

NEEDS AND CONCERNS OF COMBAT VETERANS WITH MILD TRAUMATIC
BRAIN INJURY AND THE DEVELOPMENT OF THE VETERANS COMPENSATE,
ADAPT, REINTEGRATE INTERVENTION

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DEDICATION

I would like to dedicate this study to my parents. First, to my mother, Jocie Mae Daggett, who had the ambition to become a surgical nurse in her youth, yet had to cease her nursing training during her second year due to an illness. She was my foremost role model who supported me during each of my nursing educational endeavors and encouraged me forward, even throughout the course of her extensive fight with pulmonary fibrosis that ended in May 2009. Second, to my father, Robert Orin Daggett, a Korean veteran, who has taught me family and life values, work ethics, and the meaning of being an American, serving others.

I would like to further dedicate this study to our U.S. veterans who have served our country, and allow me to serve them within the Department of Veterans Affairs as a professional nurse.

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ABSTRACT

Virginia Sue Daggett

NEEDS AND CONCERNS OF COMBAT VETERANS WITH MILD TRAUMATIC BRAIN INJURY AND THE DEVELOPMENT OF THE VETERANS COMPENSATE, ADAPT, REINTEGRATE INTERVENTION

Traumatic brain injury (TBI) has emerged as a major cause of morbidity among U.S. soldiers who have served in Iraq and Afghanistan. Even mild TBI (mTBI) can result in cognitive impairments that can impact how veterans experience such things as physical symptoms, emotions and behaviors, instrumental activities of daily living, interpersonal interactions, and community reintegration. The purpose of this study was to develop a comprehensive self-management intervention for veterans with mTBI to facilitate their community reintegration upon returning from deployment to combat zones. This study was conducted in two Phases. Phase I entailed collecting qualitative data regarding needs, concerns, strategies used, and advice given by eight veterans with mTBI, guided by a conceptual model derived from Ferrans' and colleagues' health-related quality of life model and the TBI literature. Six key categories and predominant themes emerged providing further support for the model (cognitive impairments, physical symptoms, emotions and behaviors, instrumental activities of daily living, interpersonal interactions, and community reintegration). Guided by the conceptual model, a mTBI Veteran Needs and Concerns Checklist and 14 algorithms making up the VETeranS Compensate, Adapt, REintegrate (VETSCARE) intervention were developed. Phase II entailed obtaining review of the mTBI Veteran Needs and Concerns Checklist and the 14 VETSCARE algorithms from six TBI experts. On a scale of 1 to 5, with 5 being strongly agree, expert

ratings provided moderate evidence of content validity for the checklist (3.33), and for the 14 algorithms (problem relevance 3.92, accuracy 3.73, feasibility 3.80, acceptability 3.84). The average overall expert rating for the VETSCARE intervention was 3.82. The checklist and the 14 algorithms are being revised based on specific comments provided by the experts. Once revised, the mTBI Veteran Needs and Concerns Checklist and the VETSCARE intervention will be tested for feasibility in a future pilot study with veterans with mTBI who have recently returned from combat zones in Iraq and Afghanistan.

Tamilyn Bakas, PhD, RN, FAHA, FAAN, Chair

Military conflict leaves a legacy in the psyche of those warriors who later become known as veterans. And although the precise content, nature, and burden of the legacy varies according to the roles and responsibilities of the combatant, it is generally the case that the immersion of grotesque realities of killing and destruction creates a lasting imprint in memory that profoundly alters an individual's sense of humaneness and dignity.

– John P. Wilson, *Understanding the Vietnam Veteran*

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ABBREVIATIONS

Abbreviations	Terms
CDC	Centers for Disease Control and Prevention
HRQOL	Health-related quality of life
IADL	Instrumental activities of daily living
mTBI	Mild traumatic brain injury
PDA	Personal digital assistant
PTSD	Post-Traumatic Stress Disorder
TBI	Traumatic brain injury
VA	Veterans Affairs
VETSCARE	VETeranS Compensate, Adapt, REintegrate

CHAPTER ONE
THE NATURE OF THE STUDY

Introduction

Approximately 1.7 million U.S. soldiers have been deployed to Iraq and Afghanistan (Sayer, 2008). Of these, 2,725 soldiers have been wounded in action during Operation Enduring Freedom and 31,131 have been wounded during Operation Iraqi Freedom (U.S. Department of Defense, 2009). Traumatic brain injury (TBI) has emerged as a major cause of morbidity among U.S. soldiers who have served in these ongoing conflicts. Brain trauma has been acknowledged by military healthcare providers as the “signature wound of the Iraqi War” (Brain Injury Association of America, 2006; Zoroya, 2005).

Exposure to improvised explosive devices, rocket-propelled grenades, and mines increase a soldier’s risk of receiving a TBI. Currently, blast injuries account for over 50% of all combat injuries sustained in Iraq and Afghanistan. From 2003 to 2005, 51% of 862 injured soldiers who were screened at Walter Reed Army Medical Center sustained a brain injury (Brain Injury Association of America, 2006). While penetrating brain trauma events are apparent immediately, mild traumatic brain injuries (mTBI) often go unrecognized because of emergent medical evacuation and evaluation in the war theater (Martin, Lu, Helmick, French, & Warden, 2008; McCrea et al., 2008). As a result, many veterans with mTBI go without timely diagnosis, evaluation, or treatment; the injuries are not discovered until years later when the veterans have difficulty reintegrating into the community.

The U.S. Department of Veterans Affairs faces challenges in screening and evaluating soldiers for mTBI because the symptoms of this type of injury may mirror those of other disorders such as post-traumatic stress disorder (PTSD), depression, anxiety disorder, and adjustment disorder (Seal, Bertenthal, Miner, Sen, & Marmar, 2007; U.S. Government Accountability Office, 2008). Successful reintegration is likely to be compromised by TBI-associated long-term cognitive deficits.

Community reintegration is a broad, multidimensional concept that varies in definitions and outcome measurements. In fact, the terms *community integration* and *community reintegration* are used interchangeably in TBI literature. In 2005, Reistetter and Abreu (2005) described community integration as a dynamic process that is both personal and cultural. Other researchers have noted that community integration includes not only self-care and physical function but also takes into account vocational, social, and community roles (Reistetter & Abreu, 2005; Salter, Foley, Jutail, Bayley, & Teasell, 2008; Winkler, Unsworth & Sloan, 2006). Further, Mosby's dictionary defines community reintegration as "the return and acceptance of a disabled person as a participating member of the community" (The Free Dictionary, n.d.). In a recent systematic review of community reintegration following acquired brain injury, McCabe et al. (2007) stated that community reintegration is a

multidimensional concept [that] includes but is not limited to aspects of human functioning such as independence, social relationships, productivity, and leisure, all of which are significantly impacted by an acquired brain injury....Successful community reintegration is rooted in the quality of rehabilitation interventions addressing subskills such as attention, memory, communication, motor functioning. (p. 231)

Attention, concentration, learning, and executive control dysfunctions and memory deficits are the most distinct cognitive difficulties resulting from TBI. Prompt

diagnosis is important particularly for patients with mTBI because the prognosis for improvement in cognitive function plateaus at one year with or without treatment (Sloane, 2006). In addition, a number of soldiers simultaneously experience other physical trauma such as amputations and burns. They experience extensive recovery with unique rehabilitation challenges. They have long-term healthcare issues that include pain management, special prosthetics, and limited ability to communicate. Their healthcare issues are highly complex and involve multiple domains of their daily functioning.

