

THESIS

MIND-BODY INTERVENTIONS UTILIZED BY AN OCCUPATIONAL THERAPIST IN A
MEDICAL INTENSIVE CARE UNIT: AN EXPLORATORY CASE STUDY

Submitted by

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ABSTRACT

MIND-BODY INTERVENTIONS UTILIZED BY AN OCCUPATIONAL THERAPISTS IN A MEDICAL INTENSIVE CARE UNIT: AN EXPLORATORY CASE STUDY

The medical intensive care unit (MICU) presents a challenging environment within the health care arena. Patients in the MICU are at risk for occupational deprivation, due to a lack of opportunities for purposeful movements and activities, which further impedes recovery. Occupational deprivation occurs when people are not afforded equal opportunities to participate in desired occupations. Mind-body interventions might be a tool for occupational therapists to use a preparatory method to improve patients' physical and psychological health, leading to increased performance and participation in occupations while in the MICU. The purpose of this study was to explore the use of mind-body interventions delivered by an occupational therapist in a MICU. The patient in our case study was within normal ranges for all physiological and mental status variables during the mind-body interventions. Therefore, this study demonstrates that it is feasible for an occupational therapist with proper training and credential to elicit mind-body interventions in this setting, with this patient.

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LIST OF KEYWORDS AND DEFINITIONS

Complementary and Integrative Health (CIH)

Complementary and integrative health (CIH) approaches include a diverse group of practices that are used together with conventional medicine to enhance overall health and well-being, and manage and reduce stress (National Center for Complementary and Integrative Health, 2017).

Mind-Body Interventions

Mind-body interventions include a wide variety of techniques based on the foundation of connecting the mind, body, brain and behavior (National Center for Complementary and Integrative Health, 2017). Examples of mind-body interventions include: yoga; Tai Chi; deep breathing; meditation; guided imagery; progressive muscle relaxation; as well as chiropractic or osteopathic manipulation.

Post Intensive Care Syndrome (PICS)

Long term health complications in the form of physical, cognitive, or mental impairments that persist after surviving critical illness and treatment in an intensive care unit (Parker, Sricharoenchai, & Needham, 2013)

Delirium

Delirium is the acute onset or alteration in mental status, disorganized thinking, inattention, or altered level of consciousness (Brummel, Jackson, et al., 2014).

CHAPTER 1: INTRODUCTION

1.1 Purpose

The purpose of this case study was to explore the use of mind-body interventions delivered by an occupational therapist in a medical intensive care unit (MICU).

There is a significant amount of published research that indicates patients in the intensive care unit (ICU) have many complications that lead to high morbidity, high mortality, and high cost of care (Bourdin et al., 2010; Needham, Feldman, & Kho, 2011; C. Perme & Chandrashekar, 2009). Some of these complications are delirium, vital organ dysfunction, sepsis, hypoxemia, and neuromuscular weakness. These complications along with the patient's primary diagnosis can lead to prolonged bed rest and immobility, prolonged mechanical ventilation, and increased agitation or stress. Such complications further confound the patient's medical condition, and can increase the ICU and hospital length of stay, which leads to increases in the cost of care. Additionally, patients who are confronted with life-threatening illness or injuries inevitably experience psychological and psychosocial stressors that further impede their recovery (Moser et al., 2003; Wenham & Pittard, 2009). Due to the critical nature of the patient's illnesses and their confounding complications, they have fewer opportunities to participate in occupations while in the ICU (A. Affleck, S. Lieberman, J. Polon, & K. Rohrkemper, 1986; Brummel, Jackson, et al., 2014; C. Perme & Chandrashekar, 2009).

Most of the recent literature regarding occupational therapy in the ICU focuses on the benefits of early rehabilitation, including mobilization and management for delirium. This research shows promise for occupational therapy's role in early rehabilitation for patients in the ICU who are critically ill (Alvarez et al., 2017; Bourdin et al., 2010; Brummel, Girard, et al.,

2014; Engel, Needham, Morris, & Gropper, 2013; Hodgson et al., 2014; C. Perme & Chandrashekar, 2009; Schweickert et al., 2009). Older research by Affleck et al. (1984; 1986) and Howell (1999) addressed decreased participation in occupations that accompanies admission into an ICU. Affleck et al. and Howell state that this decreased participation is secondary to prolonged bed rest; sensory deprivation; sensory overload; stress; anxiety; and prolonged mechanical ventilation. They provided strategies such as stress reduction techniques; breathing; imagery; progressive relaxation; listening to relaxation music; and meditation that are specific for occupational therapists to utilize in the ICU, but did not provide research to back their claims. Such research is a necessary next step. These approaches by Affleck et al. and Howell are consistent with complementary and integrative health (CIH) approaches. CIH include a diverse group of practices that are used together with conventional medicine to enhance overall health and well-being, and manage and reduce stress (National Center for Complementary and Integrative Health, 2017). Mind-body interventions, which include a variety of techniques based on the foundation of connecting the mind, body, brain, and behavior to positively influence health, is a subset of CIH (Wahbeh, Elsas, & Oken, 2008). Despite Affleck (1984; 1986) and Howell's (1999) papers discussing interventions that are similar to CIH, there is currently no evidence substantiating their claims. To our knowledge, there are currently no interventions addressing CIH approaches in the ICU. Given the novel nature of this intervention, the objective of this study is to explore the use of mind-body interventions delivered by an occupational therapist in a MICU.

CHAPTER 2: REVIEW OF THE LITERATURE

2.1 Introduction

In this chapter, I will introduce the demographics of the hospital where the mind-body interventions took place. I will then discuss the role of occupational therapy in the ICU, the barriers that limit occupational participation and performance while in the ICU, and how mind-body interventions can be used to help mitigate those barriers. Finally, I will discuss the specific arms or aspects of yoga that will be used for these mind-body interventions.

2.2 Medical Intensive Care Unit at the University of Colorado Hospital

The University of Colorado Hospital (UCH) in Aurora, CO is home to multiple ICUs, including, Cardiothoracic Surgical ICU; Surgical ICU; Burn ICU; Neuro ICU; and the MICU. The MICU at UCH is a 24-bed unit that provides care for adults who are critically ill ("University of Colorado Hospital Authority Revenue and Refunding Revenue Bonds ", 2015). A wide range of disease and conditions are treated here with the majority related to: pulmonary disease; gastrointestinal complications; kidney complications; liver complications; multi-organ failure; sepsis; and drug overdose (Smith-Gabai, 2011). There are currently no data regarding the average length of stay for the MICU in the United States. However, according to the Society of Critical Care Medicine (2017), the average length of stay in any ICU is 3.8 days. Approximately 39% of patients in the ICU are mechanically ventilated (Wunsch et al., 2013). The mortality rate for patients in the ICU averages from 10% to 29%, although this varies depending on diagnosis. Multi-organ failure, renal failure, respiratory failure, and sepsis have the highest mortality rates in the ICU (Society of Critical Care Medicine, 2017). According to an occupational therapist at UCH approximately 50% of patients have orders for occupational therapy and have a prescribed

activity level of “activity as tolerated” in their standard admission orders (A. Hoffman, personal communication, February 25, 2016).

2.3 Role of Occupational Therapy in the Intensive Care Unit

Occupational therapy helps people throughout the lifespan acquire or reacquire the skills necessary to successfully engage in occupations that are found meaningful and essential to health and well-being (American Occupational Therapy Association, 2016). Occupations can be defined many ways, but here are defined as the everyday activities that people want to do, need to do, and are expected to do (World Federation of Occupational Therapy, 2011). Occupational therapy uses engagement in occupations as both a way to improve or restore function and as an outcome or goal. In the ICU, self-care tasks such as grooming, hygiene, toileting, and dressing, and mobility are the most common occupations utilized therapeutically and as outcomes.

