THESIS

AN ADAPTED GROUP YOGA INTERVENTION: THE LIVED EXPERIENCE OF INDIVIDUALS WITH CHRONIC TRAUMATIC BRAIN INJURY

Submitted by

Megan A. Roney

Department of Occupational Therapy

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Master's Committee:

Advisor: Arlene A. Schmid
Co-Advisor: Pat L. Sample

Lorann Stallones

ABSTRACT

AN ADAPTED GROUP YOGA INTERVENTION: THE LIVED EXPERIENCE OF INDIVIDUALS WITH CHRONIC TRAUMATIC BRAIN INJURY

The purpose of this qualitative phenomenological study was to explore the experiences of individuals with chronic traumatic brain injury (TBI) who participated in an adapted group yoga intervention. Participants attended one-hour yoga sessions twice a week for eight weeks and described their experiences through focus groups and individual interviews. Data accumulated were analysed using a coding process to generate themes of what experiences occurred, how experiences occurred, and why experiences occurred.

Participants described experiencing the yoga intervention as a progression from initially expecting physical benefits from yoga to feeling safe and comfortable in the yoga intervention classes and among fellow participants, and to experiencing physical, emotional, and cognitive changes. Participants stated that these experiences carried over into their daily lives, positively impacting their health maintenance and social participation. Participants attributed their experiences to various structural strategies of the intervention including commonalities among participants, the instructor's dual knowledge of yoga and therapeutic rehabilitation, as well as the adaptability of yoga to their personal needs. Additionally, participant experiences were attributed to a re-conceptualization of what yoga should look and feel like, enhanced body awareness, and feeling supported. The fact that the participants generally expressed beneficial outcomes indicates the need to further research adapted yoga interventions for the population of individuals with chronic TBI.

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LIST OF DEFINITIONS

Affirmation

The practice of internally repeating a statement in coordination with breath to inspire positive thought (Cunningham, 1992; Stoller, Greuel, Cimini, Fowler, & Koomar, 2011).

Body Scan

A body scan is a mindfulness practice of systematically focusing attention on parts of the body, region by region, and relaxing muscle groups progressively (Johansson, Bjuhr, & Ronnback, 2012).

Occupational Therapy

The therapeutic use of meaningful, everyday life activities, or occupations, to encourage participation in various environments (American Occupational Therapy Association, 2014).

Sensory Environment

The sensory environment is contextual elements that stimulate the senses, including lighting, scents, temperature, and auditory input.

Traumatic Brain Injury

A traumatic brain injury is an injury caused by an external force that results in an alteration in brain function or other evidence of brain pathology. ("About brain injury," 2015; D'Cruz, Howie, & Lentin, 2016)

Yoga

Yoga is an ancient Indian practice that involves physical postures (asanas), breath work (pranayama), and meditation (dhyana) designed to develop a state of well-being and harmony between physical, mental, emotional, and spiritual aspects of an individual. (Bayley-Veloso & Salmon, 2015; Mailoo, 2005; Ross & Thomas, 2010)

CHAPTER 1: INTRODUCTION

Purpose

The purpose of this qualitative study was to assess the impact of an adapted group yoga intervention on individuals with chronic traumatic brain injury (TBI). Specifically, this study explored the experience of engaging in an adapted group yoga intervention through the perspective of individuals with TBI.

Background and Statement of Problem

Our experience affects and is affected by our perceptions of our world and daily life. As Sacks (1995) stated, "One does not see, or sense, or perceive in isolation – perception is always linked to behavior and movement, to reaching out and exploring the world" (p. 111). In the ever changing world of healthcare, acknowledging the individual's experience through personalized, empathetic care has been an objective in delivering high-quality service (D'Cruz et al., 2016). This level of care indicates the importance of focusing on an individual's self-perceived experience when designing and implementing interventions in order to enhance outcomes. One way to progress toward this goal is through the expansion of phenomenological research in intervention efficacy and feasibility studies (Haggstrom & Lund, 2008; Levack, Kayes, & Fadyl, 2010; Yost & Taylor, 2013). The aim of phenomenological research is to become aware of and describe an individual's lived experience of a phenomenon (Furst, 2015; Haggstrom & Lund, 2008). In the current study, we used a phenomenological approach to obtain rich narrative data to inform the understanding of how yoga affects the lived experience of people with TBI.

Traumatic brain injury is a global public health problem that can result in a wide range of cognitive, behavioral, emotional, and physical changes for the individual affected (Centers for

Disease Control and Prevention, 2015; Conti, 2012). The effects of a TBI influence one's engagement in daily life activities, social interactions, and community integration (Douglas, 2013; Haggstrom & Lund, 2008; Kim & Colantonio, 2010). There is limited research describing experiences of individuals with TBI, possibly because of the nature of effects that often accompany chronic TBI. Effects that may influence the reliability of experiential descriptions include decreases in: safety awareness in goal planning and decision-making; self-awareness of physical and cognitive abilities; and cognitive alertness during therapeutic encounters (D'Cruz et al., 2016). Nevertheless, phenomenological research has shown that individuals with TBI express a relationship between the personal meaning they associate with an activity and their experience of feeling engaged while performing said activity (Haggstrom & Lund, 2008). The effect of personal meaning on engagement has significant implications for research exploring effective interventions for this population. An association of personal meaning with intervention activities may influence engagement, and therefore continuance and efficacy.

Many individuals with severe TBI receive an initial short-term combination of: physical rehabilitation focused on enhancing mobility, strength, and endurance; and cognitive rehabilitation involving management of behavior and thought process (Centers for Disease Control and Prevention, 2015; Geurtsen, van Heugten, Martina, & Geurts, 2010). While individuals with TBI tend to regain independence in physical activities in the first year post injury, cognitive discrepancies may persist for much longer, and secondary psychosocial problems may appear later in life (Andelic et al., 2010; Geurtsen et al., 2010). Due to the apparent long-term effects of TBI, it is imperative to explore rehabilitation options for individuals beyond the acute TBI recovery phase that will potentially lead to successful

engagement in long-term rehabilitation. One way to do this is to understand how individuals with TBI perceive their own engagement in intervention (Haggstrom & Lund, 2008).

Complementary and integrative health (CIH) comprises wellness interventions that are not a part of conventional Western medicine including acupuncture, acupressure, creatine, homeopathy, hyperbaric oxygen therapy, mindfulness-based practices, music therapy, neurotherapy, Tai Chi, yoga, and others (Cantor & Gumber, 2013). CIH practices have attributes that may address persisting cognitive issues specific to individuals with TBI (Cantor & Gumber, 2013; National Center for Complementary and Integrative Health, 2016). To further shape effective, client-centered services, researchers have indicated a need to explore the efficacy of CIH rehabilitation programs, specifically how participants perceive their experience of CIH practices (Doig, Kuipers, Prescott, Cornwell, & Fleming, 2014; Haggstrom & Lund, 2008).

One modality under CIH is yoga, a holistic practice used to develop a state of harmony between physical, mental, emotional, and spiritual aspects of an individual (Mailoo, 2005; Ross & Thomas, 2010). As yoga grows in popularity in the United States, investigations into its applicability as a form of complementary healthcare have blossomed, and recognition is growing in support of yoga as a safe and feasible option for various clinical conditions (Bayley-Veloso & Salmon, 2015). A review of 52 clinical research studies of yoga revealed that, for individuals with chronic conditions, yoga helped to increase self-awareness and self-efficacy, and to decrease anxiety (Bayley-Veloso & Salmon, 2015).

Evidence indicates that the practice of yoga may improve cognitive functioning, enhance balance and coordination, reduce stress and distress, facilitate communication, and facilitate adjustment to disability (Bayley-Veloso & Salmon, 2015; Garrett, Immink, & Hillier, 2011; Ross & Thomas, 2010; Smith, Creer, Sheets, & Watson, 2011). Because of these benefits, yoga has

been suggested as a means to address many deficits faced by individuals with TBI (Cantor & Gumber, 2013). While yoga as an intervention for individuals with TBI is still a new area of research, a handful of pilot studies and studies of interventions that incorporated yoga as one element of rehabilitation demonstrate preliminary feasibility and efficacy (Donnelly, Linnea, Grant, & Lichtenstein, 2017; Gerber & Gargaro, 2015; Johansson et al., 2012; Johansson, Bjuhr, & Rönnbäck, 2015; Schmid, Miller, Van Puymbroeck, & Schalk, 2015; Silverthorne, Khalsa, Gueth, DeAvilla, & Pansini, 2012) Researchers of these initial studies indicate the need for continued research of the effect of yoga for individuals with TBI (Donnelly et al., 2017; Schmid et al., 2015; Silverthorne et al., 2012). The studies provide preliminary quantitative research supporting the efficacy and safety of yoga as intervention, but lack in-depth qualitative analysis describing the experience of individuals with TBI who participate in yoga interventions (Johansson et al., 2015).

Drawing from the occupational therapy (OT) principle that increased engagement occurs when an individual attaches meaning to the experience of an activity, it is important to consider the subjective meaning individuals attribute to a lived experience to obtain effective outcomes (Erikson, Karlsson, Borell, & Tham, 2007; Haggstrom & Lund, 2008). Therefore, this study sought to describe the lived experience of engagement in an adaptive yoga group intervention from the perspective of individuals with TBI.

Research Question

1. What was the lived experience of individuals with chronic TBI throughout their engagement in an adapted group yoga intervention?

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

In this chapter literature relating to individuals with TBI and the experience of participation in yoga will be examined. This process will begin with an explanation of TBI etiology, prevalence and classification, followed by a discussion of effects experienced by individuals with TBI in the chronic stage. An explanation of rehabilitation for individuals with chronic TBI will be presented from both a traditional standpoint as well as illumination of the growing use of CIH. Yoga as a modality for intervention will then be discussed, and the research currently available concerning yoga intervention for individuals with TBI will be explored. Within this research, I will identify the need to understand the subjective experience of the individual in experiencing an adapted group yoga intervention and make a case for a phenomenological study to support this need.

Traumatic Brain Injury

A population whose experience has often been misunderstood or disregarded is that of individuals who sustain a chronic TBI, a common condition defined as an injury causing an alteration in brain function, or other evidence of brain pathology, caused by an external force ("About brain injury," 2015; D'Cruz et al., 2016).

Prevalence and Etiology

In order to describe the experience of individuals with TBI who participated in a yoga intervention, it is helpful to first understand TBI prevalence and etiology. In 2010 the Centers for Disease Control and Prevention (CDC) (2015) estimated there were approximately 2.5 million emergency department visits, hospitalizations, and deaths in the United States as a result of TBI

alone or in combination with other injuries. However, this is not an accurate depiction of TBI prevalence, as it does not account for individuals who did not seek medical treatment at all, those who were only seen in an outpatient setting, and those receiving care in a federal facility, such as members of the U.S. military (Centers for Disease Control and Prevention, 2015). In the United States, approximately 5.3 million people are living with a TBI-related disability; however again, this is a conservative estimate due to unreported injuries (Iaccarino, Bhatnagar, & Zafonte, 2015). Falls are the most common cause of non-fatal TBI, followed by motor vehicle collisions, and strikes or blows to the head from or against an object (Centers for Disease Control and Prevention, 2015; Langlois, Rutland-Brown, & Wald, 2006).

Another cause of TBI is anoxia, the reduction or disruption in oxygen delivery to the brain resulting in necrosis of brain tissue (Cullen & Weisz, 2011). Several events lead to anoxia including: prolonged seizures; cardiac and respiratory arrest; near drowning; anesthetic accidents; carbon monoxide poisoning; severe anemia; and encephalopathies (Cullen & Weisz, 2011; Fitzgerald, Aditya, Prior, McNeill, & Pentland, 2010). Classification of TBI includes mild, moderate, and severe severity determined by the individual's neurologic signs and symptoms in clinical presentation (Centers for Disease Control and Prevention, 2015). Central nervous system tumors, post-neurosurgical complications, radiotherapy, cerebral abscess, bacterial meningitis, and gunshot wounds are also causes of TBI (Conti, 2012; Lynne Turner-Stokes, Pick, Nair, Disler, & Wade, 2015). In 2009 approximately 22,070 people in the United States were diagnosed with primary malignant brain tumors (Conti, 2012). While no specific prevalence information currently exists for post-neurosurgical complications, radiotherapy, cerebral abscesses, bacterial meningitis, and gunshot wounds in relation to TBI, it is thought that the incidence of such injuries is low in comparison to TBI caused by falls or motor vehicle

collisions, hence most research surrounding TBI focuses on these two etiologies (Ciuffreda, 2012; Fitzgerald et al., 2010).