The Defense and Veterans Brain Injury Center represents collaboration between the U.S. Department of Defense and the U.S. Department of Veterans Affairs to serve active duty soldiers, their dependents, and veterans with TBI through integrated healthcare, clinical research, and educational programs. This partnership has identified the following system needs to improve care for veterans with combat-related TBI: (1) to increase resources for the Defense and Veterans Brain Injury Center, (2) to implement TBI screening for all soldiers returning from deployment, (3) to expand community services, (4) to enhance access to care, (5) to increase care management services for survivors of TBI, and (6) to broaden efforts to educate communities about TBI (Brain Injury Association of America, 2006). While the system needs have been identified, little is known about the needs and concerns reported by adult survivors of TBI themselves, particularly in the context of returning combat veterans. Identifying the needs and concerns of these combat veterans will help to identify priority areas for intervention that will support system initiatives to expand community services, enhance access to care, and improve individualized care management services for veteran survivors of TBI.

Identifying the needs and concerns of these new combat veterans with mTBI is critical to the design of patient-directed and comprehensive nursing interventions within the Department of Veterans Affairs. Effective comprehensive nursing self-management interventions are needed to facilitate successful reintegration and to enhance health-related quality of life (HRQOL) for veterans with mTBI. Although the Veterans Affairs (VA) developed integrative healthcare teams to provide care for combat veterans with mTBI, these teams may not be logistically accessible. Furthermore, comprehensive nursing interventions to facilitate community reintegration for either veterans or civilians with mTBI do not exist. To design effective interventions for this population, the needs and concerns of veterans returning from combat with mTBI must be identified to help guide key intervention components designed to promote assessment, symptom monitoring, and self-management across multiple domains. Further, new interventions designed for this particular veteran population need to be technologically savvy to increase acceptability and adoption, mobile for flexibility, and Web-based for accessibility in both urban and rural settings (Martin et al., 2008).

Purpose, Specific Aims, and Research Questions

The purpose of this study was to develop a Web-based, comprehensive self-management intervention program for combat veterans with mTBI that has evidence of content validity from TBI experts. The study was conducted in two phases.

The specific aims for Phase I were:

Specific Aim 1. To identify needs, concerns, strategies used, and advice given by combat veterans with mTBI guided by a conceptual model derived from Ferrans' et al.

(2005) conceptual model of HRQOL and the TBI literature (Ferrans, Zerwic, Wilbur, & Larson, 2005).

- 1a. What are the most relevant needs and concerns of combat veterans with mTBI?
- 1b. What are the strategies used and advice given by combat veterans with mTBI?

Specific Aim 2. To develop a checklist by which to identify the needs and concerns of combat veterans with mTBI guided by a conceptual model derived from Ferrans' et al. conceptual model of HRQOL (Ferrans et al., 2005).

2. What are the categories and items of a checklist to identify the needs and concerns of combat veterans with mTBI?

Specific Aim 3. To develop algorithms and strategies in the context of cognitive impairments that address the needs and concerns on the checklist.

- 3a. What are the strategies in the context of cognitive impairments that address the needs and concerns identified on the checklist?
- 3b. What algorithms can be developed to deliver the assessment and strategies to combat veterans with mTBI by the VETeranS Compensate, Adapt, Reintegrate (VETSCARE) Web-based intervention?

The specific aim for Phase II was:

Specific Aim 4. To determine the evidence of content validity for the components of the VETSCARE Web-based intervention.

- 4a. What evidence of content validity is provided for the checklist to identify the needs and concerns?

- 4b. What evidence of content validity is provided for the strategies that address the needs and concerns?
- 4c. What evidence of content validity is provided for the planned algorithms of the VETSCARE Web-based intervention that address the checklist to identify the needs, concerns, and strategies?

Significance

A comprehensive intervention is needed urgently to facilitate the community reintegration of veterans with mTBI who have recently returned from serving in Iraq and Afghanistan. This study resulted in the development of the VETSCARE intervention content that is based on data provided by veterans and validated by TBI expert researchers and clinicians.

After completion of this initial study, funding opportunities will be explored in order to develop the Web-based VETSCARE intervention to be accessible via mobile technologies such as personal digital assistants (PDAs) so that a prototype can be tested for feasibility with a small group of veterans with TBI. Currently, PDAs or smart phones are available to combat veterans with TBI through the Department of Veterans Affairs; therefore, creating a self-management intervention program that is accessible by mobile devices may increase the utilization of existing resources by veterans. Future research will explore the efficacy of the VETSCARE intervention, with the long-term goal being to implement the intervention into practice to improve the HRQOL of returning combat veterans with mTBI. The VETSCARE intervention also has the potential to be adapted and used for adult civilians with mTBI.

Conceptual and Operational Definitions

Veteran Characteristics

Conceptual definition. Veteran characteristics were obtained to provide a description of the sample. The veteran characteristics included the following demographics: (1) age, (2) gender, (3) ethnicity/race, (4) marital status, (5) employment status, (6) years of education, (7) household income, (8) health insurance coverage, (9) combat-related pension, (10) living quarters, and (11) number of deployments to combat.

Operational definition. A demographic survey designed by the investigator measured the Iraq and Afghanistan veterans' characteristics noted above.

Needs and Concerns of Veterans with mTBI

Conceptual definition. The needs of veterans with mTBI were perceived needs that had not been fulfilled post-deployment through the characteristics of the environment, the VA healthcare system, and/or community resources for successful community reintegration. The concerns of veterans with mTBI were issues that had a direct effect on or were a matter of significance related to their unfulfilled perceived needs and community reintegration.

Operational definition. Open-ended interview questions were designed to collect data to explore the needs and concerns of veterans with mTBI during the first year of follow-up care within the VA healthcare system. Interview questions included the following:

1. Describe a normal day in providing care for yourself.

2. What have been your greatest concerns or problems since you were discharged from the hospital and/or service?

Strategies Used and Advice Given

Conceptual definition. Strategies were compensatory behaviors used by veterans to address deficits that had resulted from receiving a mTBI. The strategies used were learned through rehabilitation services or self-taught by the veterans. Advice given was the recommendations veterans with mTBI proposed for other veterans with mTBI who were returning from deployment. Advice given was based on veterans' specific strategies and individual experiences.

Operational definition. Open-ended interview questions were designed to collect data to explore the strategies used and advice given of veterans with mTBI during the first year of follow-up care within the VA healthcare system. Interview questions included the following:

1. What strategies have helped you cope with these concerns or problems?
2. What advice would you give a comrade once he or she has been diagnosed with a mTBI sustained in combat?