Occupational therapy plays a critical role in the care of patients in the ICU. According to the American Occupational Therapy Association (AOTA) (2015), the primary goal for occupational therapy in the treatment of adults who are critically ill is to stabilize their medical status and address threats to life and loss of function. A few examples of skilled occupational therapy interventions in the ICU include: participation in self-care tasks; early mobilization; splinting; utilization of positioning devices; and education and training for post-surgical precautions (A. Affleck et al., 1986; American Occupational Therapy Association, 2015; Brummel, Girard, et al., 2014). Most evidence for patients in the ICU is focused on establishing the safety, feasibility, and benefits of early rehabilitation (Alvarez et al., 2017; Brummel, Girard, et al., 2014; Hodgson et al., 2014; Needham, 2008; C. S. Perme, Southard, Joyce, Noon, & Loebe, 2006; Pohlman et al., 2010; Schweickert et al., 2009). These authors discuss how early mobilization for patients in the ICU is safe, feasible, and helps to decrease ICU and hospital

length of stay. Additional benefits of early rehabilitation include decreased incidence of delirium and overall improvement of functional outcomes. Despite these few skilled interventions addressed by AOTA and the evidence regarding early mobilization and delirium, there is a lack of evidence regarding occupational therapy interventions that specifically address improving participation and performance in occupations in the ICU.

Barriers to Participating in Occupations in the Intensive Care Unit

Participation and performance in occupations are core themes and overarching goals of occupational therapy (Baum & Law, 1997). According to Baum & Law (1997) optimal occupational performance occurs when "...the person, the environment, and the person's occupation intersect to support the tasks, activities, and roles that define that person as an individual" (p. 281). Deficits in either person factors, environmental factors, or with the occupation can cause a disruption to occupational performance and participation, which has potential to further decrease quality of life, and health and well-being.

Patients in the ICU are confronted with life-threatening illness or injuries that inevitably lead to physical, psychological, and psychosocial stressors. Patients are therefore at risk for occupational deprivation, which is when people are not afforded equal opportunity to participate in desired occupations (Whiteford, 2010). This occupational deprivation is potentially due to a lack of opportunities for purposeful movements and activities, and thus occupations, while in the ICU (A. T. Affleck, S. Lieberman, J. Polon, & K. Rohrkemper, 1986; Brummel, Girard, et al., 2014). Some of the barriers contributing to this occupational deprivation include immobility and prolonged bed rest; sensory deprivation; sensory overload; prolonged mechanical ventilation; ICU-acquired weakness; agitation; stress; and delirium (A. T. Affleck et al., 1986; Brummel, Girard, et al., 2014; Brummel, Jackson, et al., 2014). Additionally, there are many machines,

devices, and sensors that are used to keep the patient alive, but can make the ICU a difficult environment that can impede activity and movement (Wenham & Pittard, 2009). Additional environmental stressors reported in the ICU are noise levels from hospital staff and the drone of the monitors; sleep disruption due to the continuation of background noise and perceived loss of control about the ability to control the noise; and social isolation. These stressors present barriers to occupational performance and participation, which is known to have a negative impact on health, and are important barriers to address (CITATION RE: OPP). One potential method to help mitigate these barriers and enhance participation and performance in occupations in the ICU is to incorporate mind-body interventions (add reference from conventional medicine).

2.4 Complementary and Integrative Health

Complementary and integrative health (CIH) approaches include a diverse group of practices that are used together with conventional medicine to enhance overall health and well-being, and manage and reduce stress (National Center for Complementary and Integrative Health, 2017). CIH is divided into two domains: mind-body interventions and natural products. This intervention focused only on mind-body interventions.

Mind-body Interventions

Mind-body interventions include a wide variety of techniques based on the foundation of connecting the mind, body, brain, and behavior to positively influence health (National Center for Complementary and Integrative Health, 2017). Examples of mind-body interventions include: yoga; Tai Chi; deep breathing; meditation; guided imagery; progressive muscle relaxation; as well as chiropractic or osteopathic manipulation. Approximately 30% of adults use alternative or complementary approaches to health care, and recently, there has been an increase in the use of CIH for people with chronic disability and physical dysfunction (Okoro, Zhao, Li,

& Balluz, 2012; Wells, Bertisch, Buettner, Phillips, & McCarthy, 2011). This study will be focusing primarily on yoga and relaxation techniques including breathwork, meditation, and physical postures.

Yoga and Perceived Benefits

Yoga originated from India approximately five thousand years ago with the intent of using set physical and mental practices to improve the connection between the mind, body, and spirit (Mailoo, 2005). In yogic philosophy there are eight arms, or components of yoga. This study will only be focusing on three: pranayama (breathing), dhyana (meditation), and asanas (physical postures).

Breathing Exercises

Pranayama refers to breathing exercises or breathwork. There are many different forms of breathing exercises that can range from prolonged inhalation, breath retention, and exhalation, to single or alternative nostril breathing (Mailoo, 2005; Woodyard, 2011). Breathwork has been shown to decrease anxiety, blood pressure, and heart rate, and improve vagal activity (vagal activity refers to the activity of the vagus nerve within the parasympathetic nervous system. The vagus nerve helps to slows the body's heart rate to keep it within normal limits) (Pavlov & Tracey, 2012). Mason et al. (2013) additionally showed that slow yogic breathing can improve oxygen saturation.

Meditation

Dhyana is meditation. According to the National Center for Complementary and Integrative Health (2017) "meditation is a mind-body practice that has a long history of use for increasing calmness and physical relaxation, improving psychological balance, coping with illness, and enhancing overall health and well-being" (p. 1). Meditation has been studied for

people with many different conditions and has been shown to decrease blood pressure; relieve pain; improve anxiety and depression; and affects activity in the amygdala in the brain, which controls emotion (Astin, Shapiro, Eisenberg, & Forys, 2003; National Center for Complementary and Alternative Medicine, 2007)

Postures

Asanas are physical postures. According to McCall (2007) “asanas constitute a systematic way to take the body through the entire range of motion” (p. 14). The postures can be executed sitting, standing, or lying down. Practicing physical postures can help improve muscle strength, flexibility, endurance, stability, and coordination (Akhtar, Yardi, & Akhtar, 2013). For this study, the majority of asanas were executed either sitting or lying down.

Additional Benefits of Breathing, Meditation, and Postures

Combinations of breathwork, meditation, and physical postures have been shown to improve lung function; calm the nervous system; improve cholesterol; improve joint health; and improve circulation of lymph fluid which is linked with immune functioning (McCall, 2007). Improvement in brain functions such as coordination, reaction time, memory, and decreases in the stress hormone, cortisol, have also been shown (Kirkwood, Rampes, Tuffrey, Richardson, & Pilkington, 2005).

Studies on the effects of breathwork, meditation, and physical postures have been conducted on many different populations and conditions (Akhtar et al., 2013; Raub, 2002; Ross & Thomas, 2010). Some include: osteoarthritis; traumatic brain injury; stroke; rheumatoid arthritis; pain; diabetes mellitus; cardiovascular and pulmonary conditions; HIV/AIDS; eating disorders; cancer; insomnia; pregnancy and maternal childbirth; schizophrenia; asthma; and cancer conditions (Akhtar et al., 2013; Raub, 2002; Ross & Thomas, 2010). However, to our

knowledge, there is currently no research regarding mind-body interventions for patients in the ICU who are critically ill.