Impact of Chronic Traumatic Brain Injury

Traumatic brain injury causes changes in an individual's cognitive, behavioral/emotional, and physical aspects of life that can lead to rehabilitation needs extending far beyond the acute stage (Centers for Disease Control and Prevention, 2015; Conti, 2012; Shah, Al-Adawi, Dorvlo, & Burke, 2004). While symptoms of a TBI vary depending on the individual, changes in cognitive, behavioral/emotional, and physical aspects of one's life often occur affecting interpersonal, social and occupational functioning, and quality of life (Centers for Disease Control and Prevention, 2015; Cullen & Weisz, 2011). An estimated 1.1% or 3.17 million United States citizens were living with long-term or life-long TBI-related disability at the beginning of 2005 (Zaloshnja, Miller, Langlois, & Selassie, 2008). Andelic et al. (2010) found a significant proportion of individuals face substantial disability one year post TBI including problems with social integration, unemployment, and poor physical and mental health.

Cognitive and Physical Deficits and Quality of Life

While individuals with TBI tend to regain independence in physical activities in the first year post injury, cognitive discrepancies may persist or secondary psychosocial problems may appear later in life (Andelic et al., 2010; Geurtsen et al., 2010). Research concerning TBI has identified deficits that can lead to long-term disability including: self-efficacy; self-awareness; short-term memory; executive functioning; balance and coordination; and fatigue management (Cicerone & Azulay, 2007; Doig et al., 2014; Haggstrom & Lund, 2008; Johansson et al., 2015; Rohling, Faust, Beverly, & Demakis, 2009). These deficits have an adverse effect on quality of life and participation in daily life (Cicerone & Azulay, 2007; Doig et al., 2014; Haggstrom &

Lund, 2008; Johansson et al., 2015; Rohling et al., 2009). Cicerone & Azulay (2007) found a strong correlation between subjective quality of life after TBI and perceived self-efficacy for the management of cognitive symptoms. Up to 97% of individuals who sustain a TBI experience impaired self-awareness, which can lead to under or over recognition of impairments and difficulty in setting realistic goals for the future (Doig et al., 2014).

Problems with learning and memory stem from deficits in encoding information and difficulty actively taking part in recovery (Stephens, Williamson, & Berryhill, 2015). Deficits in various executive functioning skills such as strategizing, organizing, and focusing attention are often debilitating following TBI and have a strong effect on functional outcomes (Stephens et al., 2015). Mental fatigue is a common complaint of individuals with a TBI and substantially impacts one's ability in daily work, school, and social activities (Johansson et al., 2015). Changes in muscle tone, decreased coordination, and impaired balance can occur after experiencing a TBI and affect efficiency in physical activities (Centers for Disease Control and Prevention, 2015). Literature has further shown that these residual cognitive and physical impairments tend to lead to a decrease in participation in activities of daily life (Haggstrom & Lund, 2008).

Traumatic Brain Injury and Effect on Participation

Individuals with TBI express feelings of change in terms of their participation in daily life as a result of their injury (Haggstrom & Lund, 2008). In a qualitative study exploring how adults with TBI experience participation in daily life, participants described factors that enhanced their satisfaction in their participation including: the ability to adapt the activity to accommodate post-injury capabilities; learning alternative ways to do activities; an increased ability to make choices about activities; access to social support; feeling a sense of belonging;

being able to do things for others; and engagement in meaningful activities (Haggstrom & Lund, 2008). Participants also indicated factors that decreased their participation including: frustration in having to give up preferences and habits used to perform daily life activates prior to their injury; difficulty in physically accessing buildings and surroundings where they performed daily activities; decreased social interaction; and encountering prejudice and negative attitudes towards individuals with disabilities (Haggstrom & Lund, 2008). Literature has also linked changes in participation to limitations in community reintegration (Andelic et al., 2010; Cicerone & Azulay, 2007; Haggstrom & Lund, 2008; Winkler, Unsworth, & Sloan, 2006).

Traumatic Brain Injury and Community Reintegration

Several studies exploring the long-term effects of TBI indicate that individuals experience impacted community reintegration resulting from decreased social participation (Andelic et al., 2010; Cicerone & Azulay, 2007; Haggstrom & Lund, 2008; Winkler et al., 2006). In a study of 85 patients with moderate to severe TBI in Norway, 35% were considered to have major problems with social integration one year post-injury (Andelic et al., 2010). Gerber and Gargaro (2015) indicate that the decreased social contact as well as depression and loneliness many individuals experience following a severe TBI create significant barriers to successful community integration. Predictors of successful community integration for individuals with chronic TBI include challenging behavior, loss of emotional control, and perceived self-efficacy for the management of cognitive symptoms (Cicerone & Azulay, 2007; Winkler et al., 2006). Based on these studies, there is a clear link between one's level of participation and success in community integration.

Traumatic Brain Injury: A Disease Process

Individuals with TBI experience chronic effects that can lead to long-term disability (Ciurli, Formisano, Bivona, Cantagallo, & Angelelli, 2011). There has been a call in recent TBI literature to acknowledge TBI as a chronic disease process due to well-documented evidence of effects lasting beyond acute injury (Masel & DeWitt, 2010). Adverse long-term effects in physical, cognitive, emotional, and social aspects of an individual's life following TBI lead to deficits in one's functional ability (Andelic et al., 2010; Masel & DeWitt, 2010). In a study exploring disabling effects of moderate-to-severe TBI one-year post injury, Andelic et al. (2010) found 35% of 85 patients experienced major problems with social integration and 42% were unemployed. There is increased incidence of obstructive sleep apnea and sleep disturbances in TBI survivors (Masel & DeWitt, 2010). In a qualitative study exploring participation, individuals with TBI indicated a decrease in their social involvement after injury and indicated their injury had a negative effect on their participation (Haggstrom & Lund, 2008). In a study comparing standard mortality rates of individuals with chronic TBI by age, older adults who sustain a TBI were found to be at an increased risk of death from secondary medical conditions compared to age-matched individuals without TBI (Harrison-Felix et al., 2012). The long-term effects of TBI have resulted in it being viewed more as a disease process instead of as a single, traumatic event eliciting a call for applicable chronic disease treatment including an expansion of rehabilitation services beyond initial acute injury (Masel & DeWitt, 2010).

Rehabilitation of TBI

Many individuals with severe TBI receive an initial combination of physical rehabilitation focused on enhancing mobility, strength and endurance, and cognitive rehabilitation focused on management of behavior and thought process (Centers for Disease

Control and Prevention, 2015; Geurtsen et al., 2010). While individuals with TBI tend to regain independence in physical activities the first year post injury, cognitive discrepancies may persist or secondary psychosocial problems may appear later in life (Andelic et al., 2010; Geurtsen et al., 2010). Complementary and integrative health possesses several attributes fit to address persisting cognitive issues specific to individuals with TBI, and services typically occur in a community setting (Cantor & Gumber, 2013). To further shape effective, client-centered services, researchers have indicated a need to explore the efficacy of rehabilitation programs, specifically how participants self-perceive their experience of rehabilitation (Doig et al., 2014; Haggstrom & Lund, 2008).

Traditional Rehabilitation

Rehabilitation of TBI addresses individual deficits including cognitive dysfunction, motor impairments, and agitation using various rehabilitation techniques such as pharmacotherapy, remediation therapy, OT, physical therapy, environmental management, medications, and splinting (Iaccarino, Bhatnagar, & Zafonte, 2015). As far as rehabilitation to address the treatment of long-term psychosocial problems faced by individuals with chronic TBI, a systematic review of comprehensive rehabilitation programs found day treatment programs to be the most effective in enhancing daily life functioning and community integration (Geurtsen et al., 2010). Substantial evidence exists indicating the effectiveness and cost-effectiveness of continued rehabilitation for individuals with TBI (L. Turner-Stokes, 2008). Iaccarino, Bhatnagar, & Zafonte estimate that currently "the direct and indirect cost of TBI in the US is between $60.4 and $221 billion" (2015, p. 55). The expanding socioeconomic burden associated with increasing incidences of TBI is causing implications for public health and fueling the need to identify and

expand upon existing cost-effective approaches to address this now labeled epidemic (Iaccarino, Bhatnagar, & Zafonte, 2015).

Complementary and Integrative Health Used in TBI Rehabilitation

The use of CIH in the United States has seen an increase in popularity with some crossover of CIH interventions into conventional medicine, such as relaxation training (Cantor & Gumber, 2013). CIH comprises health interventions that are not a part of conventional Western medicine including acupuncture, acupressure, creatine, homeopathy, hyperbaric oxygen therapy, mindfulness-based practices, music therapy, neurotherapy, Tai Chi, yoga, and others (Cantor & Gumber, 2013). Interventions using CIH have been identified as relevant for individuals with TBI due to their ability to act as part of a multimodal comprehensive intervention to address diverse challenges faced by individuals with TBI (Cantor & Gumber, 2013).

Pilot studies exploring the feasibility and potential effect of a modified mindfulness-based cognitive therapy (MBCT) for individuals with TBI found improvements in health status and depression symptoms maintained one year after intervention (Bedard et al., 2014). Other studies adapted a mindfulness-based stress reduction program (MBSR) to specifically target mental fatigue experienced by individuals with TBI (Johansson et al., 2012; Johansson et al., 2015). In addition to experiencing improvement in mental fatigue and processing speed after intervention, participants also expressed growing attitudes of self-acceptance and integration of mindfulness practice into their everyday lives (Johansson et al., 2015). Critiques of CIH include: its cost to patients, payers, and tax payers, estimated at $34 billion a year in the United States; and the limited regulation and consumer awareness of CIH (Cantor & Gumber, 2013). Because of the apparent applicability to individuals with chronic TBI, the growing interest in CIH, and

the lack of strong research to support CIH's efficacy and safety, it is appropriate to expand research initiatives in CIH approaches for individuals with chronic TBI.

Call for Integrative Rehabilitation Services for Chronic TBI

Researchers and medical professionals have indicated the need to increase research in outpatient and community therapies in order to address long-term effects of chronic TBI (Haggstrom & Lund, 2008; Harrison-Felix et al., 2012; Masel & DeWitt, 2010). In a 2015 report to Congress on TBI, the CDC recommended increased research of subsequent rehabilitation services beyond the acute inpatient level including community-based rehabilitation, and integrative community services to support the lifelong needs of individuals with chronic TBI. A systematic review of rehabilitation settings and techniques found that neuropsychological rehabilitation in a therapeutic environment alongside fellow individuals with TBI's can be more effective than a less intense individual intervention (Lynne Turner-Stokes et al., 2015). In a qualitative study exploring the meaning of participation from the perspective of individuals with TBI, Haggstrom and Lund (2008) found participation depended not only on the individual, but also upon the level of enablement the situation provides for participation. Therefore current rehabilitation practice needs to focus on supporting clients to surmount obstacles within their natural environment. One way of doing this would be offering group rehabilitation within the community that addresses clients' physical and social needs such as an adaptive yoga rehabilitation program.

Yoga and Yoga in Clinical Practice

Yoga is an ancient practice originating in India that involves physical postures (*asanas*), breath work (*pranayama*), and meditation (*dhyana*) designed to develop a state of well-being and harmony between physical, mental, emotional, and spiritual aspects of an individual (Bayley-

Veloso & Salmon, 2015; Mailoo, 2005; Ross & Thomas, 2010). Benefits of yoga as expressed by practitioners include: increased flexibility, strength, and self-awareness; enhanced self-efficacy; and reduced stress and anxiety (Bayley-Veloso & Salmon, 2015; Mehling et al., 2011; Ross & Thomas, 2010). As yoga grows in popularity in the United States, investigations into its applicability as a form of complementary healthcare have blossomed and recognition is growing in support of yoga practice as a safe and feasible option for various clinical conditions (Bayley-Veloso & Salmon, 2015). Yoga practice offers a way for individuals with medical conditions to combat muscle atrophy, offers adaptability to specific needs and limitations, and also allows for awareness of movement through slow, deliberate sequencing of elements (Bayley-Veloso & Salmon, 2015).

In a review of studies comparing the benefits of exercise and yoga, yoga practice was shown to have a more beneficial effect than exercise alone on social and occupational functioning, pain reduction, decreased fatigue, and sleep disturbances (Ross & Thomas, 2010). One study compared the health effects of yoga and exercise for students with mild to moderate depression among three groups: an exercise-based yoga group, a yoga group involving spiritual and ethical elements, and a control group that did not receive treatment (Smith et al., 2011). The students in the yoga groups experienced greater benefits in self-report measures of depression, stress, and hopefulness than participants in the control group (Smith et al., 2011). Participants in the group yoga involving ethical and spiritual elements experienced significant decreases in anxiety symptoms (2011). In a randomized control trial exploring the effects of yoga on military personnel who were deployed to Iraq, participation in yoga helped to significantly reduce anxiety and led to significant improvement as compared to control participants on 16 out of 18 mental health and quality of life factors (Stoller et al., 2011).

