://doi.org/10.1155/2015/876947>
- Swartzman, S., Booth, J. N., Munro, A., & Sani, F. (2017). Posttraumatic stress disorder after cancer diagnosis in adults: A meta-analysis. *Depression and Anxiety*, 34(4), 327–339. <https://doi.org/10.1002/da.22542>
- Tamburri, L. M., DiBrienza, R., Zozula, R., & Redeker, N. S. (2004). Nocturnal care interactions with patients in critical care units. *American Journal of Critical Care: An Official Publication, American Association of Critical-Care Nurses*, 13(2), 102–115.

- Teicher, M. H., Polcari, A., Andersen, S. L., Anderson, C. M., & Navalta, C. (2003). Neurobiological effects of childhood stress and trauma. In S. W. Coates, J. L. Rosenthal, & D. S. Schechter (Eds.), *September 11: Trauma and Human Bonds*. (pp. 211–237). The Analytic Press/Taylor & Francis Group.
- Thakur, E. R., Sansgiry, S., Kramer, J. R., Waljee, A. K., Gaidos, J. K., Feagins, L. A., Govani, S. M., Dindo, L., El-Serag, H. B., & Hou, J. K. (2020). The incidence and prevalence of anxiety, depression, and post-traumatic stress disorder in a national cohort of US veterans with inflammatory bowel disease. *Inflammatory Bowel Diseases*, 26(9), 1423–1428. <https://doi.org/10.1093/ibd/izz280>
- Tilburgs, B., Nijkamp, M. D., Bakker, E. C., & van der Hoeven, H. (2015). The influence of social support on patients' quality of life after an intensive care unit discharge: A cross-sectional survey. *Intensive and Critical Care Nursing*, 31(6), 336-342.
- Tøien, K., Myhren, H., Bredal, I. S., Skogstad, L., Sandvik, L., & Ekeberg, Ø. (2010). Psychological distress after severe trauma: A prospective 1-year follow-up study of a trauma intensive care unit population. *Journal of Trauma and Acute Care Surgery*, 69(6), 1552-1559.
- Tomer, A., & Eliason, G. (2000). Beliefs about self, life, and death: Testing aspects of a comprehensive model of death anxiety and death attitudes. In A. Tomer (Ed.), *Series in death, dying, and bereavement. Death attitudes and the older adult: Theories, concepts, and applications* (p. 137–153). Brunner-Routledge.
- Topçu, S., Ecevit Alpar, Ş., Gülseven, B., & Kebapçı, A. (2017). Patient experiences in intensive care units: A systematic review. *Patient Experience Journal*, 4(3), 115-127.
- Tripathi, A., Das, A., & Kar, S. K. (2019). Biopsychosocial model in contemporary psychiatry: Current validity and future prospects. *Indian Journal of Psychological Medicine*, 41(6), 582–585. [https://doi.org/10.4103/IJPSYM.IJPSYM\\_314\\_19](https://doi.org/10.4103/IJPSYM.IJPSYM_314_19)