Schmid et al. (2015) conducted a study to determine patient perceived perceptions of adding yoga to their current inpatient rehabilitation. The main findings were that patients identified improvements in breathing, which helped increase their participation in functional activities; were better able to manage their frustrations, stress, worry, anxiety, and pain; and believed it enhanced their overall recovery. This is the closest study that specifically addresses the addition of yoga to patients' occupational therapy in a hospital setting. Additional research by Affleck looks at the importance of addressing the stress response that typically occurs in patients in the ICU, but no specific interventions were formally studied (Affleck et al., 1984; A. Affleck et al., 1986). Common stress reduction techniques such as breathing; imagination; autogenic training; progressive relaxation; listening to relaxation music; and mediation were given as potential interventions for occupational therapy to use in the ICU.

Despite the large abundance of studies that show positive effects on health and well-being through yoga or other mind-body techniques, there is little evidence on the effects of incorporating these techniques as therapy for patients in the ICU who are critically ill. Mind-body interventions might be a tool for occupational therapists to use to help improve patient's physical and psychological health leading to increased performance and participation in occupations while in the ICU.

2.5 Yoga and Occupational Therapy

According to the AOTA, the goal of occupational therapy is to help individuals across the lifespan participate in the activities they want and need to do (American Occupational Therapy Association, 2016). There is a gap in evidence of how to address the many barriers present for

patients in the ICU who experience occupational deprivation and lack opportunities to participate in purposeful movements and activities through occupations. We believe mind-body interventions may provide benefits such as: reduced stress and anxiety; increased oxygen saturation; enhanced breathing; and decreased blood pressure. These physiological benefits of mind-body interventions may translate to improved cognitive functioning; enhanced mobility, thus less time spent in bed; decreased stress and anxiety; and overall, improved ability to participate and perform desired occupations while in the ICU. Given the novel nature of this intervention, we want to explore the addition of mind-body interventions to occupational therapy in the MICU.

CHAPTER 3: METHODOLOGY

3.1 Research Design

The initial intention of the study was to recruit 30 participants. However, in a five-month recruitment period, only one patient met all inclusion criteria. Therefore, a case study was completed. The case includes one patient seen by an occupational therapist in the MICU. Approval was obtained from the Colorado Multiple Instructional Review (COMIRB) board and the Colorado State University Institutional Review Board.

3.2 Recruitment

Patients were eligible for this study if they met the following inclusion criteria: admission to the MICU; English speaking; ≥ 18 years old; physician referral for occupational therapy; and able to make decisions and provide consent [determined by a Medical Doctor (MD)]. Patients were excluded for the following reasons: pregnant women; younger than 18 years old; prisoners; individuals determined by the MD to lack decision-making capacity (i.e.- use of a proxy is consenting for medical and surgical procedures); and ventilator settings > 10 Positive End-Expiratory Pressure (PEEP), and fraction of inspired oxygen (FiO_2) $> 60\%$. PEEP is the pressure in the airway at the end of expiration that exceeds atmospheric pressure (Smith-Gabai, 2011). PEEP is applied through modes of mechanical ventilation and allows the lungs to have a constant positive airway pressure to prevent alveolar from collapsing. Patients were screened for eligibility for five months; however, only one patient met all inclusion criteria. Approximately 99% of patients in the MICU were excluded secondary to impaired cognition and thus required a proxy for consenting, or for high ventilator settings ($\text{PEEP} > 10$; $\text{FiO}_2 > 60\%$).

3.3 Outcome Measures

Data were collected by an occupational therapist. Demographic data collected included age, gender, and education level. Responses to the mind-body sessions were assessed via the patient's physiological and mental responses. Variables measuring physiological response included heart rate, blood pressure, oxygen saturation, and respiratory rate. Variables measuring mental status response included administration of the Richmond Agitation - Sedation Scale (RASS) and the Mental Status Examination (MSE), both completed by the occupational therapist. All variables were measured before, during, and after the mind-body sessions. Percent change ($T1-T2/T1 \times 100$) was calculated for each variable measuring the physiological response. The mind-body session was ceased if the patient became medically and/or neurological unstable at any point in the treatment session, as is standard for occupational therapy practice in the MICU. The session was stopped if the patient experienced marked ventilator dysynchrony; new arrhythmias (abnormal heart rate); patient distress; myocardial ischemia; loss of airway device integrity; or endotracheal tube removal (Pohlman et al., 2010). Ventilator dysynchrony occurs when there is a mismatch between the patients' breathing and the timing of the mechanical ventilator, leading to the patients' respiratory demands not getting met (Mellott, Grap, Munro, Sessler, & Wetzel, 2009). The patient could ask to stop the intervention at their discretion. Physiological and mental status variables were collected as discussed below. The criteria for medical and/or neurological instability used to stop the intervention, are included for each.

Physiological Variables

Heart rate, or the number of time the heart beats in one minute, was continuously measured by a pulse oximeter placed either on the patient's finger or toe (Elliott & Coventry,

2012). Normal heart rate in an adult population is between 60 and 100 beats/min. Criteria for medical and/or neurological instability is a heart rate < 40 or > 130 beats/min.

Blood pressure was recorded using mean arterial pressure (MAP). MAP is derived from the patient's systolic and diastolic blood pressures (Brzezinski, 1990). It is an average measure of blood pressure over several heartbeats, and is therefore considered a more comprehensive measurement of blood flow compared to a single measure of blood pressure. The location of the blood pressure cuff was directly over the patient's brachial artery of the right or left upper arm. The target MAP for an adult population is between 70 and 105 mmHg. Criteria for medical and/or neurological instability is a MAP < 65 mmHg.

Oxygen saturation is the amount of oxygen that is circulating in the blood (Elliott & Coventry, 2012). This is determined based on the percentage of oxygen in the blood compared to its maximum carrying capacity. Oxygen saturation was continuously measured using a pulse oximeter that is on the patient's finger or toe. Normal oxygen saturation values are between 95% and 100%. Criteria for medical and/or neurological instability is an oxygen saturation $< 88\%$.

Respiratory rate, or the number of breaths per minute, is measured by inspiratory expansion and expiratory contraction of the chest cage (Braun, 1990). The occupational therapist manually measured respiratory rate for increased accuracy, as opposed to using the reading from the monitor. The occupational therapist manually counted and recorded the number of breaths the patient took in one minute. Normal respiratory rate is between 10 and 20 breaths/min. Criteria for medical and/or neurological instability is a respiratory rate < 5 or > 40 breaths/min.

Mental Status Variables

The RASS is a 10-point scale used to measure agitation, sedation, and level of alertness in the ICU. The scoring scale ranges from +4, combative, to -5, unarousable. Levels +1 to +4

denotes the extent of agitation or anxiety, level 0 denotes a calm and alert stage, and levels -1 to -5 denotes the extent of sedation. The RASS was administered via direct observation of the patient. RASS has been shown to have reliability and validity for the adult ICU population (Sessler et al., 2002). Criteria for medical and/or neurological instability is a RASS score of $\geq +3$ (very agitated) or -4 or -5 (deep sedation, unarousable).