Because it can be practiced at a low-intensity level, yoga is highly adaptable for various populations with varying physical capabilities (Bayley-Veloso & Salmon, 2015). A review of 52 clinical research studies of yoga revealed a wide variety of psychological and physical benefits including: increased self-awareness; enhanced self-efficacy; and reduced anxiety for individuals with several chronic conditions including cancer, diabetes, schizophrenia, low back pain, neck pain, post-cardiovascular accident (CVA) disability, and post traumatic stress disorder (PTSD) (Bayley-Veloso & Salmon, 2015). The same review noted that all studies incorporated a flexible approach in which modifications of physical postures were made to fit the abilities of the participants (Bayley-Veloso & Salmon, 2015). In a randomized control trial comparing the use of trauma-informed yoga and supportive women's health education for women with chronic, treatment-resistant PTSD, results indicate yoga may improve the functioning of traumatized individuals by helping them to tolerate physical and sensory experiences associated with fear and helplessness, and to increase emotional awareness and affect tolerance (van der Kolk et al., 2014).

Yoga and TBI

Due to the evidence indicating yoga's benefits including: improving attention and other cognitive functions; improving balance and coordination; reducing stress and distress; facilitating communication; and facilitating adjustment to disability, it has been suggested that yoga could potentially address many deficits faced by individuals with TBI (Cantor & Gumber, 2013). Pilot studies and studies incorporating yoga as an aspect of intervention have shown promise for yoga as a means of beneficial intervention for individuals with TBI (Donnelly et al., 2017; Gerber & Gargaro, 2015; Johansson et al., 2012; Johansson et al., 2015; Schmid et al., 2015; Silverthorne et al., 2012).

Gerber and Gargaro (2015) found an increase in community integration and a decrease in family burden after individuals with TBI participated for 6 months in a social and recreational day program. A variety of activities were offered including: yoga; walking; discussion groups; crafts; games; and hobbies and skill training sessions on topics such as relaxation techniques, managing emotions, and health and wellness education (Gerber & Gargaro, 2015). Self-assessed mental fatigue decreased significantly for 18 individuals with CVA and 11 with TBI who participated in an 8-week MBSR treatment (Johansson et al., 2012). MBSR is described as "a structured public health intervention to cultivate mindfulness in medicine, healthcare and society," that includes gentle yoga with an emphasis on awareness practices such as body scanning and seated meditation (Johansson et al., 2012, p. 1623). Based on participant requests for a longer program with more support, Johansson, Bjuhr, and Ronnback offered an advanced MBSR program with adaptations such as a slower pace, more repetitions, and minimal talking during practice, as well as adjustments in yoga to specifically address mental fatigue and decreased balance and coordination (Johansson et al., 2015). The participants, including 8 individuals with CVA and 6 with TBI, reported an increasing acceptance of oneself and others as well as increased satisfaction with life as a result of participation (Johansson et al., 2015).

A 2011 phenomenological study explored the personal experience and perceived outcomes of a group yoga program for individuals who experienced a CVA (Garrett et al.). Participants expressed improved body awareness including improved functional ability in the affected side and overall sensations of physical enhancement (Garrett et al., 2011). For some, this awareness led to a conscious effort to involve the affected side in the performance of daily occupations (Garrett et al., 2011). While this study explored the experience of individuals with

CVA, the findings raise the question of whether individuals with TBI would have similar experiences from engaging in a group yoga intervention.

In a case study three participants with chronic TBI participated in 8 weeks of one-on-one yoga instruction resulting in improvements in balance, lower extremity strength, and endurance (Schmid et al., 2015). During interviews, participants described a return of valued occupations such as playing the piano and golfing. One participant also discussed an increase in social participation, which he attributed to bolstered stamina as a result of practicing yoga (Schmid et al., 2015). In a pilot study of the effects of breath-focused yoga for adults with severe TBI, participants self-reported improvements in physical functioning, emotional well-being, and overall health over time, further substantiating the value of yoga for individuals with TBI (Silverthorne et al., 2012). Another pilot study exploring adapted yoga found significant improvements in the Emotions and Feelings subscales of the Quality-of-Life After Brain Injury instrument among individuals with acquired brain injury (ABI) that participated in yoga compared to the control group participants who did not significantly improve (Donnelly et al., 2017). These improvements indicate increased emotional satisfaction and decreased negative emotions after participating in the yoga intervention.

These preliminary studies indicate the need for continued research of the effect of yoga for individuals with TBI. The studies provide preliminary quantitative research supporting the efficacy and safety of yoga as intervention. While some studies provided limited qualitative research regarding participants' opinions of the intervention, the literature is currently missing an in-depth qualitative analysis describing the experience of individuals with TBI who participate in yoga interventions. Haggstrom and Lund (2008) illustrate the importance of utilizing subjective experience in research by stating:

> *Many of the categories identified for participation can be understood only through subjective experience and cannot be captured by professionals' observation of the performance of activities. These results emphasize the importance of considering clients' unique experiences of participation when designing individually tailored rehabilitation programmes intended to enhance participation. (2008, p. 40)*

Yoga and Occupational Therapy

The occupational roots of yoga reach back to the ancient Indian philosophy that health is dependent on balance of energies reflective of one's spiritual, social, and physical occupations (Mailoo, 2005). The practice of yoga offers a means of occupational freedom in that it encourages a focus on experience itself instead of associating experience with success or failure, which threatens self-esteem and can lead to occupational alienation (Mailoo, 2005). Growing acceptance and blossoming evidence of yoga as an effective therapeutic modality in Western healthcare offers a registered and licensed occupational therapist (OTR/L) with proper training the opportunity to adapt yoga postures, breath work, and meditation to address the specific occupational needs of clients (Mailoo, 2005; Stoller et al., 2011). For example, beginning in the 1990s the philosophical concept drawn from the Alcoholics Anonymous (AA) program of affirmation, or the repetition of positive thoughts, was paired with yoga postures to address the needs of individuals in recovery (Cunningham, 1992). Needs may be preparatory in nature, for example, using yoga to combat PTSD that often accompanies life-altering experiences like TBI (Stoller et al., 2011).

Yoga may also be a beneficial intervention for individuals who engaged in practice as a meaningful occupation prior to their injury. Erikson et al. (2007) found that individuals with TBI who suffered from memory impairment expressed increased success in engaging in meaningful occupations through adaptation of habits used in familiar activities and familiar contexts from before the injury. Similarly, Haggstrom and Lund (2008) found that individuals with TBI noted a

positive influence on their participation in meaningful activities when they learned alternative ways to perform tasks and developed new ideas of satisfaction in how they performed activities. Five of the seven participants in this study reported having previous experience practicing yoga, each with varying levels of meaning attached to their previous experiences. Researchers exploring the use of yoga in reducing state anxiety emphasize the importance of using client-centered practice to tailor the yoga program to enhance meaning for the individual (Chugh Gupta, Baldassarre, & Vrkljan, 2013). This may include collaboration between the OTR/L, the individual, and the yoga instructor to meet the needs of the individual, or adjusting the traditional structure of yoga practice to align with the individual's values and beliefs (Chugh Gupta et al., 2013).

Conclusion

Traumatic brain injury is an important global public health problem that affects cognitive, behavioral/emotional, and physical aspects of life that in turn affect participation in daily life activities, social interaction, and community integration (Centers for Disease Control and Prevention, 2015; Conti, 2012; Shah et al., 2004). Chronic implications resulting from TBI have caused a movement among researchers to view TBI as a disease process instead of a one-time event, and have resulted in a need for increased research of rehabilitation approaches that extend beyond the acute phase (Haggstrom & Lund, 2008; Harrison-Felix et al., 2012; Masel & DeWitt, 2010).

One area that is gaining momentum in preliminary research is the use of CIH methods in TBI rehabilitation, including yoga (Cantor & Gumber, 2013). The holistic nature of yoga in incorporating physical, mental, and personal elements indicates its potential in providing a form of integrative rehabilitation that researchers identify as beneficial (Bayley-Veloso & Salmon,

2015; Haggstrom & Lund, 2008; Harrison-Felix et al., 2012; Masel & DeWitt, 2010). Preliminary studies have established the efficacy and feasibility of yoga for individuals with TBI (Gerber & Gargaro, 2015; Johansson et al., 2012; Johansson et al., 2015; Schmid et al., 2015; Silverthorne et al., 2012). Limited qualitative data describing the experience of yoga from the perspective of individuals with TBI causes a gap between finding a safe and effective alternative rehabilitation method that can be offered in the community, and the probability that individuals will use and benefit from such rehabilitation on a personal level. Drawing from the OT principle that increased participation occurs when an individual attaches meaning to his or her occupations, it is important to consider the subjective meaning individuals attribute to rehabilitation activities to obtain effective outcomes (Erikson et al., 2007; Haggstrom & Lund, 2008). Therefore, this study sought to describe the experience of engagement in a yoga group intervention from the perspective of individuals with TBI in order to understand their lived experience.

CHAPTER 3: METHODS

Research Design

We used a phenomenological method to investigate the experience and self-perceived outcomes of engagement in an eight-week group yoga intervention, from the perspective of individuals with chronic TBI. Data were collected in a focus group following week four, a focus group following week eight, and individual interviews following the completion of the eight-week yoga intervention. The thorough qualitative investigation of the reported experiences of the participants in the intervention expands the description of physical, psychosocial, and daily life changes that emerge through the practice of yoga for individuals with chronic TBI.

Researchers' Positions

The research team for this study included two professors of OT, one professor of applied social and health psychology, one professor of recreational therapy, and one graduate student completing her master's degree in OT. The primary author experienced a TBI due to a car collision in 2004, practiced yoga throughout her rehabilitation, and continues to practice yoga. The primary author coded the data alongside another author who was the triangulating analyst to the data. The triangulating analyst's primary research focuses on identification, service needs, service access, and life outcomes of children and adults with TBI. We realized that our personal and professional bias concerning brain injury may influence our perspectives, and attempted to limit individual bias through the maintenance of a detailed audit trail of notes tracking the analysis process and continual researcher reflection and check-in discussions with one another in terms of positioning.

Participants

A convenience sample was recruited from a local TBI support group through an in-person presentation of the study and distribution of Institutional Review Board (IRB) approved flyers. Flyers also were posted in a local rehabilitation hospital and the office of a university program for student veterans. Prior to commencement of the study, IRB approval was obtained from Colorado State University and participants gave written consent to participate. The inclusion criteria were: a period of six months or more since the TBI; self-reported balance impairment; and no consistent engagement in yoga for at least one year prior to participation in the study. Participants were excluded if they experienced a stroke. Participants received a $25 gift card to assist with the cost of transportation to yoga sessions and to thank them for their time during assessments.

Eleven individuals expressed interest in participation in the study and underwent an eligibility criteria screening via telephone. All of these individuals were deemed eligible, and of them, three declined participation prior to the first session, and one was lost to follow up. Reasons for declining participation included lack of transportation, schedule conflicts, and family issues. Seven individuals gave written consent to participate in the study. An initial hour-long interview was conducted with each participant prior to the beginning of the study to gather background information and to develop a relationship between participant and researcher. These interviews were included to increase mutual trust and participant comfort in sharing information and following through with the intervention. Participants ranged in age from 46 to 69, and demographic data of each participant can be found in Table 1. Pseudonyms are used for each participant to protect confidentiality.

The Yoga Intervention

The intervention was held at an OT laboratory situated in the satellite campus of a state university. The satellite campus is remotely located at the base of the Rocky Mountain foothills reachable only by car via a dirt road or a 10-minute walk from the nearest bus stop. The laboratory is surrounded by pastures and wildlife areas associated with the U.S. Department of Agriculture Animal and Plant Health Inspection Service, the state division of wildlife, and the university's forest service.

The intervention was composed of one-hour, bi-weekly group yoga sessions for eight weeks (16 total sessions). A certified yoga instructor who also is an OTR/L taught the sessions. The yoga curriculum consisted of beginner and moderate level physical postures, breath work, affirmation, and meditation. Yoga programming was designed with the aim of improving balance, strength, flexibility, and dynamic weight shifting through movement.

The yoga protocol was based on a prior study of one-on-one yoga with an instructor for individuals with CVA and TBI (Schmid et al., 2015). It was adapted in the present study to specifically target needs of individuals with TBI within a group setting (see Table 2). As the class progressed, physical postures advanced in challenge from sitting, to standing, to laying supine (see Table 3). Adaptations or modifications to physical postures were provided throughout the intervention to accommodate varying abilities and preferences. Physical props were used for modification of the poses. Props including blocks, bolsters, blankets, straps, and eye pillows were available to facilitate support in certain physical postures. Two research assistants also were available during each session to manually assist in posture adaptations.