- Turner, R. J., & Lloyd, D. A. (1995). Lifetime traumas and mental health: The significance of cumulative adversity. *Journal of Health and Social Behavior*, 36(4), 360–376. <https://doi.org/10.2307/2137325>
- Ullman, A. J., Aitken, L. M., Rattray, J., Kenardy, J., Le Brocq, R., MacGillivray, S., & Hull, A. M. (2015). Intensive care diaries to promote recovery for patients and families after critical illness: A Cochrane systematic review. *International Journal of Nursing Studies*, 52(7), 1243-1253.
- van de Leur, J. P., van der Schans, C. P., Loef, B. G., Deelman, B. G., Geertzen, J. H., & Zwaveling, J. H. (2004). Discomfort and factual recollection in intensive care unit patients. *Critical Care*, 8(6), 1-7. <https://doi.org/10.1186/cc2976>
- Van der Kolk, B. A. (2014). *The body keeps the score: brain, mind, and body in the healing of trauma*. Penguin Books
- Van Mol, M. M., Kompanje, E. J., Benoit, D. D., Bakker, J., & Nijkamp, M. D. (2015). The prevalence of compassion fatigue and burnout among healthcare professionals in intensive care units: A systematic review. *PloS One*, 10(8), e0136955.
- Wade, D., Brewin, C. R., Howell, D. C. J., White, E., Mythen, M. G., & Weinman, J. A. (2014). Intrusive memories of hallucinations and delusions in traumatized intensive care patients: An interview study. *British Journal of Health Psychology*, 20(3), 613–631. <https://doi.org/10.1111/bjhp.12109>
- Wade, D., Hardy, R., Howell, D., & Mythen, M. (2013). Identifying clinical and acute psychological risk factors for PTSD after critical care: A systematic review. *Minerva anesthesiologica*, 79(8), 944–963.
- Wade, D., Howell, D. C., Weinman, J. A., Hardy, R. J., Mythen, M. G., Brewin, C. R., Borja-Boluda, S., Matejowsky, C. F., & Raine, R. A. (2012). Investigating risk factors for psychological morbidity three months after intensive care: A prospective cohort study. *Critical Care (London, England)*, 16(5), R192. <https://doi.org/10.1186/cc11677>



- Wade, D., Moon, Z., Windgassen, S. S., Harrison, A. M., Morris, L., & Weinman, J. A. (2016). Non-pharmacological interventions to reduce ICU-related psychological distress: A systematic review. *Minerva Anestesiologica*, 82(4), 465–478.
- Wallen, K., Chaboyer, W., Thalib, L., & Creedy, D. K. (2008). Symptoms of acute posttraumatic stress disorder after intensive care. *American Journal of Critical Care*, 17(6), 534-543. <https://doi.org/10.4037/ajcc2008.17.6.534>
- Wang, Y. Y., Wan, Q. Q., Lin, F., Zhou, W. J., & Shang, S. M. (2018). Interventions to improve communication between nurses and physicians in the intensive care unit: An integrative literature review. *International Journal of Nursing Sciences*, 5(1), 81-88.
- Warlan, H., & Howland, L. (2015). Posttraumatic stress syndrome associated with stays in the intensive care unit: Importance of nurses' involvement. *Critical Care Nurse*, 35(3), 44–54. <https://doi.org/10.4037/ccn2015758>
- Weinert, C. R., & Sprenkle, M. (2008). Post-ICU consequences of patient wakefulness and sedative exposure during mechanical ventilation. *Intensive Care Medicine*, 34(1), 82-90. <https://doi.org/10.1007/s00134-007-0829-2>
- Weis, F., Kilger, E., Roozendaal, B., Dominique, J. F., Lamm, P., Schmidt, M., ... & Schelling, G. (2006). Stress doses of hydrocortisone reduce chronic stress symptoms and improve health-related quality of life in high-risk patients after cardiac surgery: A randomized study. *The Journal of Thoracic and Cardiovascular Surgery*, 131(2), 277-282.
- Welch, C. A., Harrison, D. A., Hutchings, A., & Rowan, K. (2010). The association between deprivation and hospital mortality for admissions to critical care units in England. *Journal of Critical Care*, 25(3), 382-390. <https://doi.org/10.1016/j.jcrc.2009.11.003>
- Wilkin, K., & Slevin, E. (2004). The meaning of caring to nurses: An investigation into the nature of caring work in an intensive care unit. *Journal of Clinical Nursing*, 13(1), 50–59. <https://doi.org/10.1111/j.1365-2702.2004.00814.x>