Mental status was also assessed using the MSE. The purpose of the MSE is to describe the patient's psychological functioning via direct patient observation (Work Group on Psychiatric & American Psychiatric Association Steering Committee on Practice, 2006). We focused on two domains, including mood and affect, and thought content. Mood is the patients' internal, temporary state of mind or feelings; while affect is the patients' observable emotions or desires. The occupational therapist observed for and recorded appropriateness of affect, range of affect, stability of affect, and intensity of affect. The patient's attitude towards the occupational therapy encounter, specific moods or feeling observed or reported, and level of anxiety were also assessed. Thought content is the patient's current thoughts, including worries, concerns, and impulses. The occupational therapist observed for outward expressions of anxiety, which was documented as low, moderate, or high.

3.4 Intervention

During her stay at the MICU, the patient completed two mind-body sessions that were embedded into her scheduled occupational therapy. An occupational therapist, with nine and a half years of experience as an occupational therapist and three and a half years as a registered yoga teacher, administered the mind-body sessions. Each mind-body session utilized a patient-directed, semi-structured format that was approximately 15 minutes in length, out of the full 30-minute occupational therapy session.

The mind-body sessions involved components of: breathwork; postural alignment; meditation; imagery; and relaxation techniques. At the beginning of the mind-body session, the occupational therapist attempted to minimize distractions and interruptions by discussing the plan with the registered nurse, and hanging a sign on the door stating: *Relaxation in Session. Do not Disturb. See the registered nurse with questions.* The occupational therapist focused on the patient's positioning for alignment and comfort. The patient was lying supine in bed with the head of bed elevated 30-45 degrees for the duration of both sessions. Additional options for positioning could include sitting down, seated at the edge of the bed, or in the bedside chair. The position was dependent on the patient's needs and preference; however, the patient would only be asked to mobilize to the level (bed, edge of bed, or chair) to which they were able to successfully do with minimal to moderate assistance.

There were eight potential mind-body techniques that could be utilized and were chosen based on the patient's needs, abilities and preference (see Table 1 for description of each mind-body technique). These mind-body techniques could be used in isolation or combined with a functional task (occupation) such as bed mobility, functional mobility, or transfer training. If combined with bed mobility and functional mobility, or transfer training the occupational therapist would focus on cueing breath, body awareness, proprioception, and purposeful movements.

The occupational therapist described these mind-body techniques to the patient and allowed her to choose which techniques to use. In session one, the patient chose Gratitude/Resourcing, Mindful Check-In/Body Scanning, and Scanning the Environment. In session two, she chose Gratitude/Resourcing, Three Part Breath, and Mindful Check-In/Body Scanning.

Table 3.1: Description of Specific Mind-Body Techniques

Mind-Body Technique	Description of Techniques
1. Three Part Breath	Deep and calming breaths with attention to sensation of the breath moving in and out of the abdomen, rib cage, and upper chest (in this order).
2. Progressive Muscle Relaxation (PMR)	A systematic procedure of tensing and relaxing of muscle groups combined with structured breathing.
3. Gentle movement/stretching with breath	This is similar to PMR, but sequence and focus will be based on specific patient needs.
4. Sensing Well-being	Attention that is brought to the body and bodily sensations with a focus towards what feels pleasant or neutral.
5. Gratitude/Resourcing	Mental effort is encouraged to focus on identifying something or someone that brings a sense of joy or gratitude, well-being, or security.
6. Self-Compassion	Adoption of an attitude of gentleness and care towards oneself.
7. Mindful Check-In/ Body Scanning	Bringing awareness to one's internal self and noticing what areas are seeking one's attention with encouragement to do so with a sense of curiosity and non-judgment. This could be guided or the person could perform this more freely.
8. Scanning the Environment	Using all the senses a person is encouraged to notice five things in their environment.

CHAPTER 4: MANUSCRIPT

4.1 Introduction

The intensive care unit (ICU) presents a challenging environment within the health care arena. The ICU provides care for adults who are critically ill and medically complex. According to the Society of Critical Care Medicine (2017), the average length of stay in any ICU is 3.8 days. Approximately 39% of patients in the ICU are mechanically ventilated (Wunsch et al., 2013). The mortality rate for patients in the ICU averages from 10% to 29%, although this varies depending by diagnosis. Multi-organ failure, renal failure, respiratory failure, and sepsis have the highest mortality rates in the ICU (Society of Critical Care Medicine, 2017). There are many different types of ICUs, some include: Surgical ICU; Cardiovascular ICU; Cardiothoracic ICU; Neurological ICU; Burn ICU; and medical ICU (MICU) (University of Colorado Health, 2017). This study took place in the MICU. The MICU differs from other ICUs in medical conditions and diseases treated. The majority of the medical conditions and diseases treated in the MICU include: pulmonary disease; gastrointestinal complications; kidney complications; liver complications; multi-organ failure; sepsis; and drug overdose (Smith-Gabai, 2011).

Patients in the ICU are confronted with life-threatening illness or injuries that inevitably lead to physical, psychological, and psychosocial stressors. Patients are at risk for occupational deprivation, which is when people are not afforded equal opportunity to participate in desired occupations (Whiteford, 2010). This occupational deprivation is potentially due to a lack of opportunities for purposeful movements and activities, and thus occupations, while in the ICU (A. T. Affleck, S. Lieberman, J. Polon, & K. Rohrkemper, 1986; Brummel, Girard, et al., 2014). Some of the barriers contributing to this occupational deprivation include immobility and

prolonged bed rest; sensory deprivation; sensory overload; prolonged mechanical ventilation; ICU-acquired weakness; agitation; stress; and delirium (A. T. Affleck et al., 1986; Brummel, Girard, et al., 2014; Brummel, Jackson, et al., 2014). Additionally, there are many machines, devices, and sensors that are used to keep the patient alive, but can make the ICU a difficult environment that can impede activity and movement (Wenham & Pittard, 2009). Additional environmental stressors reported in the ICU are noise levels from hospital staff and the drone of the monitors; sleep disruption due to the continuation of background noise and perceived loss of control about the ability to control the noise; and social isolation. These stressors present barriers to occupational performance and participation, which is known to have a negative impact on health, and are important barriers to address (CITATION RE: OPP). One potential method to help mitigate these barriers and enhance participation and performance in occupations in the ICU is to incorporate mind-body interventions.

Occupations are defined many ways, but here are defined as the everyday activities that people want and need to do (World Federation of Occupational Therapy, 2011). In the ICU, occupations likely include self-care tasks such as grooming, hygiene, toileting, dressing, and mobility. These occupations are often the focus of ICU-based occupational therapy.

Occupational therapy plays a critical role in the care of patients in the ICU. According to the American Occupational Therapy Association (AOTA) (2015), the primary goal for occupational therapy in the treatment of adults who are critically ill is to stabilize their medical status and address threats to life and loss of function. Examples of skilled interventions for occupational in the ICU include participation in self-care tasks; early mobilization; utilization of positioning devices; splinting; and education and training for post-surgical precautions (A. Affleck et al., 1986; American Occupational Therapy Association, 2015; Brummel, Girard, et al., 2014).

In the last decade, there has been an influx of literature regarding early rehabilitation, focused on establishing the efficacy of early mobilization and delirium management for patients in the ICU (Alvarez et al., 2017; Brummel, Girard, et al., 2014; Hodgson et al., 2014; Needham, 2008; C. S. Perme et al., 2006; Pohlman et al., 2010; Schweickert et al., 2009). This literature has demonstrated that early mobilization for patients in the ICU is safe, feasible, and has the potential to improve short and long term physical and psychological outcomes. Regarding the literature about delirium, Alvarez et al. (2017) demonstrated reduced incidence of delirium in the ICU secondary to early rehabilitation provided by occupational therapy. Despite this recent emphasis on rehabilitation for patients who are critically ill in the ICU, there is still a lack of evidence regarding occupational therapy interventions that specifically address participation and performance in occupations in the ICU. Additionally, there is a dearth of information regarding the effect of patient stress and anxiety while in the ICU on participation and performance in desired occupations. Mind-body interventions may be a potential modality for use by occupational therapists to enhance participation and performance in occupations in the ICU.