Beginning in week three, participants were encouraged to synchronize their breath with affirmation. Affirmation refers to the practice of internally repeating a statement in coordination with breath to inspire positive thought, adapted from the AA Twelve Step philosophy (Cunningham, 1992; Stoller et al., 2011). Affirmations were simple statements that varied from session to session with foci on aspects of self-integrity and self-awareness (see Table 4). The decision to refrain from introducing affirmations until week three reflected our attempt to create a conducive learning environment without overwhelming participants by systematically building upon yoga concepts as the intervention progressed.

Data Collection

Data were collected in the form of individual and group interviews midway through, and again upon completion of the intervention. Shortly after each interview, field notes were completed to record important nonverbal, atmospheric, and sensory detail (Creswell, 2013). Additionally, descriptive notes of observations during yoga classes and the primary author's own reflections throughout the research process were recorded.

Halfway through the intervention we conducted a focus group at the laboratory following the completion of week four of the intervention. Participants sat in chairs arranged in a circle in the room in which yoga sessions were conducted. Ground rules for participation were outlined in an effort to ensure each participant was given a chance to speak and to understand his or her right to confidentiality. Questions were structured based on a focus group agenda and were open-ended to elicit participants' personal experience thus far in the yoga intervention. Ideas and reflections expressed were recorded on a white board for participants to reference as the focus group progressed. The focus group lasted 45 minutes.

Examples of Midway Focus Group Questions:

1. What do you think about this yoga class so far? What do you like? What do you not like?
2. Have you noticed any changes in your life as a result of adding this class to your schedule?
3. We're halfway through with the class. What hopes do you have for the rest of the class?
4. What does yoga mean to you?

A second focus group with identical format was conducted following the final yoga intervention session. Questions in this interview also focused on participants' experiences in addition to building on responses expressed in the first focus group. The final focus group lasted 55 minutes.

Examples of Final Focus Group Questions:

1. What do you think about the second half of yoga class? Has anything changed from our first focus group that you'd like to share?
2. In the last focus group you all talked about several changes you've seen in your daily life since beginning practicing yoga including having more energy, exercising outside of class (walking), remembering the importance of your breath, and increasing your awareness of your body. Have you noticed other changes in your daily life in the second half of the yoga program?
3. We're at the end of the program. What hopes do you have beyond this class?
4. In one statement, tell me what you have learned in this program that you will take with you into your life?

Qualitative individual interviews were conducted within two weeks of the intervention's completion to elicit the participants' personal experience of group yoga participation and perceived outcomes. The interviews were semi-structured and inquiries loosely followed a guide of open-ended questions that aimed to understand the participants' experience of the group yoga intervention, including perceived changes in physical, mental, and emotional aspects of daily life as a result of participation. Questions pertaining to body awareness also were asked based on reflections of changing awareness expressed during the focus group conducted after week four. The spouses of Bill and Daniel were present and contributed pertinent information during their husbands' interviews. The flexibility of the interviews allowed conversation to take a natural form and created an environment that encouraged the participant's free expression of his or her experience (Creswell, 2013). Probing questions such as "how so?" or "can you tell me more about that?" were used following responses that merited clarification or amplification. Interviews took place in the participants' homes, strengthening the interviewee's comfort level and allowing the primary researcher an opportunity to observe the participant in his or her natural environment. Interviews lasted from 30 to 90 minutes.

Examples of Final Interview Questions:

1. Please tell me about your experience of participating in this group yoga intervention.
2. Is there anything that you feel has changed in your daily life as a result of practicing yoga?
3. Did practicing yoga help you pay attention to your body sensations? How so?
4. In addition to these and similar inquires, a photograph taken of the participant in a yoga posture during a yoga session was presented and the participant was asked to reflect upon the image.

Examination and Description of the Data

A phenomenological approach was used to describe the phenomenon of participation in the group yoga intervention. The broad aim of phenomenological research is to explore and describe the direct experience of a phenomenon through the view of those who experience it and to avoid inclinations to apply one's individual perception to the description (Creswell, 2013). Throughout history this aim has developed tributaries of study including existential phenomenology, which emphasizes the concept of the embodied human being orienting to the concrete world through lived experience (Kupers, 2015). Merleau-Ponty expanded existential influences by philosophizing that perception originates from the body and therefore body and mind are inseparable (Merleau-Ponty, 2012). This idea influenced the study of phenomenology in that one's perceptions of a phenomenon are seen as a result of a sensory experience embodied in a conscious reflection (Kupers, 2015). Merleau-Ponty's perception of phenomenology shares similarities with the synonymous nature of mind, body, and spirit emphasized in the practice of yoga (Garrett et al., 2011). Furthermore, Merleau-Ponty highlights the influence of environment in the perception of engagement in a phenomenon, just as the practice of OT centers on the relation of the environment, person, and occupations (Merleau-Ponty, 2012; Rigby & Craciunoiu, 2014). These relationships illustrate the applicability of the existential phenomenological philosophy in describing the experience of the holistic practice of yoga for individuals with chronic TBI, including perceived outcomes in daily life occupations.

Processing of interview data began with management. Interviews were audio-recorded and transcribed verbatim by the primary author. Two researchers, one being the primary author, thoroughly read each interview, recorded initial thoughts and comments, and identified preliminary "clusters of meaning" or categories of data with the use of the precise words of

participants (Creswell, 2013, p. 82). They then adhered to the following procedure suggested by Creswell (2013) for examining phenomenological data.

1. Realization of personal influence: Each researcher individually described and considered her personal experience with yoga and TBI to increase awareness of the influence lived context of the phenomenon has on her perception of the data.
2. Familiarization: Individually, the researchers read each transcript, line by line, to become familiar with the words of the participant, noting initial reactions and impressions.
3. Horizontalization: Individually researchers listed important statements, taking care not to overlap or repeat declarations, but to give each testament equal value.
4. Collaboration and creation of meaning units: Researchers met to discuss and compare individual findings. Through discussion and re-referencing of *in vivo* context, researchers grouped listed statements into broader themes and sub-themes.
5. "What" description: Using themes and direct quotations, researchers wrote a description of what the experience of participating in a group yoga intervention was for individuals with TBI that reflected a collective consensus.
6. "How" description: Using themes, direct quotations, information from field notes, and bracketed information in transcripts, researchers wrote a description of how individuals with TBI experienced the group yoga intervention that reflected a collective consensus.
7. "Why description: Using themes, direct quotations, information from field notes, and bracketed information in transcripts, researchers wrote a description of why individuals with TBI experienced the group yoga intervention as they did that reflected a collective consensus.
8. "Essence" description: Researchers combined descriptions into a collaborative essence of

"what," "how," and "why" participants experienced the group yoga intervention and reached collective agreement of the essence of the experience.

Methods of Rigor

Creswell (2013) recommends qualitative researchers employ validation strategies to document the accuracy of study data, increasing the rigor of analysis. This study employed multiple methods to increase rigor: *Clarification of researcher bias*; *prolonged engagement and persistent observation*; *triangulation*; and *rich, thick description*. Use of all strategies was documented through a detailed audit trail of analysis progression. Clarification of researcher bias involved positioning, or the clarification of the individual researcher's relationship to the study topic and data and biases that may exist as a result. It also involved reflexivity. Reflexivity is the practice of considering one's position throughout data collection and analysis and recording reflections of possible bias through memoing "in which the researcher writes down ideas about the evolving theory throughout the process of open, axial, and selective coding," (Creswell, 2013, p.89). Triangulation occurred through analysis from multiple data sources including: individual interviews, focus groups, field notes, and observations. A triangulating analyst was used to: keep the primary author and research honest; ask hard questions about methods, meanings, and interpretations; and provide the research with the opportunity for catharsis by sympathetically listening to the researcher's feelings (Creswell, 2013, p. 251). Finally thick and rich description was used in field notes, observations, and the data analysis audit. These validation strategies increased the rigor of the study and helped ensure accuracy of data analysis.

Another validation strategy typically used in qualitative studies is member checking, or the process of soliciting participants' views of the credibility of the findings and interpretations (Creswell, 2013). While member checking would have added increased credibility to this study,

contact with the participants beyond the final interviews was not stipulated in the original IRB proposal, and data analysis took place one year after data collection. Therefore, the research team determined member checking accuracy would be difficult considering the likelihood of unreliability in data reviewed nearly a year after collection.

Table 1. Participant demographics.

Partic-ipant	Age	Gender	Marital Status	Highest Education	Years Since TBI	Cause of Injury	Assistive Device
Ann	54	F	Divorced	SPG	1	Car collision	Cane*
Bill	69	M	Married	CG	3	Car collision	Cane*
Cari	57	F	Divorced	SC	4	Car collision	Cane*
Dan	46	M	Married	CG	3	Car collision	None
Erin	57	F	Single	CG	33	Brain surgery	None
Fiona	51	F	Divorced	PGD	9	Suicide attempt (anoxia)	None
Gi	61	M	Married	SPG	21	Car collision	Cane*

Note: * occasional use; education: SC, some college; CG, college graduate; SPG, some post-graduate; PGD, post-graduate degree; M, male

Table 2. Yoga Protocol Session 1.

Yoga Pose	Description	Modifications or Adjustments
Breath work	Slow, deep, rhythmic breathing	No affirmation included
Body scan	Instructor guides participants through awareness of each body part (cephalocaudal)	
Cat/cow	Spinal flexion & extension, pelvic anterior and posterior tilt	Tactile cues to relax shoulders
Spinal circles	Spinal & pelvic rotation across transverse plane	
Shoulder movements	Shoulder elevation & depression	
Arm movements	Arms abduct out to sides, overhead, and adduct	Unilateral movement; abduct to shoulder height, then adduct
Finger movements	Progression of thumb pad to pads of digits 2-5	Instructor verbally guides through each digit connection, one hand at a time
Neck movements	Neck rotation, flexion, extension, lateral flexion, & lateral extension	Tactile cues to relax shoulders
Eye movements	Gaze directed up/down, left/right, & diagonally	Eyes closed; Upper extremity movements in same directions instead of eyes
Cactus pose	Shoulder abducted to sides and externally rotated, elbow flexed 90 degrees	Unilateral movement
Spinal twists	Spinal rotation across the longitudinal plane, arms in cactus pose	One hand placed at back of chair, one hand at opposite knee
Eagle pose (hip opener)	Crossed legs, arms cross in front of body so elbows are touching	Hands hold opposite elbow
Pigeon pose (figure four)	External hip rotation (foot to opposite knee), trunk flexion	Chair placed in front of knees, foot rests on chair; bolster placed on thighs, trunk leans against
Relaxation/meditation	Contraction and release of body parts individually (cephalocaudal), guided movement of energy/breath through the body	

Note: All sessions started with centering and meditation. All movements were done in a seated position. All movements were coordinated with breath.

Table 3. Yoga Protocol Session 16.

Position	Yoga Pose	Description	Modifications or Adjustments
Seated	Breath work	Slow, deep, rhythmic breathing	Affirmation included
	Body scan	Instructor guides participants through awareness of each body part (cephalocaudal)	
	Cat/cow	Spinal flexion & extension, pelvic anterior and posterior tilt	Tactile cues to relax shoulders
	Spinal circles	Spinal & pelvic rotation across transverse plane	
	Shoulder movements	Shoulder elevation, depression, & rotation	
	Finger movements	Progression of thumb pad to pads of digits 2-5	Instructor cues initial movement then participants continue on their own, both hands simultaneously
	Neck movements	Neck rotation, flexion, extension, lateral flexion, & lateral extension	Tactile cues to relax shoulders
	Forward fold	Trunk flexion	Hands placed on thighs; hands placed on a block on the floor
	Cactus pose	Shoulder abducted to sides and externally rotated, elbow flexed 90 degrees	Unilateral movement
	Spinal twists	Spinal rotation across the longitudinal plane, arms in cactus pose	One hand placed at back of chair, one hand at opposite knee
	Eagle pose (hip opener)	Crossed legs, arms cross in front of body so elbows are touching	Hands hold opposite elbow
	Pigeon pose (figure four)	External hip rotation (foot to opposite knee), trunk flexion	Chair placed in front of knees, foot rests on chair; bolster placed on thighs, trunk leans against
Standing	Arm movements	Arms abduct out to sides, overhead, and adduct	Unilateral movement; abduct to shoulder height, then adduct
	Mountain pose with cactus pose	Standing with feet hip width apart, shoulder abducted to sides and externally rotated, elbow flexed 90 degrees	Unilateral movement
	Mountain pose side bend	Standing with feet hip width apart, lateral trunk flexion, arms in cactus pose	
	Warrior I and II	Prolonged lunge	Back foot placed further (laterally) from midline
	Chair pose	Prolonged modified squat with knees touching each other	Feet placed hip width apart

	Tree pose	Weight shift to one leg, other hip externally rotates and foot comes to opposite knee	Chair placed in front and chair back held for balance, foot placed on calf or at ankle
Floor	Pelvic tilts	Pelvic anterior and posterior tilt	
	Pigeon pose (figure four)	External hip rotation (foot to opposite knee), hip flexion	Strap used under knee
	Knees to chest	Hips flexed, knees flexed	
	Eye movements	Gaze directed up/down, left/right, & diagonally	Eyes closed; UE movements in same directions instead of eyes
	Bridge pose	Hips flexed, knees flexed, feet flat on mat, hips flow through flexion/extension lifting off mat	
	Relaxation/ meditation	Contraction and release of body parts individually (cephalocaudal), guided movement of energy/breath through the body	

Note: All sessions started with centering and meditation. Movements progressed from positions in seated, standing, and laying on the floor. All movements were coordinated with breath.