VETSCARE Intervention

Conceptual definition. The VETSCARE intervention consists of conceptual components derived from the needs and concerns that were reported by veterans with mTBI as informed by a conceptual model derived from Ferrans' et al. conceptual model of HRQOL and the TBI literature (Ferrans et al., 2005). These components and subcategories are listed in Table 1.

Table 1.

Proposed VETSCARE Intervention

Conceptual Components	Subcategories
Cognition	I. Impairments <ul style="list-style-type: none">– Memory– Concentration– Executive Functioning
Symptoms	II. Physical <ul style="list-style-type: none">– Headaches– Fatigue/Insomnia– Tinnitus III. Emotions and behaviors <ul style="list-style-type: none">– Anger– Fear (uncertainty)– Depression (sadness)
Functional Status	IV. Instrumental activities of daily living (IADL) <ul style="list-style-type: none">– Work/school– Finances– Leisure activities

(table continues)

Conceptual Components	Subcategories
Characteristics of the Environment	V. Interpersonal interactions <ul style="list-style-type: none"> – Communication – Relationships – Support
	VI. Community reintegration <ul style="list-style-type: none"> – Return to combat unit – Adaptation to society – Expectations of others

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Operational definition. The VETSCARE intervention content addressed each of the conceptual components and subcategories derived from the needs and concerns that were reported by veterans with mTBI. The intervention content was recorded in paper form for expert review by TBI healthcare providers and researchers.

Algorithms

Conceptual definition. Algorithms were flow diagrams which illustrated logical pathways of assessment and strategies to assist veterans with mTBI in the management of their needs and concerns that have resulted from cognitive deficits of memory, attention, and executive functioning.

Operational definition. Algorithms of assessments and strategies were designed by the investigator and were tailored to assist veterans and address their needs and concerns. Algorithms were in paper form for expert review.

TBI Expert Characteristics

Conceptual definition. Characteristics of the TBI experts were obtained including (1) age, (2) gender, (3) type of expert, (4) education, (5) type of degree, (6) years as a professional, (7) years of experience providing TBI care, and (8) years of research and/or practice if respondent was a healthcare provider in the VA healthcare system.

Operational definition. A demographic survey designed by the investigator measured the TBI experts' characteristics noted above.

Content Validity

Conceptual definition. Characteristics of the VETSCARE intervention were assessed to ascertain content validity of the checklist to identify the needs and concerns, strategies, and algorithms based on TBI experts' ratings. The intervention characteristics assessed included problem relevance, accuracy, feasibility, and acceptability.

Operational definition. Rater forms designed by the investigator measured the level of problem relevance, accuracy, feasibility, and acceptability of the checklist to identify the needs and concerns. The rating form specifically requested the experts to rate the degree to which the content in each algorithm addressed the need or concern of the veteran with mTBI or problem relevance from which it was created. This definition of content validity was consistent with Bakas et al. (2009) and Trochim (2001) for interventions translating a cause construct into the actual intervention. TBI experts also were asked to provide comments and recommendations for improvement in the VETSCARE intervention content, including the checklist, to identify the needs and concerns, strategies used, and algorithms.

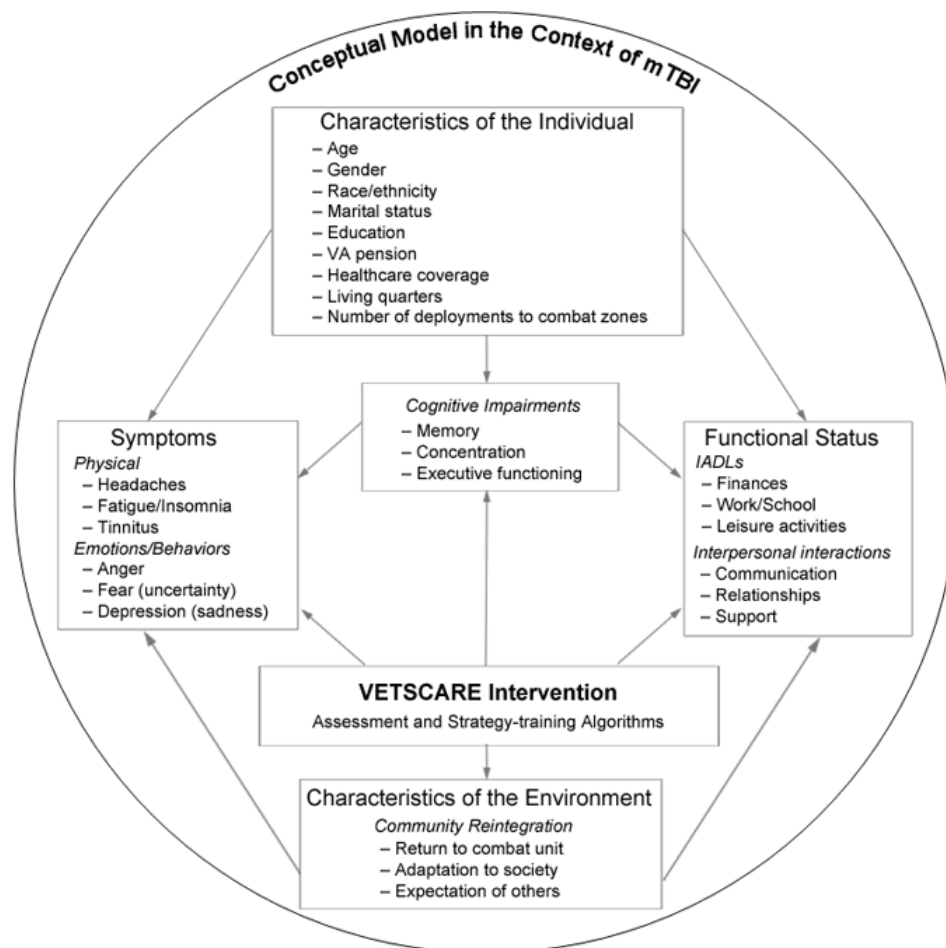
Conceptual Model

The conceptual model for the study was derived from Ferrans' et al. HRQOL conceptual model and the TBI literature (2005; see Figure 1). Recent TBI reviews indicated the need to organize and guide TBI research utilizing a comprehensive model as well as recognizing Ferrans' et al. (2005) model as an exemplar to encompass the domains of HRQOL relevant to survivors of TBI and the complexity of TBI (Daggett, Bakas, & Habermann, 2009; Petchprapai & Winkelman, 2007). Ferrans' et al. (2005) work was selected because it defines theoretically-based relationships among distinct domains. It encompasses the influences of individual and environmental characteristics that may be significant to combat veterans' TBI health-related outcomes post-deployment. Ferrans and colleagues derived their framework (2005) from Wilson and Cleary's (1995) model, which connects clinical factors to HRQOL, to create a conceptual model based on a taxonomy of patient outcomes. The model represents relationships among the basic concepts of HRQOL and consists of the following five taxonomy levels: biological/physiological factors, symptoms, functioning, general health perceptions, and overall quality of life (Wilson & Cleary, 1995). In 2005, Ferrans et al. integrated the influences and relationships of the characteristics of individual and the characteristics of the environment.