Complementary and integrative health (CIH) approaches, such as mind-body interventions, have recently gained popularity among the Western culture to manage and reduce stress, and improve overall health and well-being (Okoro et al., 2012; Wells et al., 2011). Approximately 30% of adults use alternative or complementary approaches to health care, and recently, there has been an increase in the use of CIH for people with chronic disability and physical dysfunction (Okoro et al., 2012; Wells et al., 2011). Additionally, Hardison & Roll (2016) state CIH is “...frequently used in health care to assist patients in managing pain, stress, and anxiety; and in targeting additional health, wellness, and quality of life outcomes” (p. 1).

CIH is divided into two domains: mind-body interventions and natural products. Our intervention focused only on mind-body interventions. According to the National Institute of Health (2016), “mind-body medicine focuses on the interactions among the brain, mind, body, and behavior and on the powerful ways in which emotional, mental, social, spiritual, and behavioral factors can directly affect health” (p. 1). Mind-body interventions bring together complementary approaches to health and well-being in a coordinated way, in that they are used together with conventional medicine (National Center for Complementary and Integrative Health, 2017).

The mind and body are irrefutably linked, and according to the National Center for Complementary and Alternative Medicine (2007), “mechanisms may exist by which the brain and central nervous system influence immune, endocrine, and autonomic functioning, which is known to have an impact on health” (p. 5) (Astin et al., 2003; Mehta, 2011; National Center for Complementary and Alternative Medicine, 2007). With injury or illness there is likely a disconnect between the mind and the body (Emerson & Hopper, 2011). This disconnect is presumably present for patients in the ICU, due to the extent of their illness or injuries.

This study focuses primarily on yoga and relaxation techniques including breathwork, meditation, and postures. There is significant evidence that mind-body interventions have positive effects on psychological functioning and quality of life in adults with and without disability. Studies on the effects of breathwork, meditation, and physical postures have been conducted with many different populations and conditions (Akhtar et al., 2013; Raub, 2002; Ross & Thomas, 2010; Wahbeh et al., 2008). Breathwork have been shown to improve anxiety; blood pressure; vagal activity; oxygen saturation; and heart rate (Mason et al., 2013). Meditation has been shown to decrease blood pressure; relieve pain; improve anxiety and depression; and can

affect activity in the amygdala in the brain, which controls emotion (National Center for Complementary and Integrative Health, 2016). Practicing physical postures can improve muscle strength, flexibility, endurance, stability, and coordination (Akhtar et al., 2013).

According to the AOTA, the goal of occupational therapy is to help individuals across the lifespan participate in the activities they want and need to do (American Occupational Therapy Association, 2016). There is a gap in evidence of how to address the many barriers present for patients in the ICU who experience occupational deprivation and lack opportunities to participate in purposeful movements and activities through occupations. We believe mind-body interventions may provide benefits such as: reduced stress and anxiety; increased oxygen saturation; enhanced breathing; and decreased blood pressure. These physiological benefits of mind-body interventions may translate to improved cognitive functioning; enhanced mobility, thus less time spent in bed; decreased stress and anxiety; and overall, improved ability to participate and perform desired occupations while in the ICU.

Mailoo (2005) stated that yogic philosophy and occupational therapy share similar views, and with further research, yoga may be a feasible tool for occupational therapists to incorporate into modern practice. Occupational therapists are specifically trained to consider the whole person and select interventions to create and restore health, as well as prevent physical and cognitive disability. For occupational therapists to holistically treat the whole person, it may be beneficial to add a mind-body intervention to the MICU occupational therapy intervention. Given the novel nature of this intervention for this specific population, the objective of this case study is to explore the use of mind-body interventions, delivered by an occupational therapist in a MICU.

4.2 Methods

Design

The initial intention of the study was to recruit 30 participants. However, in a five-month recruitment period, only one patient met all inclusion criteria. Therefore, a case study was completed. The case study includes one patient seen by an occupational therapist in the MICU. Approval was obtained from the Colorado Multiple Instructional Review (COMIRB) board and the Colorado State University Institutional Review Board.

Recruitment

Patients were eligible for this study if they met the following inclusion criteria: admission to the MICU; English speaking; ≥ 18 years old; physician referral for occupational therapy; and able to make decisions and provide consent [determined by a Medical Doctor (MD)]. Patients were excluded for the following reasons: pregnancy; younger than 18 years old; prisoners; individuals determined by the MD to lack decision-making capacity (i.e.- use of a proxy is consenting for medical and surgical procedures); and ventilator settings > 10 Positive End-Expiratory Pressure (PEEP), and fraction of inspired oxygen (FiO_2) $> 60\%$. PEEP is the pressure in the airway at the end of expiration that exceeds atmospheric pressure (Smith-Gabai, 2011). PEEP is applied through modes of mechanical ventilation and allows the lungs to have a constant positive airway pressure to prevent alveolar from collapsing. Patients were screened for eligibility; however, only one patient met all inclusion criteria. Approximately 99% of patients in the MICU were excluded secondary to impaired cognition and thus required a proxy for consenting, or for high ventilator settings (PEEP > 10 ; $\text{FiO}_2 > 60\%$).

Occupational Profile of Patient in the Case Study

The patient included in this case study was a 57-year-old female who was admitted to the MICU secondary to abdominal pain. Upon being in the MICU, the patient was diagnosed with septic shock, which occurs when sepsis (infection) leads to dangerously low blood pressures (Singer et al., 2016); acute kidney injury; worsening weakness and numbness of the lower extremities; diarrhea; decreased urine output; and skin lesions. The patient has a history of: alcohol and tobacco abuse; depression, with a suicide attempt in 2012; anxiety and panic attacks; incontinence; hepatitis, potentially caused by alcoholism; and seizures due to alcohol withdrawal. Prior to admission the patient reported living with a significant other, who is a severe alcoholic. The patient reported being bedbound for the previous six months, and unable to walk for the last month because of weakness and numbness in lower extremities. Prior to this, the patient was using a walker for mobility. She required assistance from her significant other for all activities of daily living (ADLs) and instrumental activities of daily living. She reported performing all ADLs and with assistance at home at the bedside. The patient's highest level of education was high school.

Upon the initial examination by the occupational therapist the patient was alert and oriented to person, place, and time. The patient's mood, affect, insight, and judgement were intact. The patient demonstrated limited mobility secondary to abdominal discomfort. The patient tolerated the hospital bed in chair mode (head of bed elevated between 45-90 degrees; foot of bed lowered between 45-90 degrees); but experienced a bout of emesis, due to constant coughing. The patient reported generalized anxiety, and requested interventions to help control her anxiety, since this hospitalization exacerbated her symptoms. The patient discussed that she had infrequently practiced meditation to help manage her anxiety and panic attacks.