Table 4. Affirmations used during session one and two of each week.

Week	**Session 1**	**Session 2**
1	*No affirmation introduced*	*No affirmation introduced*
2	*No affirmation introduced*	*No affirmation introduced*
3	*No affirmation introduced*	I am strong.
4	I am brave.	I am open.
5	I am learning.	I am enough.
6	I am free.	Just be here now.
7	I am courageous.	I am whole.
8	I am present.	I am strong.

Note: All affirmations were integrated into breath work (inhale on first two syllables and exhale on final 1 or 2 syllables).

CHAPTER 4: MANUSCRIPT

Introduction

Traumatic brain injury (TBI) is a global public health problem that can result in a wide range of cognitive, behavioral, emotional, and physical changes for the individuals affected (Centers for Disease Control and Prevention, 2015; Conti, 2012). While individuals with TBI tend to regain independence in physical activities in the first year post injury, cognitive discrepancies may persist for much longer, and secondary psychosocial problems may appear later in life (Andelic et al., 2010; Geurtsen et al., 2010). The effects of a long-term or chronic TBI negatively influence one's engagement in daily life occupations, or purposeful activities that are valued by the individual, including social interactions or participation in community life (Andelic et al., 2010; Gerber & Gargaro, 2015; Haggstrom & Lund, 2008; Kim & Colantonio, 2010; Levack et al., 2010; Stephens et al., 2015). Due to the apparent long-term negative effects of TBI, it is imperative to explore rehabilitation options for individuals beyond the acute TBI recovery phase to enhance community reintegration and promote success in daily life post-injury (Andelic et al., 2010; Kim & Colantonio, 2010).

Support for yoga as an intervention in clinical settings is growing as studies indicate positive outcomes for populations with various medical conditions (Bayley-Veloso & Salmon, 2015). Yoga is an ancient Indian practice that combines physical postures (*asanas*), breath work (*pranayama*), and meditation (*dhyana*) to develop a state of well-being and harmony between physical, mental, emotional, and spiritual aspects of an individual (Mailoo, 2005; Ross & Thomas, 2010). Researchers have found that individuals with chronic conditions who practice yoga may experience improved cognitive functioning, self-awareness, balance, coordination,

adjustment to disability, and reduced stress (Bayley-Veloso & Salmon, 2015; Garrett et al., 2011; Ross & Thomas, 2010; Smith et al., 2011). Because of these benefits, yoga has been suggested as a means or a modality to address many deficits faced by individuals with chronic TBI (Cantor & Gumber, 2013).

While yoga as an intervention for individuals with TBI is still a new area of research, a handful of pilot studies and studies that incorporated yoga as one element of rehabilitation demonstrate preliminary feasibility and efficacy (Donnelly et al., 2017; Gerber & Gargaro, 2015; Johansson et al., 2012; Johansson et al., 2015; Schmid et al., 2015; Silverthorne et al., 2012). While these studies provide preliminary quantitative research supporting the feasibility and efficacy of yoga as intervention, there is still a need for continued research of the effect of yoga for individuals with TBI in a group setting (Donnelly et al., 2017; Schmid et al., 2015; Silverthorne et al., 2012).

An in-depth qualitative analysis describing the experience of individuals with TBI engaging in group yoga has yet to be completed. While qualitative exploration seeking to understand the individual's perspective is beginning to grow in the field of TBI research in general, questions of data reliability persist. This is possibly due to the nature of the effects that often accompany chronic TBI. Post-TBI effects that may influence the reliability of experiential descriptions include decreases in: safety awareness in goal planning and decision-making; self-awareness of physical and cognitive abilities; and cognitive alertness during therapeutic encounters (D'Cruz et al., 2016). Nevertheless, phenomenological research has shown that individuals with TBI express a relationship between the personal meaning they associate with an activity and their experience of feeling engaged while performing said activity (Haggstrom & Lund, 2008).

The effect of personal meaning on engagement has significant implications for research exploring effective interventions for individuals with TBI. An association of personal meaning with intervention activities may influence engagement, and therefore continuance and efficacy. In the ever changing world of healthcare, acknowledging the individual's experience through personalized, empathetic care has been an objective in delivering high-quality service (D'Cruz et al., 2016). Attaining this level of care means focusing on an individual's self-perceived experience when designing and implementing interventions in order to enhance outcomes. One way to progress toward this goal is through the expansion of phenomenological research in efficacy and feasibility studies in order to understand the individual's lived experience of the intervention (Haggstrom & Lund, 2008; Levack et al., 2010; Yost & Taylor, 2013). In the current study we used a phenomenological approach to obtain rich narrative data to inform the understanding of how individuals with TBI experience an adapted yoga intervention.

Methods

Design

A qualitative phenomenological design was used to describe a common meaning among participants with chronic TBI of the experience of engaging in an eight-week yoga intervention study. During focus groups and interviews throughout the intervention, participants were asked to reflect on what they experienced while practicing yoga and how they experienced practicing yoga. The phenomenological research process outlined by Creswell (2013) was used to analyze transcripts of the interviews and focus groups to develop a compiled description of the experience of practicing yoga from the view of the participants.

Researchers' positions

The research team for this study included two professors of occupational therapy (OT), one professor of applied social and health psychology, one professor of recreational therapy, and one graduate student completing her master's degree in OT. The primary author experienced a TBI due to a car collision in 2004, practiced yoga throughout her rehabilitation, and continues to practice yoga. The primary author analyzed the data alongside another author who acted as a triangulating analyst to the data. The triangulating analyst's primarily research focuses on identification, service needs, service access, and life outcomes of children and adults with TBI. We acknowledge that our personal and professional bias concerning brain injury may have influenced our perspectives, but we attempted to limit individual bias through the maintenance of a detailed audit trail tracking the analysis process and continual reflection and discussions with one another in terms of positioning.

Participants

A convenience sample of seven participants was recruited from a midsize university city in northern Colorado. Recruitment included posting flyers in a rehabilitation hospital and the office of a university program for student veterans. Additionally, two authors presented at a TBI support group to potential participants. Eleven individuals expressed interest in participation in the study and underwent inclusion criteria screening. The inclusion criteria were: a period of six months or more since the TBI; self-reported balance impairment; and no consistent engagement in yoga for at least one year prior to participation in the study.

Participants were excluded if they self-reported exercise restrictions, consistently practiced yoga for the past year, or were unable to attend yoga sessions due to transportation issues. All eleven individuals were deemed eligible and, of them, three declined participation

prior to the first session, and one was lost to follow up. Reasons for declining participation included lack of transportation, schedule conflicts, and family issues. Prior to commencement of the study, participants gave written consent to participate in this Institutional Review Board approved study. Participants received a $25 gift card to assist with the cost of transportation to yoga sessions.

An initial hour-long interview was conducted with each participant prior to the beginning of the study to gather background information and to develop a relationship between participant and researchers. These interviews were completed to increase mutual trust and participant comfort in sharing information and following through with the intervention. These data are not included in our data analyses for this study. All but two participants had some prior yoga experience, but none had practiced consistently. Participants ranged in age from 46 to 69 and four (57% were female), see Table 1 for additional demographic data. Pseudonyms have been provided for each participant to protect confidentiality.

Yoga intervention

The intervention was held in a research laboratory at the base of the Rocky Mountain foothills surrounded by pastures, wildlife, and forest areas. The intervention was composed of one-hour, bi-weekly group yoga sessions for eight weeks (16 total sessions). A registered yoga teacher who was also a registered and licensed occupational therapist (OTR/L) taught the sessions. The yoga protocol was adapted from a prior study (Schmid et al., 2015) to specifically target the needs of individuals with TBI in a group setting. The yoga curriculum consisted of beginner and moderate level physical postures, breath work, affirmation, and meditation. Yoga programming was designed with the aim of improving balance, strength, flexibility, and dynamic weight shifting through movement.

As the class progressed, physical postures advanced to be more challenging and moved from sitting, to standing, to laying supine. Modifications to physical postures were provided throughout the intervention to accommodate varying abilities and preferences. Physical props (e.g. bolters, straps, blocks, blankets) were used to facilitate support in certain physical postures. Two research assistants were available during each session to manually assist in posture adaptations.

Beginning in week three, participants were encouraged to synchronize their breath with an affirmation. Affirmation refers to the practice of internally repeating a statement in coordination with breath to inspire positive thought, adapted from the Twelve Step philosophy (Cunningham, 1992; Stoller et al., 2011). Affirmations were simple statements that varied from session to session with foci on aspects of self-integrity and self-awareness (see Table 2). The decision to refrain from introducing affirmations until week three reflected our attempt to create a conducive learning environment without overwhelming participants by systematically building upon yoga concepts as the intervention progressed.

Data collection

Qualitative data were collected in a focus group mid-way through the intervention, a focus group at the end of the intervention, and individual interviews following the completion of the intervention. Shortly after each interview, the interviewer recorded field notes regarding important nonverbal, atmospheric, and sensory detail (Creswell, 2013). Additionally, descriptive notes of observations during yoga classes and the primary author's own reflections throughout the research process were recorded.

Both focus groups were held at the laboratory after yoga sessions. Questions were structured based on a focus group agenda and were open-ended to elicit participants' personal

experience of the yoga intervention. See Table 3 for sample questions from both focus groups and individual interviews. Ideas and reflections expressed were recorded on a white board for participants to reference as the focus group progressed. Focus groups lasted 45 minutes to an hour.

Qualitative individual interviews were conducted in the two weeks following the intervention to elicit the participants' personal experience of engagement in yoga. Interviews were semi-structured and loosely followed a guide of open-ended questions, including perceived changes in physical, mental, and emotional aspects of daily life as a result of participation in the yoga intervention. Questions pertaining to body awareness also were asked based on reflections expressed during the first focus group. The spouses of Bill and Daniel were present and contributed pertinent information during their husbands' interviews. The flexibility of the interviews allowed conversation to take a natural form and created an environment that encouraged the participant's free expression of his or her experience (Creswell, 2013). Probing questions were used following responses that merited clarification or amplification. Interviews took place in the participants' homes to strengthen the interviewee's comfort level and allow for observation of the participant in his or her natural environment. Interviews lasted from 30 to 90 minutes.

Data analysis

Interviews were audio-recorded and transcribed verbatim by the primary author. The primary author and the triangulating analyst thoroughly read each transcript, recorded initial thoughts and comments, and identified preliminary "clusters of meaning" or categories of data with the use of the precise words of participants (Creswell, 2013, p. 82). Both researchers then met on several occasions to collaborate and triangulate multiple sources of data including direct

quotations, information from field notes, and parenthetical information referring to environmental context in transcripts. The researchers then listed direct statements from participants into broader themes and subthemes, culminating in three descriptions of the participants' experience that reflected a collective consensus:

- What participants experienced through engaging in the group yoga intervention.
- How participants experienced the group yoga intervention.
- Why participants experienced the group yoga intervention in the way they did.
- Collaborative meaning of the group yoga intervention experience for individuals with TBI.

In order to increase the rigor of analysis, multiple validation strategies were employed including: *clarification of researcher bias*; *prolonged engagement and persistent observation*; *triangulation*; and *rich, thick description*. Use of all strategies was documented through a detailed audit trail of analysis progression. Clarification of researcher bias involved positioning, or the clarification of the individual researcher's relationship to the study topic and data and biases that may exist as a result. It also involved reflexivity through the process of memoing throughout the coding process. Triangulation occurred through analysis from multiple data sources including: individual interviews, focus groups, field notes, and observations. A triangulating analyst was used to: keep the primary author and research honest; ask hard questions about methods, meanings, and interpretations; and provide the research with the opportunity for catharsis by sympathetically listening to the researcher's feelings (Creswell, 2013, p. 251). Finally thick and rich description was used in field notes, observations, and the data analysis audit. These validation strategies increased the rigor of the study and helped to ensure accuracy of data analysis.