A conceptual model applicable to combat veterans with mTBI, derived from Ferrans' et al. (2005) model and the TBI literature, provided the initial framework for categorizing the needs and concerns of veterans. Further categorization of the needs and concerns helped to construct a thematic conceptual matrix that provided a guide to develop the remainder of the VETSCARE intervention (Miles & Huberman, 1994). The

intervention content was categorized into six key themes within the context of mTBI. The six themes were cognitive impairments, symptoms-physical, symptoms-emotions and behaviors, IADL, interpersonal interactions, and community reintegration. These then became the main components of the VETSCARE self-management intervention. Subsequently, the themes were subcategorized to develop strategies in response to the specific needs and concerns reported by veterans with mTBI. Figure 1 illustrates the model derived to address the needs and concerns of combat veterans in the context of cognitive impairment from mTBI.

Figure 1. Conceptual Model in the Context of mTBI



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Assumptions

1. Combat veterans with TBI will respond to interview questions honestly and accurately to the best of their knowledge.
2. Nurses can develop and test interventions that can ameliorate negative outcomes of combat veterans with mTBI at various points in their community reintegration.
3. Successful reintegration of combat veterans with TBI is amendable to a Web-based intervention.
4. Combat veterans with TBI can utilize a Web-based self-management program to assist them in their daily tasks and in multiple domains of their lives.

Limitations

1. Each participant was limited to one interview; therefore, there was not the opportunity to revalidate the themes with the veterans.
2. A non-probability, convenience sample was selected that may limit generalizability to other veteran-with-TBI populations.

The next chapter provides a description of Ferrans' et al. HRQOL conceptual model (2005), the importance of the model to nursing, and a review of literature addressing TBI in adult survivors, TBI in veterans, the needs and concerns of survivors of TBI, strategies used and advice given by survivors of TBI, and interventions used with adult survivors of TBI. The methodology of the study is presented in detail in Chapter Three and results are presented in Chapter Four. Chapter Five provides a discussion of the results and implications for nursing practice, research, and theory.

CHAPTER TWO

REVIEW OF LITERATURE

The preceding chapter summarized the nature of this study, integrating the problem, purpose, specific aims and research questions, conceptual and operational definitions of variables, conceptual model, assumptions, and limitations. This chapter presents a review of TBI in the U.S., TBI among U.S. veterans, individual characteristics of combat veterans, an overview of Ferrans' et al. conceptual model (2005) of HRQOL, and research findings relevant to this study.

Review of Literature

Care of survivors of TBI is shifting from the traditional focus of acute medical rehabilitation to post-acute care-in-community settings (U.S. Department of Health and Human Services/National Institutes of Health [USDHH/NIH], 1999). Research has noted that efforts to integrate care-in-community settings are not always successful. Care is often fragmented once persons with TBI are discharged from acute rehabilitation facilities (Nochi, 1998; Sample & Darragh, 1998; USDHH/NIH, 1999).

Healthcare providers in community-based settings are essential in the assessment of the needs and concerns of persons during the second phase of their TBI rehabilitation. To optimize the recovery outcomes of their patients with TBI, community healthcare providers should be thoroughly knowledgeable about TBI. They need to understand the physical, psychological, and social consequences of TBI that may impact the lives of persons with TBI and their family members. Not only is this knowledge critical for providers to make effective treatment decisions, but it is also essential in order for them

to appropriately respond to healthcare issues and manage symptoms of TBI (Swift & Wilson, 2001).

In this review of literature, the challenges that TBI creates in the U.S. and in veterans who have sustained TBI injuries in combat were identified. A description of Ferrans' et al. conceptual model (1995) is provided as the basis for the conceptual model for this study. The conceptual model for this study is presented in the context of cognitive impairments from mTBI and is used to organize needs and concerns relevant to combat veterans with mTBI.

TBI in the U.S.

In 2006, the Centers for Disease Control and Prevention (CDC) reported that 1.4 million Americans experience TBI each year in the U.S. resulting in 50,000 deaths, 235,000 hospitalizations, and 1.1 million emergency service evaluations and/or discharges. These injuries are the consequence of falls (28%), motor vehicle accidents (20%), struck by or against incidents (19%), and assaults (11%). In 2000, direct medical costs and indirect costs of TBI were estimated at \$60 billion. Furthermore, the CDC suggests that approximately 5.3 million Americans with TBI have lifelong needs for assistance in performing their activities of daily living post-injury (CDC, 2006; National Dissemination Center for Children with Disabilities, 2006; U.S. Department of Veterans Affairs, 2004). Consequently, these events significantly influence the quality of life of individuals with brain injuries and their families over an enduring length of time.

TBI in Veterans

Not only does TBI impact the lives of American civilians and their families, but TBI also significantly impacts the lives of our uniformed service personnel during eras of peace and conflict. In fact, brain trauma has been described as the *signature wound* of the Iraqi War (Brain Injury Association of America, 2006; Zoroya, 2005). Literature suggests the incidence of TBI among our military and veteran populations is 7,000 peacetime admissions per year. The prevalence of TBI among active duty males is 225 per 100,000, while the prevalence of TBI among active duty females is 150 per 100,000 (CDC, 2006; Vanderploeg et al., 2008). However, these statistics may underestimate the problem. Whereas penetrating brain trauma events are apparent, allowing for immediate medical evaluation and evacuation from the war theatres, mTBI are not as noticeable. These injuries may be overlooked because of more visible injuries. The accurate proportion of TBI among injured soldiers is in all probability higher because closed brain injuries are not diagnosed in a prompt manner (Brain Injury Association of America, 2006; Kronenberger & Sarkar, 2005; U.S. Government Accountability Office, n.d.). At Walter Reed Army Medical Center, 41% of soldiers from Operation Enduring Freedom and Operation Iraqi Freedom treated from January 2005 through February 2006 were diagnosed with TBI, 85% were closed head injuries (Vanderploeg et al., 2008).

Most often mTBI is not diagnosed in these soldiers until they have returned home and experienced deficits in functioning (Zeitzer & Brooks, 2008). According to the CDC and Zeitzer and Brooks, mTBI is defined as

as injury to the head arising from blunt trauma or acceleration or deceleration forces that result in one or more of the following: any period of confusion, disorientation, or impaired consciousness; any dysfunction of memory around the time of injury; loss of consciousness lasting less

than 30 minutes; or the onset of observed signs or symptoms of neurological or neuropsychological dysfunction. (CDC, 2003, p. 2; Zeitzer & Brooks, 2008, p. 347)

Blast injuries have been identified as one of the primary causes of mTBI in soldiers who return from combat. Even though blast injuries were traced to combat in the Vietnam and World War II conflicts, more soldiers have survived TBI from blast injuries sustained in Iraq and Afghanistan due to enhanced emergency services and improved body protection, thus decreasing mortality rates during the ongoing conflicts (Lew, Poole, Alvarez, & Moore, 2005; Zeitzer & Brooks, 2008). American soldiers have experienced patterns of injury during Iraq and Afghanistan military operations that were not typically seen in earlier conflicts (MacLennan et al., 2008). In addition, there have been an increased number of U.S. soldiers who return from deployment in Iraq with TBI than soldiers who sustained TBI and who returned from serving in earlier conflicts. There is a significant difference in the ratio of wounded-to-kill in Iraq than in previous conflicts. For example, Lehman (2008) reported that the ratio during the Vietnam conflict was 1.2 wounded troops to one killed troop whereas the ratio in Iraq has been 16 wounded troops to one killed troop. Survivorship from combat wounds sustained in Iraq have been attributed to improved armor, advanced field hospitals, and proximity to the Landstuhl, Germany, Regional Medical Center.