Outcome Measures

Data were collected by the occupational therapist. Demographic data collected included age, gender, and education level. Responses to the mind-body sessions were assessed via the patient's physiological and mental responses. Variables measuring physiological response included heart rate, blood pressure, oxygen saturation, and respiratory rate. Variables measuring mental status response included administration of the Richmond Agitation - Sedation Scale (RASS) and the Mental Status Examination (MSE), both completed by the occupational therapist. All variables were measured before, during, and after the mind-body sessions. Percent change ($T1-T2/T1 \times 100$) was calculated for each variable measuring the physiological response. The mind-body session was ceased if the patient became medically and/or neurological unstable at any point in the treatment session, as is standard for occupational therapy practice in the MICU. The session would be stopped if the patient experienced marked ventilator dysynchrony; new arrhythmias (abnormal heart rate); patient distress; myocardial ischemia (reduced blood flow to heart); loss of airway device integrity; or endotracheal tube removal (Pohlman et al., 2010). Ventilator dysynchrony occurs when there is a mismatch between the patients' breathing and the timing of the mechanical ventilator, leading to the patients' respiratory demands being unmet (Mellott et al., 2009). The patient could ask to stop the intervention at her discretion. Physiological and mental status variables were collected as discussed below. The criteria for medical and/or neurological instability used to stop the intervention are included for each.

Physiological Variables

Heart rate, or the number of time the heart beats in one minute, was continuously measured by a pulse oximeter placed either on the patient's finger or toe (Elliott & Coventry,

2012). Normal heart rate in an adult population is between 60 and 100 beats/min. Criteria for medical and/or neurological instability is a heart rate < 40 or > 130 beats/min.

Blood pressure was recorded using mean arterial pressure (MAP). MAP is derived from the patient's systolic and diastolic blood pressures (Brzezinski, 1990). It is an average measure of blood pressure over several heartbeats, and is therefore considered a more comprehensive measurement of blood flow compared to a single measure of blood pressure. The location of the blood pressure cuff was directly over the patient's brachial artery of the right or left upper arm. The target MAP for an adult population is between 70 and 105 mmHg. Criteria for medical and/or neurological instability is a MAP < 65 mmHg.

Oxygen saturation is the amount of oxygen that is circulating in the blood (Elliott & Coventry, 2012). This is determined based on the percentage of oxygen in the blood compared to its maximum carrying capacity. Oxygen saturation was continuously measured using a pulse oximeter placed on patient's finger or toe. Normal oxygen saturation values are between 95% and 100%. Criteria for medical and/or neurological instability is an oxygen saturation $< 88\%$.

Respiratory rate, or the number of breaths per minute, is measured by inspiratory expansion and expiratory contraction of the chest cage (Braun, 1990). The occupational therapist manually measured respiratory rate for increased accuracy, as opposed to using the reading from the monitor. The occupational therapist manually counted and recorded the number of breaths the patient took in one minute. Normal respiratory rate is between 10 and 20 breaths/min. Criteria for medical and/or neurological instability is a respiratory rate < 5 or > 40 breaths/min.

Mental Status Variables

The RASS is a 10-point scale used to measure agitation, sedation, and level of alertness in the ICU. The scoring scale ranges from +4, combative, to -5, unarousable. Levels +1 to +4

denotes the extent of agitation or anxiety, level 0 denotes a calm and alert stage, and levels -1 to -5 denotes the extent of sedation. The RASS was administered via direct observation of the patient. RASS has been shown to have strong reliability and validity for the adult ICU population (Sessler et al., 2002). Criteria for medical and/or neurological instability is a RASS score of $\geq +3$ (very agitated) or -4 or -5 (deep sedation, unarousable).

Mental status was also assessed using the MSE. The purpose of the MSE is to describe the patient's psychological functioning via direct patient observation (Work Group on Psychiatric & American Psychiatric Association Steering Committee on Practice, 2006). We focused on two out of 11 domains, including mood and affect and thought content. The other domains in the MSE are appearance; attitude; behavior; speech; thought process; perceptions; cognition; insight; and judgement. Mood is the patient's internal, temporary state of mind or feelings, while affect is the patient's observable emotions or desires. The occupational therapist observed for and recorded appropriateness of affect, range of affect, stability of affect, and intensity of affect. The patient's attitude towards the occupational therapy encounter, specific moods or feeling observed or reported, and level of anxiety were also assessed. Thought content is the patient's current thoughts, including worries, concerns, and impulses. The occupational therapist observed for outward expressions of anxiety, which was documented as low, moderate, or high.

Intervention

During her stay at the MICU, the patient completed two mind-body sessions that were embedded into her scheduled occupational therapy. An occupational therapist, with 9.5 years of experience as an occupational therapist and 3.5 years as a registered yoga teacher, administered the mind-body sessions. Each mind-body session utilized a patient-directed, semi-structured

format that was approximately 15 minutes in length, out of the full 30-minute occupational therapy session.

The mind-body sessions involved components of: breathwork, postural alignment, and meditation. At the beginning of the mind-body session, the occupational therapist attempted to minimize distractions and interruptions by discussing the plan with the registered nurse, and hanging a sign on the door stating: *Relaxation in Session. Do not Disturb. See the registered nurse with questions.* The occupational therapist focused on the patient's positioning for alignment and comfort. The patient was lying supine in bed with the head of bed elevated 30-45 degrees for the duration of both sessions. Additional options for positioning could include sitting down, seated at the edge of the bed, or in the bedside chair. The position was dependent on the patient's needs and preference; however, the patient would only be asked to mobilize to the level (bed, edge of bed, or chair) to which she was able to successfully do with minimal to moderate assistance.

There were eight potential mind-body techniques that could be utilized and were chosen based on the patient's needs, abilities, and preference (see Table 1 for description of each mind-body technique). Techniques focused on breathwork included: three-part breath; progressive muscle relaxation (PMR); and gentle movements/stretching with breath. Techniques focused on postural alignment included PMR, and gentle movements/stretching with breath. Techniques focused on meditation included: sensing well-being; self-compassion; mindful check-in and body scanning; gratitude/resourcing; and scanning the environment. These mind-body techniques could be used in isolation or combined with a functional task (occupation) such as bed mobility, functional mobility, or transfer training. If combined with bed mobility and functional mobility,

or transfer training the occupational therapist would focus on cueing breath, body awareness, proprioception, and purposeful movements.

The occupational therapist described these mind-body techniques to the patient and allowed her to choose which techniques to use. In session one, the patient chose Gratitude/Resourcing, Mindful Check-In/Body Scanning, and Scanning the Environment. In session two, the patient chose Gratitude/Resourcing, Three Part Breath, and Mindful Check-In/Body Scanning.

Table 4.1: Description of Specific Mind-Body Techniques

Mind-Body Technique	Description of Techniques
1. Three Part Breath	Deep and calming breaths with attention to sensation of the breath moving in and out of the abdomen, rib cage, and upper chest (in this order).
2. Progressive Muscle Relaxation (PMR)	A systematic procedure of tensing and relaxing of muscle groups combined with structured breathing.
3. Gentle movement/stretching with breath	This is similar to PMR, but sequence and focus will be based on specific patient needs.
4. Sensing Well-being	Attention that is brought to the body and bodily sensations with a focus towards what feels pleasant or neutral.
5. Gratitude/Resourcing	Mental effort is encouraged to focus on identifying something or someone that brings a sense of joy or gratitude, well-being, or security.
6. Self-Compassion	Adoption of an attitude of gentleness and care towards oneself.
7. Mindful Check-In/ Body Scanning	Bringing awareness to one's internal self and noticing what areas are seeking one's attention with encouragement to do so with a sense of curiosity and non-judgment. This could be guided or the person could perform this more freely.
8. Scanning the Environment	Using all the senses a person is encouraged to notice five things in their environment.