Results

In the following section quotes of individual participants are used to exemplify and substantiate reoccurring themes found throughout the data. The participants' descriptions of their experiences changed and grew as they progressed through each sequential yoga session. Fiona described her experience of relating to her physical body through yoga as a process.

> *"So many of the things that we would do I could not – my body did not feel most of them…it was a big wake up call for me to notice that I had no clue what I was physically feeling…I just got this general message telling me that it's normal and that it's ok to, you know, pay attention to your body, and that was a hard one for me, but just having the awareness, that, you know, gives you what to look for…it takes a while…and you can trust the process. That's kind of the messages that I gave – or that I heard."*

Similar progressions of experience appeared repeatedly in the data, therefore results are presented chronologically. Reflections describing beginning expectations before the intervention, mid-way through the intervention at four-weeks, and at the conclusion of the intervention are presented to reflect the experience of as the participants progressed through the eight weeks of yoga (see Figure 1). The themes describe broadly what the participants experienced during the group yoga intervention, and subthemes describe more specifically how yoga was experienced. An additional theme characterizes the ways in which participants' experience affected occupations in daily life outside of the yoga intervention.

Beginning expectations: Physical benefits

In final individual interviews, participants were asked to reflect upon their original motivation for participation in the intervention and what they expected to experience. Reasons for deciding to participate in the intervention varied among participants, but all expectations related to hopes for physical benefits. For example, Ann had previous experience in practicing yoga and hoped the intervention would offer a means of re-engaging in a health-promoting activity.

> *"I had done yoga in the past, and I hadn't done it for many years…I knew the study was being done to help coordination, balance, and I was having trouble with that, and I thought that I would give it a try, and I thought it would be a good way to get back into doing yoga again if it was helpful."*

While other participants had less or no experience with yoga, they expressed that they had heard about the benefits of yoga and hoped it would have positive physical effects including increasing balance and decreasing pain.

> Cari: "*I didn't expect it [yoga] to make any big difference in my life, but I knew that I needed to, you know, just because so many people do it, I figured there's probably something there that I've been missing."*

> Fiona: *"What I did expect was, you know, to um learn some specific poses, techniques, whatever that would help with um some of my physical pain."*

> Bill: *"The balance thing of course appealed to me a lot with the TBI, and I thought it might help improve my balance."*

Dan described discussing alternative therapeutic options besides medications with his neurologist and yoga being offered as a suggestion by this neurologist. He explains that he expected yoga to be more physically taxing than what he experienced.

> *"I thought it was stretching, which it kinda is, but I didn't know it would be relaxing cause typically when you're doing exercises and stuff it's, you know, it's like work."*

Erin anticipated having difficulty with physical aspects of yoga.

> *"I know yoga is good for you, you know? But I took a yoga class over at [athletic club] and they were doing hump dogs and all those, you know, and that's so hard. You know? I thought it [the intervention] would be that."*

Mid-way experiences: Physical, emotional, and cognitive comfort

During the mid-way focus group, participants were asked to reflect on the class at the halfway point, describing experiences thus far and hopes for the remainder of the intervention. Broadly, all participants described feelings of comfort in the form of: physical comfort and relaxation; emotional comfort and safety; and cognitive ease (all are described in the following

text). Various intentional aspects of the intervention environment (referred to as "strategies" from now on) facilitated the participants' experience of comfort. Strategies included insurance of commonality among participants through use of inclusion criteria of similar diagnoses, maintenance of a relaxing sensory environment within the intervention space itself, adaptation or modification of physical postures, and helping the participants to recognize that their yoga poses should not be painful.

Emotional comfort and safety through participant commonality

Emotional comfort was a common experience expressed by most participants and was described as feeling safe, comfortable, and more able and willing to open up to others in the group. Experiences of emotional comfort were attributed to connections between participants including commonalities of brain injury and prior involvement in the local brain injury support group. As some participants describe, these commonalities fostered a less competitive, less intimidating environment than they had expected to experience while practicing yoga. The following quotes demonstrate how commonalities among participants created a safe environment in which emotional comfort was experienced:

> Erin: *"I like it having almost everybody here head injured, you know? One way or the other, and it makes you not so much serious what you're thinking of yourself. Making a jerk out of yourself, you know? So, it's kinda good."*
>
> Fiona: *"I think for me the safety definitely comes from the connection of, you know, head injury, and the reason why I have a head injury is more psychological, but it doesn't take away from the fact that we all have that connection, and to me that makes such a difference, you know? Ability to open up and learn and know that everybody's in that space, and I don't know. That's what made it safe for me."*
>
> Cari: *"Maybe because it's this size, maybe it's because also I know a lot of the people here from the support group, or whatever, but I definitely feel, like you said, safer here, more relaxed."*

Physical comfort and relaxation through experiencing adapted yoga

Relaxation and physical comfort were also common experiences among participants. For Bill, relaxation was facilitated through re-conceptualizing how yoga should make his body feel. He described his relaxation through a comparison of the intervention to his previous experience with yoga.

> *"I've taken lots of yoga courses, and there, and even what [yoga teacher] says, there's not supposed to be pain. Well, there was pain with a lot of the courses, and a lot of the poses, and I thought it was supposed to be that way, and I enjoyed this a lot more…there's not a lot of pain here. There's none in fact…I'm kinda glad this is different than that kinda yoga because this is very relaxing, compared to that especially. To call it yoga, I have a hard time with that, but it's yoga in a different form and it's a lot better."*

Dan recalled the first day of class, and wished the yoga teacher had been clearer about the idea that yoga should not hurt.

> *"Back like the first day I either didn't get the message that – the no pain thing, or I'm not sure if she didn't say it, or if I didn't hear it cause the first day I was like trying to keep up with her, and she's really flexible, so I figured out pretty quick I couldn't, but I think for the first time, you should say that up front."*

For other participants relaxation was facilitated through focusing on breath and using breath in combination with movement through physical postures, a key component of yoga taught throughout the intervention.

> Ann: *"It's reminding me to stay aware of my breath cause I think I was holding my breath a lot…I think just everyday, I was holding my breath a lot just from stress, anxiety, you know? And it's reminding me to breathe, to remember to breathe."*

Gi described using the cat and cow movements (back flexion and extension while in sitting or quadruped) learned in class in combination with his breath as a stress relieving technique in his daily life.

> *"I really feel that the cow and the cat just helps me…I feel like that's really helped me when I get stressed out. I just take some time and I'll move forward on the couch or wherever and I'll, you know, I'll just breathe and breathe, breathe. You know?"*

Fiona expressed difficulty with being aware of both her body and breath, but hoped to improve in this area as she continued with the remainder of the intervention.

> *"Sometimes I'm really uncomfortable trying to, you know, being aware of my body, and just focusing on a certain area, and that's something that I hope to improve. Focusing on my breath is another thing…so there are some things that are really uncomfortable, but I hope that, you know, in time it will improve."*

Several participants described the yoga teacher's role in facilitating physical comfort through modifications or adaptations of the poses. The yoga teacher's adaptations to a series of horizontal, vertical, and diagonal eye movements was described by Cari as being helpful in relieving physical discomfort.

> *"She [yoga teacher] has been so good at helping with modifications like the eye movements. I can't do that. I get too nauseous and all sorts of stuff, and, you know, other areas that I talk to her about, which I don't remember anymore because she told me what to do to modify. Now I'm modifying it. I don't remember what I'm modifying, but it has helped."*

Ann and Erin also spoke about learning to adapt the eye movements to fit the needs of their bodies. Ann also switched to using arm movements to cross midline because she felt like using her eyes would trigger a seizure. For Erin, the eye movements were used at times to replace crossing midline with her arm due to pain she experienced as a result of paresis in her shoulder.

Additionally, participants described appreciation for instruction in using blocks, bolsters, and other provided props to aid in physical comfort while in various postures. Participants also cited the yoga teacher's voice and choice of music as increasing experiences of relaxation. These aspects of tactile and auditory input further added to the establishment of comforting experiences.

Cognitive ease through instruction adaptations

Participants also experienced cognitive ease through the yoga teacher's adaptation of the instructions. They described her abbreviation and repetition of both instructions and affirmations as helpful in aiding memory.

> Ann: *"I like that the instructor is aware that we have brain injuries and so she shortens – abbreviates like the affirmation at the beginning of class, keeps the instructions short…short and easy to remember. Stays in our head."*

Dan also described the adapted instructions as enhancing his ability to learn, but requested the yoga teacher taper off instructions as the intervention continued.

> *"So [yoga teacher] does really good…on the step by step instructions, you know? Kinda as we're going through it she tells us the next step so that we can follow it, and then we go repeat it multiple times, which helps us learn it for sure, but maybe she should toward the end of that she should start just cueing us but not quite as much so we can learn to do it."*

Final reflection of experiences: Comfort facilitates benefits

Following the completion of the intervention, participants reflected on their experiences as a whole in a final focus group and individual interviews. Participants' final reflections expressed both a continuation and growth of the experiences discussed in the mid-way focus group, ultimately leading to benefits including physical changes, cognitive awareness, and emotional connection. As Gi described in his individual interview, the intervention experience affected him on a holistic level, impacting both mind and body.

> *"Completely changed. It's helped me – both [my wife] and I say it's helped me with my balance and my confidence. It's helped me with my pain, mentally, emotionally, physically inside, you know? I can slow down and just focus on the good things and relax."*

Physical changes through body balance and relaxation

Several participants described a continuation of physical comfort facilitated by the yoga teacher's use of adaptations and modifications of poses to create physical ease. For some, this

continuation led to improvements in ability. Cari described her ability to complete the eye exercises in the second half of the intervention, which she attributed to overall health improvement and the class structure of progressing from doing the exercises in a seated position to lying supine.

> *"At the beginning of the class I couldn't do the eye exercises at all. The second half at least a couple times when we were doing the lying down, I could do the eye exercise…I am honestly not sure how much of it was the fact that we were actually laying down, that might have played into it or, I don't know. I've felt just better health-wise in general, so I don't know if that's part of it too."*

Several participants described having physical pain before coming to yoga, and feeling alleviation or decrease in their pain by end of the class.

> Cari: *"There would be times I'd wake up in pain and laying on the heat pad and everything, but I'd still be in pain when I went to yoga, and then after yoga, I'd be feeling so much better, so it helped in that regard. I feel more relaxed, yet I'd have energy."*

> Gi: *"When I got here I had a really, really, really, really, really, really-I'm sorry, but it was a really bad headache…It was just burning this morning. I almost didn't come. I was just hurting. I felt real off balance, but, you know, I feel pretty good right now."*

Physical changes were not consistent across all participants. Erin described feeling more pain in her shoulder, knee, and groin during the second half of the intervention due to changing positions from seated, standing, and lying supine. She described how the experience would affect how she planned to continue practicing yoga.

> *"I'm going to try it [yoga] on my own like on the standing things, but I am not going to get down on the floor again cause it just takes…ugh."*

Cognitive awareness through scanning the body

Ann and Gi spoke about changes in their pain occurring as a result of changing their perception of pain. Instead of simply registering pain, they focused on becoming cognitively aware of the source and cause of their pain.

Ann: *"I think it's gone deeper like instead of just, 'this hurts,' I think it's kind of deeper like, 'where is that coming from?' kind of thing."*

Gi: *"My thought process is to - where am I hurting? Don't stand up and take a step and then realize that your back is not only sore, it's weak now…I think that the yoga has changed my thought process a little bit just because that's what she was teaching…Take your time. Think about what you're doing. Find out how your body's feeling and stuff like that, and that was something that…I didn't do on a regular basis and I do much more of now than I used to."*

Many participants attributed an increased awareness to the strategy of mentally scanning the body and bringing attention to the relaxation of individual body parts. The yoga teacher used this strategy towards the end of each yoga session by verbally guiding the participants to bring attention to and relax individual body parts.

Cari:*"When she's [yoga teacher's] doing the body scan, it reminds me for some reason I always am pushing my tongue up against the roof of my mouth…and the fact that she is like, you know, she says 'relax your tongue,' and I'm like, 'oh, it's not relaxed again'…so it helps because she made me aware of that, even outside of yoga."*

Fiona: *"I just got this general message…telling me…that it's normal and that it's ok to, you know, pay attention to your body, and that's a hard one for me, but just having the awareness that you know gives you what to look for."*

Emotional connection through supporting each other

Many participants reflected on feeling an emotional connection among their peers within the intervention and with the yoga teacher. Gi exemplified the experience of connection by stating, "this group is just nice to communicate and be in the fellowship of you guys being in my yoga class, where you guys understand." Participants described feeling supported and encouraged by fellow members leading to stronger connections. This theme is best exemplified in the following exchange that occurred during the focus group as a response to Bill's expression of frustration and discouragement regarding regaining strength and balance in his recovery.