The nature of warfare in Iraq and Afghanistan is also unique from other U.S. conflicts as a result of the urban settings where bombs are embedded in vehicles and secured to human bodies injuries, resulting in blast injuries (Lehman, 2008; MacLennan et al., 2008; Martin et al., 2008). Alternative explosives such as improvised explosive devices, rocket-propelled grenades, land mines, and homemade weapons are employed,

thus increasing U.S. soldiers' vulnerability to direct or indirect blast injuries (Lehman, 2008; MacLennan et al., 2008; Martin et al., 2008).

Blast injuries result from complex pressure waves during an explosion and are categorized as primary, secondary, tertiary, and quaternary (Lehman, 2008; Martin et al., 2008; Zeitzer & Brooks, 2008).

While secondary blast injuries usually result from penetrating debris, tertiary and quaternary blast injuries result from a soldier's body being thrown against the ground or a solid object or result from injury sustained from the collapse of a structure.

The brain is especially susceptible to blast injuries because of the fragile structure of the cerebral cortex and axonal fibers (Lew, 2005; Zeitzer & Brooks, 2008). Further, it is exposed to potential contusion and shearing of bony prominences from these high impact explosions. For the purpose of this research, the focus was primary blast injuries.

Primary blast injuries consist of multiple phases (Lehman, 2008; Zeitzer & Brooks, 2008). First, the positive phase of the wave blast occurs, also known as overpressurization, from the compression of air in which the air pressure is higher than the atmospheric pressure. All body fluid-filled organs are susceptible to damage, including the brain. It has been posited that defects at the cellular level occur because areas of the brain expand then instantly decompress during this phase. Brain tissue is damaged from primary blast injuries through the four modes of (1) spalling, (2) implosion, (3) acceleration and deceleration, and (4) pressure differentials.

As spalling produces organ damage from dense fluid particles that are forcibly pushed through low dense fluid, implosion causes damage as gas pockets contract and re-expand (Lehman, 2008). Damage from acceleration and deceleration occurs as a blast

initiates movement of the body and internal organs in one direction, and the direction of movement suddenly is changed as a soldier encounters a blast from another direction or a soldier's body is thrown against the ground or a solid object. Lastly, primary blast injuries cause damage from pressure differentials during the blast in which different pressures exist between the outside of the body and the internal organs.

Polytrauma injury has been the outcome of many of these blast injuries (MacLennan et al., 2008). The Department of Veterans Affairs defines polytrauma as “injury to the brain in addition to other body parts or systems resulting in physical, cognitive, psychological, or psychosocial impairments and functional disability” (2005, p. 2). The degree of brain injury from blasts ranges from mild to severe, and affects cognition, speech, and the functioning of sensory organs (Lehman, 2008; MacLennan et al., 2008). Veterans with mTBI may experience physical, cognitive, behavioral, and emotional disorders (Rao & Lyketsos, 2000; Zeitzer & Brooks, 2008). The population of interest in this study was U.S. veterans who sustained an mTBI during combat.

Not only does polytrauma injury complicate medical treatment of veterans with mTBI, but individual and environmental characteristics also may influence the ways in which veterans with TBI may be treated medically. According to Lehman (2008), the Iraq war is the first U.S. conflict operated exclusively with volunteer troops who have been deployed multiple times to combat zones due to military staffing shortages. In fact, 40% of deployed troops to Iraq have been reservists who did not have expectations of deployment to combat zones. Their average age is 33 with 25% of all reservists 40 years of age or older. Further, more women are being deployed to combat zones (Lehman, 2008). There are many other personal characteristics such as marital status, education,

and VA pension benefits that may influence treatment. Environmental factors such as the veteran's adaptation to society and plans to return to Iraq are important as well.

In view of the fact that veterans with mTBI experience multiple complex injuries that result in issues when they return from deployment, the use of theory to guide research in this area is critical. The next section reviews Ferrans' et al. conceptual model (2005) of HRQOL and demonstrates how it can be utilized to guide TBI research in determining priority areas for interventions for combat veterans.

Overview of Ferrans' et al. (2005) Conceptual Model of HRQOL

In 2005, Ferrans and colleagues adopted the Wilson and Cleary HRQOL model (1995) and revised it to facilitate the use of HRQOL in research and clinical practice. Wilson and Cleary's model connects clinical factors to HRQOL to create a conceptual model based on a taxonomy of patient outcomes. This model integrates both the biomedical model (that focuses on etiologic agents, pathological processes, and biological, physiological, and clinical outcomes) and the social science paradigm, and the quality of life model (that focuses on dimensions of functioning, overall well-being, behaviors, and feelings). The model represents relationships between the basic concepts of HRQOL and consists of the following five taxonomy levels: biological/physiological factors, symptoms, functioning, general health perceptions, and overall quality of life (Wilson & Cleary, 1995). Each of these five determinants is influenced by both the characteristics of individual and the characteristics of the environment (Ferrans et al., 2005; Wilson & Cleary, 1995).

Ferrans et al. (2005) modified Wilson and Cleary's original model (1995) in two main ways: (1) Biological function was hypothesized to be affected by both

characteristics of the individual and characteristics of the environment, and (2) nonmedical factors were removed from the model as an influence on overall quality of life because all the nonmedical factors can be classified as either individual or environmental characteristics (Ferrans et al., 2005).

Ferrans' et al. revised conceptual model (2005) of HRQOL draws from McElroy and colleagues' ecological model (McElroy, Bibeau, Steckler, & Glanz, 1988) to illustrate the multiple layers of influence that impact health outcomes at both the individual and environmental levels. McElroy and colleagues' model is comprised of five layers of influence that include (a) intrapersonal characteristics, (b) interpersonal factors, (c) institutional factors, (d) community factors, and (e) public policy. Each of these layers is considered a characteristic of the environment with one exception: Intrapersonal factors are considered as characteristics of the individual (Ferrans et al., 2005).

Ferrans' et al. conceptual model (2005) of HRQOL also was guided by other diverse theories. For example, Ferrans et al. utilized the work of Eyer et al. (2002) to categorize the characteristics of both the individual and the environment. Additionally, Cox's psychological factors (1982) were applied to this new HRQOL model. According to Ferrans et al. (2005), Cox classified the dynamic interpersonal factors as cognitive appraisal, affective responsive, and motivation. The common sense model of illness (Leventhal, Meyer, & Nerenz, 1980) was a further theory Ferrans et al. utilized. It supports the symptom domain of this revised model. Leidy's framework of functional status (1994) was the concluding theory adopted for this revision. This work provided guidance in defining the four dimensions of functional status (Ferrans et al., 2005).