Note: *PRM = progressive muscle relaxation

4.3 Results

Tables 2 and 3 summarize the data of the two mind-body sessions completed with the patient. The patient was within normal ranges for all physiological and mental status variables

during both mind-body sessions. There were no adverse events during either of the mind-body sessions, and the intervention did not have to be stopped. The patient's resting physiological variables were collected prior to the mind-body sessions and included: blood pressure: 77/45 mmHg, which equates to a MAP of approximately 55.7 mmHg; respiratory rate: 31 breaths/minute; oxygen saturation: 96%; and heart rate: 80 beats/minute.

Regarding the physiological response during both mind-body sessions, the patient's heart rate, blood pressure, oxygen saturation, and respiratory rate remained relatively stable. Of note, in session one, the patient's respiratory rate decreased from 26 breaths/min to 20 breaths/min (23.1% change), and in session two decreased from 23 breaths/min to 17 breaths/min (26.1% change). The patient's blood pressure in session one increased from 72 to 77 mmHg (6.9% change). A MAP of 77 mmHg is still within normal limits. Secondary to the patient's medical condition, and per physician order, the patient's MAP goal was above 55 mmHg. Therefore, her MAP of 63 mmHg at the completion of the second mind-body session was not considered a contraindication. Additionally, in session two, the patient's heart rate changed from 91 beats/min to 88 beats/min (3.3% change). These results indicate the patient was within safe physiological parameters for the duration of both mind-body sessions.

Regarding the mental status response, the patient scored a 0 on the RASS before and after the mind-body intervention for both sessions. This indicates a calm and alert stage was maintained throughout the mind-body sessions. In the beginning of session 1, the patient's affect was considered attentive; stable, or not likely to change; and even, or having little variation in quality. In the beginning of session 1, the patient was welcoming and interactive with the occupational therapist. She demonstrated moderate anxiety, related to her frequent coughing, and her MICU stay. At the completion of session 1, the patient was appreciative and eager for

another mind-body session. Her anxiety about coughing had subsided, and she reported feeling hopeful for her recovery. In session 2, the patient was welcoming, and upon entrance of the occupational therapist, the patient stated, “*oh here’s my motivational therapist!*” The patient’s affect was initially calm or peaceful, yet talkative. The patient reported feeling content, but was observed to be tangential with her thoughts. She demonstrated low anxiety throughout this entire mind-body session. At the completion of session 2, the patient’s affect was even, or having little variation, and relaxed. She reported being appreciative for being guided through these mind-body sessions. Lastly, the patient was observed to be asleep after this second session.

Table 4.2: Physiological Variables from Sessions 1 and 2

	Before	After	% Change
Session 1			
Time	13:25	13:46	
Heart Rate (beats/min)	78	79	1.3%
Blood Pressure (MAP) (mmHg)	72	77	6.9%
Oxygen Saturation (%)	98	99	1.0%
Respiratory Rate (breaths/min)	26	20	23.1%
Session 2			
Time	13:45	14:05	
Heart Rate (beats/min)	91	88	3.3%
Blood Pressure (MAP) (mmHg)	65	63	3.1%
Oxygen Saturation (%)	99	97	2.0%
Respiratory Rate (breaths/min)	23	17	26.1%

Note: *MAP = mean arterial pressure, mmHg = millimeter of mercury.

Table 4.3: Mental Status Variables from Sessions 1 and 2

	Before	After
Session 1		
RASS	0	0
Affect (appropriateness, range, stability, intensity)	Attentive, stable, even	Attentive, stable, even
Attitude towards occupational therapist during encounter	Welcoming, interactive	Appreciative, eager for next session
Specific mood or feelings observed or reported	Anxious about coughing	Hopeful

Anxiety level	Moderate	Low
Session 2		
RASS	0	0
Affect (appropriateness, range, stability, intensity)	Calm, talkative	Even, relaxed
Attitude towards occupational therapist during encounter	Welcoming	Appreciative
Specific mood or feelings observed or reported	Calm, content, tangential	Relaxed, asleep
Anxiety level	Low	Low

*Note: * RASS = Richmond-Agitation and Sedation Scale*

4.4 Discussion

The purpose of this case study was to explore the use of mind-body interventions delivered by an occupational therapist to a patient in a MICU. Overall, the patient in our case study was within normal ranges for all physiological and mental status variables. Therefore, this study demonstrates that it is feasible for an occupational therapist with proper training and credential to elicit mind-body interventions in this setting, with this patient. Additionally, the results demonstrated that mind-body interventions may potentially be used to help reduce stress and anxiety, both frequently experienced by patients in the ICU.

There is little literature regarding occupational therapy interventions in the ICU, including the use of CIH approaches. There is however, a plethora of research documenting the perceived benefits of using CIH approaches to improve health and well-being in other settings and populations. For example, CIH approaches have been successfully used with people with: osteoarthritis; traumatic brain injury; stroke; rheumatoid arthritis; pain; diabetes mellitus; cardiovascular and pulmonary conditions; state anxiety; HIV/AIDS; eating disorders; insomnia; pregnancy and maternal childbirth; schizophrenia; asthma; and cancer (Akhtar et al., 2013; Chugh-Gupta, Baldassarre, & Vrkljan, 2013; Raub, 2002; Ross & Thomas, 2010; Schmid et al., 2015; Wahbeh et al., 2008). The settings for these studies were predominately in outpatient and

inpatient settings of hospital, but none were in the ICU. Additionally, only two studies included the use of occupational therapist (Chugh-Gupta et al., 2013; Schmid et al., 2015). Our research addresses two gaps in the literature, lack of evidence-based interventions for occupational therapy in the ICU, and the use of CIH approaches for patients who are critically ill in the ICU.

Hardison & Roll (2017) recently conducted a scoping review about mindfulness interventions in physical rehabilitation and the implications for use among occupational therapists. Mindfulness interventions are a type of mind-body interventions. The authors stated that mindfulness interventions in physical rehabilitation are primarily used for patients with traumatic brain injuries and chronic pain; however, further research is needed to determine the effectiveness among a wider variety of conditions within the realm of physical rehabilitation. Hardison & Roll concluded that mindfulness interventions have yet to be substantiated by evidence for use among occupational therapists. Our case study included mindfulness techniques in the MICU and was delivered by an occupational therapist. While this case study was only studied with one individual, the patient in our case study was able to successfully complete the intervention during the occupational therapy treatment time. Such treatment interventions allow the occupational therapist to holistically treat the individual, by focusing on her physical, mental, and emotional needs; which are foundational aspect of occupational therapy.

Previous literature by Schmid et al. (2015) looked at adding yoga, a mind-body intervention, into inpatient rehabilitation two times per week in addition to regular therapy. Schmid et al. demonstrated patient perceived improvements in breathing; management of frustrations; stress; worry; anxiety; and pain. Additionally, participants believed yoga helped to enhance overall recovery (Schmid et al., 2015). Schmid et al.'s study is the first study, to our knowledge, that has directly studied the addition of yoga into occupational therapy in a hospital

setting. Additionally, Chugh-Gupta, Baldassarre, & Vrkljan (2013) conducted a systematic review regarding the use of yoga to reduce anxiety in adult populations with varying diagnoses and conditions. The authors specifically discussed occupational therapy's unique ability to conduct such interventions given occupational therapy's holistic focus on the mind and body, and the connection to engagement in meaningful occupations (Chugh-Gupta et al., 2013). Chugh-Gupta, Baldassarre, & Vrkljan concluded that yoga is a feasible tool for occupational therapists to use to address anxiety. The patient in our case study demonstrated similar benefits as these two studies. She had improvements in breathing (reduced respiratory rate), reduced anxiety level, and was eager for additional mind-body sessions after the first.