Bill: "*I was in good shape."*

Ann: "*But that's not your value. It is not your value."*

Cari: "*Yes. Your value is you, not what you're pressing, not what you're walking. You're your own value and you have to accept you're different, but that doesn't mean you have to stay in this spot. You are different and you can progress from here."*

Ann: "*And just because you're different doesn't mean you're not as good."*

Gi: "*Bill, I'm not going to talk down to you. I'm not going to give you advice. I'm not going to tell you how to feel or not feel. I'm not going to tell you whether you want to go to this senior building.* [Takes deep inhale] *I am…"*

Group response: "*Strong."*

In an offering of support, Gi led his fellow participants in reciting an affirmation commonly used throughout the yoga intervention. The participants' commonalities of experiencing and understanding brain injuries and participating together in the yoga intervention created a connection that resulted in emotional support.

Effect on daily life occupations

As participants progressed through the yoga intervention, they described ways in which their experiences affected occupations outside of the yoga intervention. Participants described yoga influencing social interaction and health maintenance.

Body and breath awareness helps health maintenance and sleep

For Gi, body awareness, or the idea of sensing and realizing how his body feels, led to understanding his body's capacity, which helped with balance and fall avoidance at home.

> *"Now I sit up in bed, and I take notice of where I am, you know, and what is hurting…and I can stretch and move and sometimes I can stand up and just reach for the door handle. I'm not worried about wobbling or stuff like that. She [yoga teacher] has helped me to take that notice of where that knot was or concentrate and just hold it. Just hold it, and stretch it a little bit, and just get it out of there, and then when I stand up I'm not, you know, I'm not losing my balance because I've got a knot in my back."*

Similarly, both Cari and Ann felt their increased body awareness aided in health maintenance at home when experiencing health challenges. Cari occasionally experiences "episodes" which she

described as intense nausea, dizziness, and headaches. She described how knowledge of her body's capacity led to avoidance of an episode.

> *"Then on that Thursday as soon as I started to feel that [episode coming on], I was like I'm done. I walked away from the jigsaw puzzle and came in here and just, you know, I just relaxed, ate something, and chilled for a little bit and it didn't go into a full blown episode for me…It's [yoga's] helped me make – be a little bit more focused on my body and realize some things that I could do to help prevent an episode coming and stuff, so yeah, it's been definitely helpful."*

Ann is prone to seizures and in the second month of the yoga intervention while she was at home, had three seizures within 24 hours. She described yoga's impact on her recovery.

> *"I think I had more health problems the second half [of the yoga class] cause I had a couple falls and I had-I started having large seizures, but I think I recovered from them faster with the yoga than I would have without it."*

Participants described using breath work including focusing on breathing and aligning breathing with movement in their daily life activities to decrease overwhelming feelings of stress and to aid in sleep/wake cycles. Bill described using ujjayi breathing, a technique taught by the yoga teacher, to transition to sleep. Ujjayi breathing involves diaphragmatic breathing with a constriction of the throat, which Bill playfully referred to as the "Luigi" breath.

> *"I can at least breathe through my nose. And I use it at night when I go to sleep. I use it to help me go to sleep. I tell [the yoga teacher] I go to my Luigi breath. That's the breath that makes noise."*

Ann described using the breathing techniques in the morning to aid in waking.

> *"When I get up in the morning, the first thing I do now is take some deep breaths and stretch, and that wakes me up, whereas before, I don't think I was doing that, and I think that I was foggier longer, and it took me longer to wake up."*

Social interaction leads to social participation outside of yoga intervention

All participants expressed experiencing increased social interaction as a result of the group yoga intervention. For some, friendships developed between participants that extended beyond the yoga class. Fiona spoke of her relationship with Erin.

> *"She showed me a side of myself that I didn't know really existed, and I was like-it was amazing! … it's amazing what one connection can do."*

Erin did not have a vehicle to use to drive to the yoga classes and expressed interest in carpooling with other participants, as the research laboratory was reachable only by car via a dirt road or a 10-minute uphill walk from the nearest bus stop. Fiona began giving Erin rides and the two formed a friendship.

> *"So, you know I was more than happy to help out whenever I could and she did a lot for me, and she was very inspirational for me and, you know, our conversations, you know, days that were bad and she just has that sense of humor."*

Fiona described her social interaction with Erin impacting her perception of relationships on a broader scale.

> *"I learned that it's not so scary to get to know someone, even if they're not like me on the surface…I know that there's been times when I've wanted to do certain things, and I shy away from 'em if it's with other people. So that was another lesson, like something I learned about myself, you know? That I'm - I know I'm not alone, but to really know I'm not alone, you know? There's a difference from – between when the head stuff goes to your heart."*

Connections initiated through the yoga intervention often developed into social interactions outside of the intervention. Erin spoke of Dan's offer to help her set up her home computer, and Bill described giving Dan rides to the laboratory entrance from the bus stop. Cari described creating a new, shared occupation with her caregiver as a result of attending the yoga intervention together.

> *"Almost every day after yoga, [my caregiver] and I would go for a walk for an hour…and that was part of what was, you know, it was just great! We'd have yoga. We'd get all loosened up and, you know, made it so that we were ready to walk."*

Discussion

This study provides an initial understanding of the experiences of engaging in a group adapted yoga intervention from the perspective of individuals with chronic TBI. Based on the

interpretation of the reoccurring themes experienced by the seven participants, three major inferences developed. First, it appears that the experience of physical, emotional, and cognitive benefits occurred secondary to the establishment of a safe and comfortable environment. Second, despite beginning expectations of experiencing only physical benefits from yoga, it appears that participants experienced benefits on a more holistic level with improvements expanding beyond physical levels to emotional and cognitive aspects as well. Finally, it seems that learned yoga techniques and social interactions experienced during the yoga sessions affected daily occupations outside of the intervention. The following sections address each of these inferences.

Establishment of a safe environment

Prior to experiencing benefits, participants in this study described feelings of physical, emotional, and cognitive comfort within the environment where the yoga intervention occurred. Feelings of comfort and safety were described as resulting from the existence of commonalities among fellow participants, including having a TBI and belonging to the same support group. In this study, creation of a safe environment occurred through the intentional use of inclusion criteria of having the same diagnosis (chronic TBI) and the unintentional recruitment from a single TBI support group. An additional intentional strategy was the use of a yoga teacher who is also an OTR/L. The OT therefore possesses the knowledge of adaptation and modification of the physical environment to fit the needs of individuals with TBI.

Disability and rehabilitation literature supports the idea that the benefits of rehabilitative yoga are experienced through the preliminary establishment of a safe social and physical environment. Garrett et al. (2011) evaluated the effects of a ten-week yoga program for people with stroke. Participants described how the environment of the intervention affected their ability to experience outcomes. For example, participants in Garrett's study described an environment in

which they felt safe knowing the yoga teacher had knowledge of their physical and cognitive limitations, and they felt no pressure or judgment of their abilities and were encouraged to stop if they felt pain. Such descriptions align with the findings in the current study of the significant role of safety in promoting therapeutic change, whether it is physical, emotional, or cognitive. Hammel et al. (2008), qualitatively explored the meaning of participation for individuals with disabilities, and their results further support the importance of safety and security in eliciting change. Participants in the study by Hammel et al. (2008) described active engagement in all daily life activities as being contingent on feelings of personal security within the social environment. This finding directly supports the finding in the current study, that therapeutic changes during the yoga intervention were predicated upon participants feeling socially and physically safe within the intervention environment.

Benefits beyond beginning expectations

It appears that the participants experienced the yoga intervention as a process. The process began with expectations of physical benefits, and then progressed to feelings of comfort and safety within the intervention environment, which finally led to cognitive, emotional, and physical benefits. Throughout this process, participants' expectations of the benefits of yoga expanded. Participants began to experience a broadening cognitive awareness of their body and breath through learning and practicing yoga techniques including body scans and Ujjayi breath. Additionally, participants exemplified emotional connection to one another through peer support and the use of the strategy of affirmation.

Yoga being beneficial to individuals with TBI on physical, emotional, and cognitive levels is supported by clinical research. In a case study of one-on-one yoga for individuals with TBI, Schmid et al. (2015) found that participants experienced several physical benefits including:

decreased pain; increased balance and balance confidence; increased strength; and increased endurance. The findings of Schmid et al. (2015) support the experiences described by participants in the current study in that, some discussed that practicing yoga decreased their physical pain and led to increased physical abilities.

Donnelly et al. (2017) completed a pilot study exploring adapted yoga for individuals with acquired brain injury (ABI); they found significant improvements in the Emotions and Feelings subscales of the Quality-of-Life After Brain Injury instrument. The control group, by comparison, did not significantly improve their scores. Their results indicate that the participants experienced increased emotional satisfaction and decreased negative emotions after participating in the yoga intervention. Additionally, Donnelly et al. (2017) reports that participants described experiences of increased body awareness and emotional connection with other participants in the group. Their findings support themes of the current study including experiences of emotional connection and cognitive awareness.

In a study of breath-focused yoga for individuals with TBI, Silverthorne et al. (2012) found significant improvements in emotional well-being in addition to improved physical functioning and decreased pain. This supports the finding of emotional connection discussed by participants in the current study, where participants talked about experiencing emotional changes that were potentially enhanced by both the yoga intervention and the supportive social environment.

Johansson et al. (2012) conducted a study of a mindfulness-based stress reduction intervention, which included yoga for individuals with TBI. Participants in this study improved cognitive ability in multiple areas, including improved processing speed and word fluency for individuals in the intervention groups. These findings are consistent with the theme in the current

study of enhanced cognitive awareness through use of techniques learned in the intervention such as body scanning.

Experiences affect daily life

Participants attributed the improvements they experienced during the yoga intervention to several factors including learning breathing and body scan techniques. They described the use of these techniques in activities of their daily life to improve aspects of their health maintenance. Participants also described experiences of social interaction during the yoga intervention leading to socialization with other participants outside of the yoga sessions. In some cases this socialization led to friendships that affected daily life social participation.

Similar findings of the benefits of yoga affecting daily life are seen in rehabilitation literature. Two of the three participants in the study conducted by Schmid et al. (2015) expressed instances where the benefits they experienced in yoga influenced their participation in daily life activities. One participant spoke of a return to a valued activity of playing the piano after developing increased posture and body awareness through yoga. Another participant described how increased stamina and finger dexterity gained through the yoga intervention led to improved performance in golfing. The findings of Schmid et al. (2015) parallel the theme found in the current study of experiences in yoga positively affecting daily life activities (occupations) including health maintenance and social interaction.

Additionally, Gerber and Gargaro (2015) evaluated a day program for individuals with ABI, which included yoga among other activities. They found that the program was effective in decreasing social isolation and increasing community reintegration. Social isolation and community reintegration were also were discussed in the current study, where participants

indicated that social interaction during yoga led to social participation outside of the yoga intervention.

Clinical implications

Figure 1 illustrates the participants' experience of the yoga intervention and indicates the dynamic process of the experience as the yoga intervention progressed. This model illustrates the importance of implementing intentional strategies when designing rehabilitation interventions to increase the likelihood of physical, emotional, and cognitive outcomes. Based on the results of this study these strategies include creating a physically, cognitively, and emotionally safe environment throughout. Practitioners designing an adapted group yoga intervention for individuals with TBI might consider implementing similar strategies. Strategies may include: inclusion of similar participants; advanced yoga teacher knowledge in adaptation and modification of the environment through dual practice in OT; re-conceptualization of yoga as pain free and non-competitive; and use of yoga principles including breath through movement and body scanning to facilitate relaxation and body awareness.

Additionally, yoga appears to be beneficial to individuals with TBI by impacting physical, emotional, and cognitive domains. Because cognitive and psychosocial deficits persist or appear as secondary problems later in the TBI disease process, yoga may be a valuable rehabilitation option for individuals in the chronic stage (Andelic et al., 2010; Cantor & Gumber, 2013; Geurtsen et al., 2010).

Finally, the results of this study coincide with recent literature acknowledging the functional benefits gained through the use of complementary integrative health approaches in physical rehabilitation for individuals with TBI (Hardison & Roll, 2016). Specifically, the data suggesting that engaging in yoga affected the participants in their daily lives has great

implications for the field of occupational therapy. Occupational therapy and yoga share holistic views of the person, and through yoga, occupational therapists may help clients achieve enhancement of the mind, body, and spirit to improve their overall well-being and quality of life (Mailoo, 2005).

Strengths and limitations

The use of multiple validation strategies (Creswell, 2013), implemented throughout the data collection and analysis processes, strengthened the rigor of this study. The author maintained *prolonged engagement and persistent observation* in the field by observing all yoga sessions, conducting all interviews and focus groups, and transcribing all study data (*triangulation of data sources*). The triangulating analyst process provided an external check of the research process and kept the primary author authentic in methods and meanings ascribed to the data. Creswell (2013, p. 253) recommends using at least two validation strategies, and our use of multiple strategies indicates the high degree of rigor observed by the author, and thus strengthened the study results.