- Williams, D. R., & Cooper, L. A. (2019). Reducing racial inequities in health: Using what we already know to take action. *International Journal of Environmental Research and Public Health*, 16(4), 606. <https://doi.org/10.3390/ijerph16040606>
- Williams, D. R., & Rucker, T. D. (2000). Understanding and addressing racial disparities in health care. *Health Care Financing Review*, 21(4), 75–90.
- Williams, M. B., & Sommer, J. (2002). Trauma in the new millennium. In M. Williams & J. Sommer (Eds.), *Simple and complex PTSD: Strategies for comprehensive treatment in clinical practice*. Haworth, xix-xxii.
- Williams, S. T., Dhesi, J. K., & Partridge, J. S. (2020). Distress in delirium: causes, assessment and management. *European Geriatric Medicine*, 11(1), 63-70.  
<https://doi.org/10.1007/s41999-019-00276-z>
- Wong, D. T., Barrow, P. M., Gomez, M., & McGuire, G. P. (1996). A comparison of the Acute Physiology and Chronic Health Evaluation (APACHE) II score and the Trauma-Injury Severity Score (TRISS) for outcome assessment in intensive care unit trauma patients. *Critical Care Medicine*, 24(10), 1642-1648.
- World Health Organization. (1999) *Guidelines for Community Noise*.  
<https://www.who.int/publications/i/item/a68672>
- Wright, A. A., & Katz, I. T. (2018). Beyond burnout—redesigning care to restore meaning and sanity for physicians. *N Engl J Med*, 378(4), 309-311.
- Wu, A. W., Pronovost, P., & Morlock, L. (2002). ICU incident reporting systems. *Journal of Critical Care*, 17(2), 86–94. <https://doi.org/10.1053/jcrrc.2002.35100>
- Yakobson, M. (2018). *Risk factors for posttraumatic stress disorder in ICU survivors* (Order No. 10868400) [Doctoral dissertation, St. John's University]. ProQuest Dissertations & Theses Global. <https://lib.pepperdine.edu/login?url=https://www.proquest.com/dissertations-theses/risk-factors-posttraumatic-stress-disorder-icu/docview/2057210954/se-2?accountid=13159>

- Young, M. P., & Birkmeyer, J. D. (2000). Potential reduction in mortality rates using an intensivist model to manage intensive care units. *Effective Clinical Practice*, 3(6).
- Zeilani, R., & Seymour, J. E. (2010). Muslim women's experiences of suffering in Jordanian intensive care units: A narrative study. *Intensive and Critical Care Nursing*, 26(3), 175-184.

## APPENDIX

### IRB Non-Human Subjects Determination Notice

## IRB Non-Human Subjects Determination Notice

# PEPPERDINE UNIVERSITY

### Graduate & Professional Schools Institutional Review Board

January 11, 2022

Protocol #: **11122**

Project Title: ICU Related Medical Trauma: Towards a Deeper Understanding of Contributing Factors and Experiences of Traumatic Stress...

Dear Jacqueline:

Thank you for submitting a "GPS IRB Non-Human Subjects Notification Form" for *ICU Related Medical Trauma: Towards a Deeper Understanding of Contributing Factors and Experiences of Traumatic Stress...* project to Pepperdine University's Institutional Review Board (IRB) for review. The IRB has reviewed your submitted form and all ancillary materials. Upon review, the IRB has determined that the above titled project meets the requirements for *non-human subject research* under the federal regulations 45 CFR 46.101 that govern the protection of human subjects.

Your research must be conducted according to the form that was submitted to the IRB. If changes to the approved project occur, you will be required to submit *either* a new "GPS IRB Non-Human Subjects Notification Form" or an IRB application via the ~~eProtocol~~ system (<http://irb.pepperdine.edu>) to the Institutional Review Board.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the IRB and documenting the adverse event can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* at <https://community.pepperdine.edu/irb/policies/>.

Please refer to the protocol number denoted above in all further communication or correspondence related to this approval.

On behalf of the IRB, we wish you success in this scholarly pursuit.

Sincerely,

Institutional Review Board (IRB)  
Pepperdine University

cc: Mrs. Katy Carr, Assistant Provost for Research  
Dr. Judy Ho, Graduate School of Education and Psychology IRB Chair