Major Concepts in Ferrans' et al., 2005 Model

Biological Function

Biological function is all encompassing to include the molecular, cellular, organ, and system level processes that support life. Since biological functions are dynamic, they can be described on a continuum from ideal to life threatening. All other elements of health that include symptoms, functional status, perceptions of health, and overall quality of life can be directly or indirectly affected by an alteration in biological function. Individual characteristics of genetic composition and psychological factors influence an individual's biological vulnerability and resilience. Also, environmental characteristics of social and physical factors can impact an individual's biological function.

Symptoms

Ferrans et al. (2005) adopted Wilson and Cleary's (1995) definition for symptoms as "a patient's perception of an abnormal physical, emotional, or cognitive state" (p. 61). While symptoms can be categorized as physical, psychological, or psychophysical, a shift is required from the cellular or organism level to an individual level. Complex interactions of both characteristics of the individual and characteristics of the environment influence an individual's experience, evaluation, and interpretation of symptoms.

Functional Status

Ferrans et al. (2005) adapted Leidy's framework (1994) to clarify their views of functional status that focuses on optimizing the individual's remaining function. Leidy's model includes the four functional dimensions of capacity, performance, capacity utilization, and reserve. While functional capacity describes an individual's physical,

social, psychological, and cognitive abilities at the individual's maximal capacity, functional performance refers to an individual's daily activities. Functional performance incorporates multiple factors including personal choice, values, and motivation. On the other hand, functional capacity utilization is the percentage of functional capacity that an individual expends daily. The final functional dimension of reserve is defined as the difference between capacity utilization and functional capacity (Ferrans et al., 2005).

General Health Perceptions

Adopting the major features of Wilson and Cleary's (1995) general health perceptions, Ferrans et al. (2005) explained that these perceptions incorporate all of the elements which appear earlier in the model and are subjective in nature. General health perception is a synthesis of all the different aspects of health in an overall appraisal.

Overall Quality of Life

Ferrans et al. (2005) utilized Wilson and Cleary's (1995) characterization of overall quality of life. It is described as subjective well-being in relation to how happy or satisfied an individual is with life as a whole. There is an emphasis on how an individual's values and preferences affect overall quality of life. Because of value differences in individuals, the importance of values should be included in the assessment of life satisfaction. Ferrans and Powers (1992) defined quality of life as "a person's sense of well-being that stems from satisfaction or dissatisfaction with areas of life that are important to him/her" (p. 29).

Characteristics of the Individual

An individual's characteristics are one level of influence that affect health outcomes and are defined as intrapersonal factors (Eyler et al., 2002; Ferrans et al.,

2005). These are categorized as demographics as well as developmental, psychological, and biological variables. While the biological factors include physical attributes and familial genetics related to disease processes, the demographic variables include gender, age, marital status, and ethnicity. Even though the characteristic of developmental status cannot be modified by interventions, the psychological factors are modifiable by interventions. These factors are categorized by cognitive appraisal, affective response, and motivation. Whereas knowledge, beliefs, and attitudes regarding illness, treatment, or behavior are factors of cognitive appraisal, anxiety, fear, sadness, or joy are affective responses and are emotion evoked. The individual characteristic of motivation is categorized by intrinsic motivation, which is initiation of behavior for inherent satisfaction, and by extrinsic motivation, which is engaging in behavior for external rewards.

Characteristics of the Environment

Environmental characteristics are categorized as social or physical. The social characteristics include influences of family, friends, and healthcare providers. An individual's cultural heritage can significantly influence participation in healthcare. Likewise, characteristics in an individual's physical environment can have a negative or positive impact on health outcomes. Home, neighborhood, and work place settings are examples of physical environmental factors.

Significance to Combat Veterans with mTBI and Nursing Practice

Ferrans' et al. revised conceptual model of HRQOL (2005) is a broad middle-range theory that encompasses the health-related domains of biological function, symptoms, functional status, general health perceptions, overall quality of life,

characteristics of the individual, and characteristics of the environment. Ferrans' et al. (2005) comprehensive model is dynamic with clear, concise definitions for each domain and is applicable to diverse healthcare conditions, including TBI. Even though Ferrans' et al. (2005) model thus far has not been widely used with disease processes and chronic conditions, the model from which it was derived has been applied to diverse conditions, including AIDS (Wilson & Cleary, 1997), coronary artery bypass graft, heart surgery (Mathisen et al., 2007; Penckofer, Ferrans, Fink, & Holm, 2005), chronic obstructive pulmonary disease, and congestive heart failure (Arnold, Ranchor, Koeter, de Jongste, & Sanderman, 2005; Heo, Moser, Riegel, Hall, & Christman, 2005). Therefore, Ferrans' et al. model (2005) can be used as a foundation to effectively guide and organize research and impact patient outcomes. In fact, this model recently has been utilized to guide and organize HRQOL nursing reviews for TBI studies (Daggett et al., 2009; Petchprapai & Winkelman, 2007).

Nurses need to develop condition-specific models derived from Ferrans' et al. model (2005) that can address the identified healthcare issues of their populations of interest and complexity of health-related conditions such as the conceptual model in the context of cognitive impairments from mTBI in this study. Explicit models that are comprehensive and framed in a limited context are critical in order for nurses to plan, develop, and evaluate future interventions, particularly in the area of the healthcare issues of combat veterans with mTBI for their successful community reintegration.

The next section presents a review of literature that supports the content components of the proposed VETSCARE self-management intervention for veterans with mTBI that were derived from the needs and concerns of combat veterans and organized

by the revised conceptual model in the context of cognitive impairments of mTBI as illustrated in Figure 1. The literature regarding the needs and concerns of survivors of TBI are presented, categorized by the five components of the intervention used in this study. Subsequently, TBI interventions are reviewed.

Needs and Concerns of TBI Survivors

A literature search was conducted using the electronic databases of PUBMED, CINAHL, MEDLINE, and related resources to evaluate the existing literature pertaining to the needs and concerns of adult survivors of TBI. The keywords used included brain injury, head injury, concussion, needs, concerns, and adult. The search was limited to publications from January 1990 through December 2009 and identified 79 abstracts to review for relevance to this study. Many of the studies reported on functional status or outcomes post-injury at different time points; therefore, they were considered irrelevant because they focused on the actual functional status rather than the subjective needs and concerns expressed by survivors of TBI. Merely 11 studies were deemed relevant to the needs and concerns of adult survivors of TBI. One additional study was obtained through the review of bibliography lists. Thus, a total of 12 articles specifically related to the needs and concerns of adult survivors of TBI were reviewed.