Furthermore, although the study sample was small, it included participants of varying mechanisms of injury and years since injury, ranging from 1-33. These variations strengthen the study results in that they reflect the views of a relatively broad scope of individuals despite the study's small sample size.

The nature of qualitative research is that study findings are not intended to be generalizable to a broader audience beyond the participants themselves. While the emphasis of studying the experiences of one small group intensely over time is a strength of the qualitative paradigm in this phenomenology, this study's methods obviously limit the possibility of readers to apply findings appropriately to a larger population than those involved. Another potential

limitation of this study is the timing related to data collection on the initial expectations of the yoga course outcomes by the study participants. Participants were asked to reflect on their expectations for the yoga intervention, retrospectively, during their final interview at the conclusion of the intervention. By this time the experience of engaging in the intervention could have affected how they expressed their initial expectations. Asking participants to explain their expectations prior to the beginning of the intervention would have strengthened this portion of the study's data.

Furthermore, it cannot be concluded that the participants experienced therapeutic changes solely because of yoga or the safe environment created through the commonalities between participants. This study aimed to explore the participants' experiences and not to compare experiences of individuals in a TBI-only intervention with those in an intervention including individuals of varying abilities. Of additional note, benefits could have occurred simply because the intervention required participants to leave their home twice a week and navigate their way to the research lab for yoga class. The intervention also required them to reflect upon their experience through narrative storytelling during individual interviews and focus groups. All of these elements of the intervention require physical, emotional, and cognitive engagement not directly linked to the activity of practicing yoga, but are possible reasons for experiencing therapeutic benefits. There was not a control group for this pilot study, so it is impossible to know.

Finally, while several validation strategies were used to increase rigor, member checking, or the process of soliciting participants' views of the credibility of the findings and interpretations (Creswell, 2013) was not employed. While member checking would have added increased the credibility of the study, contact with the participants beyond the final interviews

was not stipulated in the original IRB proposal, and data analysis took place several months after data collection. Therefore, aside from the IRB barrier to performing member checks, it was determined by the researcher that member checking accuracy would be difficult considering the length of time that had passed since the intervention, and the memory problems reported by many of the participants, due to their brain injuries. There was tremendous overlap between the stories and statements made by the participants in the focus groups and in their individual interviews. This consistency of reporting by the study participants helps to provide support for the accuracy of the findings of this study, which may offset somewhat the impossibility of the researcher to perform member checks.

Despite these limitations, this study provides important insights regarding the experiences of individuals with TBI in engaging in an adapted yoga intervention. The implications of these experiences can be used to inspire future research exploring the benefits of yoga for the population of individuals with chronic TBI. Possible future research could include a randomized comparison trial with a larger sample size comparing yoga to a different intervention. The comparison group in a yoga study of this kind will need to control for important aspects of the intervention. Examples of controlled aspects include both groups: attending the same amount of sessions in the same physical environment; being taught by an interventionist who is also a therapist; spending the same amount time with the therapist; and having similar group sizes. It may also be helpful to incorporate a mixed-methods design and compare the outcomes of a group in which both quantitative data qualitative measures are taken with those of a group in which only quantitative measures are taken, in order to explore the possibility of the influence of the narrative method on therapeutic outcomes.

Conclusion

The individuals with chronic TBI in this study experienced the adapted yoga intervention as a process. Prior to beginning the study, they expected physical benefits from yoga. Halfway through the intervention they experienced feelings of safety and comfort within the intervention environment. Finally, their experiences of comfort and safety led to physical, emotional, and cognitive changes. Participants also described how these changes affected aspects of their daily life including health maintenance and social participation. This study provides insight into how an adapted group yoga intervention is experienced by a group of individuals with chronic TBI. The results support recent literature acknowledging the functional benefits gained through the use of complementary integrative health approaches in physical rehabilitation for individuals with TBI (Hardison & Roll, 2016). Additionally, the participants provided insight into the importance of establishing a safe and secure intervention environment to promote desired outcomes. The positive outcomes experienced by participants indicate the need for further study of adapted group yoga as a possible intervention strategy for individuals with chronic TBI.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Table 5. Participant demographics.

Partic-ipant	Age	Gender	Marital Status	Highest Education	Years Since TBI	Cause of Injury	Assistive Device
Ann	54	F	Divorced	SPG	1	Car collision	Cane*
Bill	69	M	Married	CG	3	Car collision	Cane*
Cari	57	F	Divorced	SC	4	Car collision	Cane*
Dan	46	M	Married	CG	3	Car collision	None
Erin	57	F	Single	CG	33	Brain surgery	None
Fiona	51	F	Divorced	PGD	9	Suicide attempt (anoxia)	None
Gi	61	M	Married	SPG	21	Car collision	Cane*

Note: *, occasional use; education: SC, some college; CG, college graduate; SPG, some post-graduate; PGD, post-graduate degree; M, male

Table 6. Affirmations used during session one and two of each week.

Week	Session 1	Session 2
1	*No affirmation introduced*	*No affirmation introduced*
2	*No affirmation introduced*	*No affirmation introduced*
3	*No affirmation introduced*	I am strong.
4	I am brave.	I am open.
5	I am learning.	I am enough.
6	I am free.	Just be here now.
7	I am courageous.	I am whole.
8	I am present.	I am strong.

Note: All affirmations were integrated into breath work (inhale on first two syllables and exhale on final 1 or 2 syllables).

Table 7. Sample focus group/interview questions.

Mid-way focus group
• What do you think about this yoga class so far? What do you like and not like?
• Have you noticed any changes in your life as a result of adding this class to your schedule?
• What hopes do you have for the rest of the class?
• What does yoga mean to you?
Final focus group
• Has anything changed in the second half of yoga class that you'd like to share?
• Have you noticed any new changes in your daily life since our last focus group?
• What hopes do you have beyond this class?
• In one statement, tell me what you have learned in this program that you will take with you into your life.
Individual interviews
• Please tell me about your experience of participating in this group yoga intervention.
• Is there anything you feel has changed in your daily life as a result of practicing yoga?
• Did practicing yoga help you pay attention to your body sensations? How so?

Note: In addition to these and similar inquiries, the participant was asked to comment upon a photograph of him/her in a yoga posture during a session as part of the individual interview to illicit self-reflection.

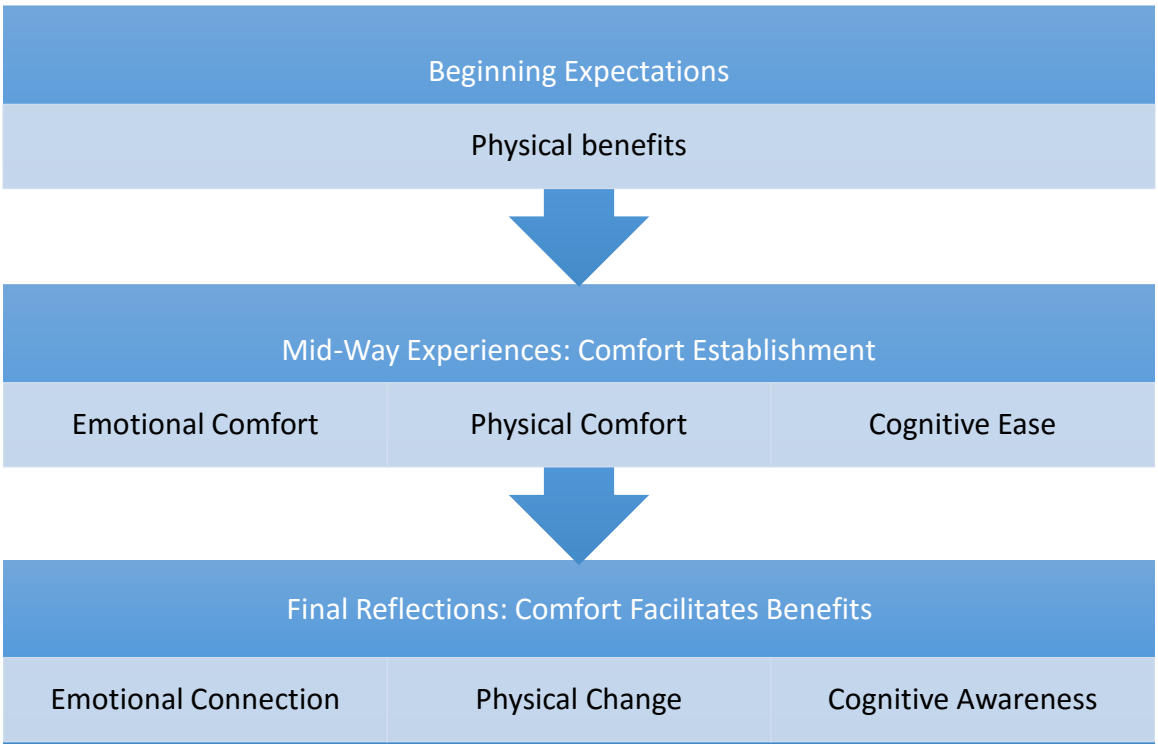

Figure 1. Chronological model of the adapted yoga intervention experience

CHAPTER 5: CONCLUSION

Individuals with chronic TBI often experience disabling physical, cognitive, and emotional deficits, which negatively impact community reintegration, social participation, and health management and maintenance (Andelic et al., 2010; Centers for Disease Control and Prevention, 2015; Conti, 2012; Shah et al., 2004). This qualitative study found that individuals with chronic TBI who engage in an adapted group yoga intervention experience physical, cognitive, and emotional changes, many of which are beneficial to their everyday occupations and recovery in general. The participants likely experienced these changes as a result of the establishment of feelings of safety and commonality among participants within the intervention environment, and by progressively expanding their expectations and understanding of yoga. Experiences therefore occurred progressively as the intervention advanced.

Implications for Occupational Therapy

The results of this study coincide with recent literature acknowledging the functional benefits gained through the use of complementary integrative health approaches in physical rehabilitation for individuals with TBI (Hardison & Roll, 2016). Specifically, the self-described impact of the practice of yoga upon participants' daily life occupations has great implications for the field of OT. Occupational therapists have the unique knowledge of the environmental influence on participation in daily occupations and outcome achievement, as well as the importance of client-centered care. These attributes uniquely position OTs with proper yoga training to deliver adapted programs to benefit individuals with chronic TBI in enhancing performance in daily occupations. In this study, the yoga instructor's ability to combine her knowledge of yoga with her knowledge of environmental adaptation gained through her

experience as an OT, allowed her to create a safe and comfortable learning environment for the participants. Her dual knowledge of yoga and therapeutic rehabilitation speaks to the opportunity OTs have in using yoga as a modality for individuals with physical, cognitive, and emotional challenges through adaptation based on an individual's personal factors and goals.

Additionally, the findings of this study reinforce the importance of soliciting client insight in order to adapt interventions to suit individual needs and preferences, which is a cornerstone of goal creation and intervention implementation in OT practice (Stephens et al., 2015). Research has shown that individuals with TBI highly value a therapist's establishment of a relationship that uses a person-centered process of engaging in treatment (D'Cruz et al., 2016). These insights imply that OTs have a unique opportunity to provide treatment to individuals with TBI that meets their individual needs through exploration and understanding of personal factors that may affect treatment. Furthermore, a client's personal investment in his or her own rehabilitation, through client-tailored intervention and active client engagement in the treatment process, may inspire greater outcome achievement (Stephens et al., 2015).

Occupational therapy literature describes the specific cognitive and behavioral benefits of mindfulness techniques similar to yoga for the population of individuals with chronic TBI (Azulay, Smart, Mott, & Cicerone, 2013; Bedard et al., 2014; Cantor & Gumber, 2013; Hardison & Roll, 2016). The combination of the holistic modality of yoga and holistic OT beliefs and practices potentially provides the means to aid participants in re-conceptualizing the TBI disease process as a healing journey through yoga. Further research exploring yoga interventions for this population is therefore necessary to continue to strengthen evidence of potential benefits.

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LIST OF ABBREVIATIONS

AA	Alcoholics Anonymous
ABI	Acquired Brain Injury
CIH	Complementary and Integrative Health
CDC	Centers for Disease Control and Prevention
CVA	Cardiovascular Accident
IRB	Institutional Review Board
MBCT	Mindfulness-Based Cognitive Therapy
MBSR	Mindfulness-Based Stress Reduction
OT	Occupational Therapy
OTR/L	Registered and Licensed Occupational Therapist
PTSD	Post Traumatic Stress Disorder
TBI	Traumatic Brain Injury