AOTA (2017) recently published a position paper regarding CIH approaches and its use among occupational therapists. AOTA believes CIH approaches align well with occupational therapy's scope of practice and can be used as preparatory methods and tasks, or occupations and activities to increase engagement in meaningful occupations to improve health and well-being (American Occupational Therapy Association, 2017). Mind-body interventions could potentially be used as a preparatory method to help reduce patients' anxiety and stress, to increase engagement in occupational therapy. Therefore, mind-body interventions conducted by occupational therapists may help to improve patient's ability to participate and engage in occupations while in the ICU, helping to improve health. As is standard for occupational therapy practice, important ethical considerations mentioned by AOTA (2017) are that occupational therapists using CIH should uphold ethical standards regarding continued competence and standards of practice. Occupational therapists hold an ethical responsibility to ensure they have the proper training, credentials, and knowledge to incorporate CIH techniques into occupational

therapy practice. Occupational therapists also hold responsibility in staying abreast regarding knowledge about CIH approaches and application of findings into practice (AOTA, 2017).

Finally, there has recently been an increase in the prevalence of psychological distress and acute cognitive impairments, known as post-intensive care syndrome (PICS), for patients who have survived critical illness (Parker et al., 2013). Approximately 24-28% of survivors of critical illness develop anxiety and depression, and 33% develop post-traumatic stress disorder (PTSD). Mind-body interventions have specifically been studied for PTSD and have been demonstrated to have positive impacts (Kim, Schneider, Kravitz, Mermier, & Burge, 2013). Additionally, delirium, or the acute onset or alteration in mental status, disorganized thinking, inattention, or altered level of consciousness, has been associated to be linked with and increased likelihood for PICS (Davidson, Harvey, Bemis-Dougherty, Smith, & Hopkins, 2013). Alvarez et al (2016) specifically studied occupational therapy for delirium management in the ICU and demonstrated decreased incidence of delirium for the experimental group as compared to people in the control group. Interventions addressed by Alvarez et al. include aspects of reorientation, simulation of the senses, and positioning, which share similarities to the mind-body techniques used in this case study. While we did not directly address delirium, mind-body interventions may be a potential tool for occupational therapists to use to help increase alertness and attention, helping to reduce delirium in the ICU. Additionally, reducing the incidence of delirium has further potential to reduce the prevalence of PICS; however, this needs further investigation.

Limitations

This case study has several limitations. First, due to the nature of a single case study and predominately urban population, results cannot be generalized. Second, replication of this intervention might be difficult because advanced training or certifications beyond general

education for occupational therapy is required for implementation. Third, due to the extent of the patients' illnesses, recruitment was difficult, and substantially limited the number of eligible patients. Further research is needed to ascertain safety, feasibility, and benefits of using mind-body interventions in the ICU.

Future Research

As previously discussed above, additional research is a necessary next step regarding integrating CIH approaches into occupational therapy in the ICU. Future research should more rigorously address the safety and benefits of utilizing mind-body interventions, and the feasibility of occupational therapists in delivering these interventions. Investigating how mind-body interventions might be used as preparatory methods to increase participation and performance in occupations in the ICU should be explored. Additionally, the effect of mind-body interventions on delirium and subsequent long-term effects will be beneficial to understand. Future researchers may want to explore the use of mind-body interventions outside of the MICU. Due to the short length of stay in the MICU (approximately 3.8 days) and the clinical nature of the patient's diagnoses, the MICU may not have been the best setting for this study. ICUs with longer lengths of stay, such as the burn ICU, which has average length of stay approximately 8 days, might be a more feasible setting (Bessey, Jeng, Caruso, Kagan, & Klein, 2012). Barriers to implementing this type of research study included: short length of stays; scheduling around patients' surgeries or procedures; pharmaceutical sedation; impaired cognitive status; and high mortality rates. Future researchers should carefully examine exclusion criteria, as this appeared to be the main limiting factor for recruitment; however, the criteria for this study was determined by COMIRB secondary to concerns about intervention research in the MICU.

Implications for Occupational Therapy

Mind-body interventions may be a powerful tool for occupational therapists to incorporate into their sessions for patients in the MICU, or any ICU, who are experiencing high amounts of stress, anxiety, and difficulty engaging in occupations. Mind-body interventions should only be used by trained occupational therapists who have prior training, credentials, and licensure in CIH. These approaches should be client-centered and supportive of the patients' goals and be incorporated into their overall plan of care.

4.5 Conclusion

In summary, the outcome of this case study substantiated the need for additional research to ascertain the safety, benefits, and feasibility of utilizing mind-body interventions by occupational therapists in a ICU. There are currently few evidence-based interventions for occupational therapy in the ICU, and our study begins to address this gap. Mind-body interventions have the potential to increase participation and performance in occupations while in the ICU to enhance health and well-being, and could potentially help to improve long-term outcomes after discharge. Occupational therapists are uniquely suited to provide these interventions because of their holistic frame of reference, and understanding that the mind and body share an intimate connection that impacts occupational engagement, and subsequently health and well-being.

Declaration of Interest.

No potential conflict of interest was reported by the authors.

CHAPTER 5: CONCLUSION

The MICU presents a challenging environment within the healthcare arena. Patients are confronted with life-threatening illness or injuries that inevitably lead to physical, psychological, and psychosocial stressors. Patients in the MICU are at risk for occupational deprivation, due to a lack of opportunities for purposeful movements and activities, which further impedes recovery (A. T. Affleck, S. Lieberman, J. Polon, & K. Rohrkemper, 1986; Brummel, Girard, et al., 2014). There are currently few evidence-based occupational therapy interventions in the ICU that address this sequela of health concerns. There is significant evidence suggesting that mind-body interventions have positive effects on psychological functioning and quality of life (Akhtar et al., 2013; Raub, 2002; Ross & Thomas, 2010). While this was only a single case study, our results suggest mind-body interventions were likely beneficial for this MICU patient. Further research is needed to evaluate if mind-body interventions may be a beneficial tool for occupational therapists to use to help increase performance and participation in occupations while in the MICU.

Occupational therapists are uniquely suited to provide these interventions because of their holistic frame of reference, and understanding that the mind and body share an intimate connection that impacts participation and engagement in occupations, and subsequently health and well-being (American Occupational Therapy Association, 2017). Occupational therapists are specifically trained to consider the whole person and select interventions to create and restore health, as well as prevent physical and cognitive disability. Yogic philosophy and occupational therapy share similar views (Mailoo, 2005), and with further research mind-body interventions may be a feasible tool for occupational therapists to incorporate into modern practice in the ICU.

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LIST OF ABBREVIATIONS

ADL	Activities of Daily Living
AOTA	American Occupational Therapy Association
BPM	Beats per Minute
CIH	Complementary and Integrative Health
COMIRB	Colorado Multiple Institutional Review Board
DBP	Diastolic Blood Pressure
FiO ₂	Fraction of Inspired Oxygen
ICU	Intensive Care Unit
IRB	Institutional Review Board
MAP	Mean Arterial Pressure
MD	Medical Doctor
MSE	Mental Status Examination
MICU	Medical Intensive Care Unit
mmHg	Millimeters of Mercury
NCCAM	National Center for Complementary and Alternative Medicine
PEEP	Positive End Expiratory Pressure
PICS	Post Intensive Care Syndrome
PMR	Progressive Muscle Relaxation
PTSD	Post-Traumatic Stress Disorder
RASS	Richmond Agitation and Sedation Scale
SBP	Systolic Blood Pressure
UCH	University of Colorado Hospital