In 2004, Corrigan, Whiteneck, and Mellick conducted a quantitative study of survivors of TBI with all levels of injury severity. The results demonstrated that 58.8% ($N = 1802$) experienced at least one unmet need during the year following the injury and that 40.2% experienced at least one unmet need one year following the injury. Another quantitative study of community-dwelling survivors of TBI with all levels of injury severity showed that 35.2% ($N = 1830$) of the survivors of TBI reported at least one

unmet need one year post-hospital discharge with 51.5% of survivors experiencing unrecognized needs and reported that 47.0% of survivors conveyed they had experienced at least one barrier to obtaining assistance (Pickelsimer et al., 2007). Needs may be underestimated because some survivors of TBI may not have the ability to acknowledge their needs (Pickelsimer, 2007; Priganto, 2005). In contrast, survivors of TBI have reported difficulty obtaining a diagnosis of brain injury. Subsequently, this has resulted in both personal and professional consequences (Sample & Darragh, 1998). Because of the wide variety of needs and concerns reported in the TBI literature, this review was conducted by organizing specific needs and concerns into the major headings used in Figure 1.

The major headings (see Figure 1) organized the needs and concerns discovered in the literature according to the components and subcategories of the conceptual model in the context of mTBI. In the context of mTBI, the major components of the conceptual model include (a) cognitive impairments; (b) characteristics of the individual; (c) symptoms (physical, emotions, and behaviors); (d) functional status (IADL, interpersonal interactions); (e) characteristics of the environment (community reintegration); and (f) the VETSCARE intervention. Table 1 in Chapter One lists the components and subcategories of the conceptual model, and Table A1 in Appendix A provides a listing of descriptive studies that support the major components of the conceptual model. Subsequently, a review of intervention literature in the context of TBI follows. Table A2 in Appendix A identifies findings of TBI intervention studies.

Cognitive Impairments in the Context of mTBI

Murray and Clark (2006) defined cognition as “the process by which sensory information is transformed, condensed, elaborated, stored, retrieved, and exploited thus allowing understanding and interaction with the environment” (p. 413). While cognition includes the multidimensional functions of memory, attention, and executive functioning, language also is viewed as part of cognition and is multidimensional. In fact, language relates closely to these cognitive functions in functioning, structure, and neurophysiological circuitry (Murray & Clark, 2006). Further, the World Health Organization provides distinct terminology through the International Classification of Impairment of Functioning, Disability and Health and defines the concept of impairment as “a problem in body function and structure such as deviation or loss” (World Health Organization, 2001, p. 164; Kearney & Pryor, 2004; Murray & Clark, 2006).

Cognitive impairments of memory, attention, and executive functioning are generally a consequence of TBI regardless of the degree of injury severity. The extent of cognitive impairments post-TBI is dependent on multiple factors including the injury location and the level of damage to neural structures and pathways (Murray & Clark, 2006). Murray and Clark defined memory as “the cognitive function responsible for storing, retaining and retrieving processed information” (p. 417). Sohlberg and Mateer (2001) differentiated memory into three types: time-dependent, content-dependent, and everyday memory. Time-dependent memory consists of short-term memory, also known as working memory, and long-term memory. Content-dependent memory is based on declarative (explicit knowledge) and nondeclarative (implicit knowledge), and everyday memory encompasses prospective memory, the ability to complete intentions, and

purposeful acts (Murray & Clark, 2006; Sohlberg & Mateer, 2001). Sohlberg and Mateer (2001) emphasized that the objective of all neurorehabilitation programs for cognitively impaired individuals should concentrate in improving day-to-day functioning.

Researchers have explored the perceived needs and concerns related to these cognitive impairments, with needs and concerns regarding memory in three main areas: memory deficits, concentration deficits, and executive function deficits.

Memory deficits. Studies listed in Appendix A, Table A1, report that memory deficits along with lack of problem-solving skills are among the most predominate unmet needs experienced by persons with TBI (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004; Heinemann, Sokol, Garvin, & Bode, 2002). Not only do persons with TBI experience memory deficits and lack of problem-solving skills at one year post-injury (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan, 2004), but studies have documented these deficits and lack of skills as far out as seven years post-injury (Heinemann et al., 2002). These findings are consistent with the need for ongoing reassessments of survivors of TBI (Rotondi, Sinkule, Balzer, Harris & Moldovan, 2007).

Concentration deficits. Only one study listed in Appendix A, Table A1, reported concentration as an unmet need in survivors of TBI and indicated that it should be periodically reassessed and treated as a long-term deficit (Rotondi et al., 2007).

According to Sohlberg and Mateer (2001), concentration or attention and memory deficits have been the most frequently reported symptoms post-TBI. The concept of attention includes a wide range of cognitive skills, such as immediate span of attention; focused, sustained, and divided attention; and the speed with which one processes

information. Attention is related and interdependent to both memory and executive function because they share neurocircuitry in the brain. Survivors of TBI may experience concentration difficulties, distractibility, inability to multitask, and/or forgetfulness. Even though these symptoms may be mild, they may be persistent, affect functioning, and lead to other poor healthcare outcomes in survivors of TBI.

Executive functioning deficits. Survivors of mTBI experience executive function difficulties in the areas of initiation, planning, and management of complex behaviors that particularly place demands on attention and working memory (Sohlberg & Mateer, 2001). While basic attention problems have a tendency to resolve shortly after the injury, persistent attention problems are particularly common in survivors of mTBI as they attempt to complete cognitively demanding tasks or tasks in environments that are extremely distracting. Symptoms of executive functioning problems are multiple and include deficits related to disinhibition, problem solving and reasoning, and poor planning. These executive functioning deficits also have been associated with self-awareness deficits of survivors of TBI (Murray & Clark, 2006). Further, their verbal fluency is affected as demands are placed on retrieval from long-term memory, sustained attention, and executive control of retrieval processes (Sohlberg & Mateer, 2001).

As previously noted, problem-solving difficulties and memory deficits were identified as some of the most common unmet needs of survivors of TBI one year post-injury (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004). In fact, survivors of TBI specifically have acknowledged needs related to an inability to express their needs accurately and the need for cognitive retraining (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001).

Studies also have demonstrated that cognitive needs are significant and chronic, particularly in the executive function of judgment. (Fraas, Balz, & Degrauw, 2007; Rotondi et al., 2007). Heinemann et al. (2002) reported that survivors of TBI with greater needs had a tendency to receive fewer services, resulting in lower life satisfaction seven years post-injury.

While research initiatives have begun, knowledge related to combat veterans' cognitive impairments from TBI are nevertheless limited. Zeitzer and Brooks (2008) described, based on subjective reports, that veterans with TBI experienced cognitive impairments. The veterans reported difficulties focusing, reduced speed in processing, limited memory, deficits in attention, and the inability to complete tasks.

Individual Characteristics in the Context of mTBI

Characteristics of the individual in the context of mTBI impact the needs and concerns of survivors of TBI. These include multiple factors such as demographics related to age, gender, race and ethnicity, marital status, education, income, and living quarters. The needs and concerns of combat veterans with TBI also may be influenced by additional demographic characteristics such as VA disability pension directly related to combat injuries, enrollment in VA healthcare system, and the number of deployments to combat zones, for example, that may have increased the veterans' vulnerability to combat-related conditions such as PTSD.

As previously noted, to date combat veteran TBI literature is limited. One recent random control trial reported individual characteristics of combat veterans with TBI in an intervention group wherein 92.0% were male veterans, of which 68.0% were Caucasian (Vanderploeg et al., 2008). The veterans in the study had a mean age of 32 years, and

45.3% of the veterans reported a single marital status. The highest educational level was high school graduate; 86.0% of the veterans with TBI reported working or going to school. In addition, 58.4% were on active duty at the time of injury.

As shown in Appendix A, Table A1, studies report the age of adult survivors of TBI ranged from 15 to 89 years (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004; Fraas et al., 2007; Heinemann et al., 2002; Lefebvre, Pelchat, Swaine, Gelinas, & Levert, 2005; Leith, Phillips, & Sample, 2004; Man et al., 2004; Ouellet, Sirios, & Lavoie, 2009; Pickelsimer et al., 2007; Rotondi et al., 2007; Sample & Darragh, 1998; Tate, 2004). Little research has been conducted on needs and concerns of populations of younger adults with TBI; only two studies reported mean ages younger than 30 years (Lefebvre et al., 2005; Tate, 2004). Studies revealed that most of the survivors of TBI were single, Caucasian males (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004; Heinemann et al., 2002; Leith et al., 2004; Pickelsimer et al., 2007; Rotondi et al., 2007). According to the National Council on Disability (2009), the average age of an active duty member deployed to combat in Iraq or Afghanistan has been 27, while the average age of deployed National Guard or Reserve troops has been 33. Of those deployed 60.0% have been married and 88% have been male. Though 60% have been Caucasian, the deployed troops have been from diverse racial backgrounds including African-American (22%), Latino (11%), Asian (4%), and other (3%) (National Council on Disability, 2009). It has been estimated that 11% to 20% of service members have sustained an mTBI during deployment (Hoge et al., 2008).

Survivors of TBI reported income as one of the most prevalent unmet needs (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Heinemann et al., 2002; Man et al., 2004). For survivors of TBI who were employed, incomes post-injury varied dramatically, ranging from less than \$10,000 annually to over \$50,000, which was earned by only a small percentage of survivors of TBI (Heinemann et al., 2002; Pickelsimer et al., 2007; Rotondi et al. 2007). Income may influence the ability of survivors of TBI to afford and maintain their own living quarters. This review revealed that even though the majority of survivors of TBI lived in private residences, they did not live alone but rather lived with family members (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004; Leith et al., 2004; Pickelsimer et al. 2007; Sample & Darragh, 1998; Tate, 2004). Other survivors of TBI were dependent on healthcare services to assist them in achieving their activities of daily living. (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004; Heinemann et al., 2002; Pickelsimer et al., 2007; Tate, 2004). Post-injury income also may have been directly or indirectly influenced by the individual characteristic of education. The studies showed that the majority of survivors of TBI had 12 or fewer years of education (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004; Heinemann et al., 2002; Lefebvre et al., 2005; Leith et al., 2004; Pickelsimer et al., 2007). Further, the lack of sufficient healthcare insurance coverage was an additional characteristic of the individual that was revealed in the studies' results (see Appendix A, Table A1) as an unmet need of survivors of TBI (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Leith et al., 2004; Pickelsimer et al., 2007).

In 2001, Sohlberg and Mateer described the individual characteristics of a survivor of TBI that contribute to recovery, and they incorporated demographic variables and factors associated with the brain injury. Younger adults demonstrated higher levels of recovery than infants, children, and older adults. Pre-morbid intelligence and educational levels were significant predictors of post-injury function. Cultural factors, including beliefs and values, can impact the use of services by survivors of TBI. Poor vocational outcomes were linked to survivors of TBI who have had a history of low socioeconomic status, unstable work histories, and pre-morbid alcohol and/or drug use. Additionally, the time elapsed since injury and the injury extent and severity were key factors in successful recovery from TBI and the experienced needs and concerns of survivors of TBI (Ouellet et al., 2009; Sohlberg & Mateer, 2001). Even though the majority of studies reviewed (listed in Appendix A, Table A1) did not evaluate these pre-morbid predictors, Corrigan et al. (2004) revealed that functioning, social integration, alcohol intake, employment status, and symptoms at one year post-TBI were individual characteristics related to increasing risks for experiencing needs.

Symptoms in the Context of mTBI

Short-term or permanent physical, cognitive, emotional, or behavioral deficits and resulting symptoms can result from TBI. Specific cognitive symptoms are typical following TBI and include attention, memory, and executive functioning problems as previously reviewed (Murray & Clark, 2006). Even though cognitive symptoms may be strong predictors of functional outcomes post-TBI, survivors of TBI do concurrently experience specific physical symptoms, especially survivors of mTBI who experience similar physical symptoms post-injury. Headaches, excessive fatigue, irritability, sleep

disturbances, balance problems, and tinnitus are common mTBI symptoms (Brain Injury Association of America, 2006; Riggio & Wong, 2009; Silver, McAllister, & Arciniegas, 2009). Sensory deficits and cognitive problems may result as communication barriers that are dependent of the injury location and compromise functioning abilities (Murray & Clark, 2006).

Emotional and behavioral symptoms also are recognized as the consequence of TBI and are diverse. These may include mood swings (emotional lability), depression, hyperactivity, aggression, sexual inappropriateness, and elopement (Sohlberg & Mateer, 2001). In addition, emotional and behavioral symptoms are dependent on the injury location. For example, injury to the frontal lobe is associated with emotional and behavioral changes such as initiation, motivation, inhibition, frustration, and aggression. While temporal lobe damage is associated with aggression, damage to the cerebral cortex can impair one's ability to process emotions and behaviors. The following sections discuss the specific physical symptoms subcategories of headaches, fatigue/insomnia, and tinnitus; and emotional and behavioral subcategories of anger, fear (uncertainty), and depression (sadness) as discovered in the literature reviewed. While many symptoms are experienced by survivors with TBI, it is the management of these symptoms that often result in expressed needs and concerns by these survivors.

Physical symptoms. The literature indicates that survivors of TBI in the studies reviewed (see Table A1, Appendix A) rarely identified or associated the management of physical symptoms as needs and concerns. This may be the result of time-since-injury, higher levels of injury severity, or compensatory behaviors adopted by the survivors in order to adapt to chronic symptoms. Per chance, the mechanisms of brain injury related to

blast injuries in combat result in a unique cluster of symptoms that are consistently persistent. Or, it is possible that physical symptoms more often are reported as needs and concerns by TBI survivors who have predominantly sustained a mTBI and who have higher levels of self-awareness. Regardless, limited results did imply that survivors of TBI experienced needs and concerns related to their symptoms, and one study noted limited treatment for symptoms in women with acquired brain injury from both rural and urban settings (Sample & Darragh, 1998).

Headaches, fatigue/insomnia and tinnitus. TBI studies reported the management of specific physical symptoms of headaches, fatigue/insomnia, or tinnitus as unmet needs post-TBI (Corrigan et al., 2004; Lefebvre et al., 2005; Pickelsimer et al., 2007). Survivors of TBI were surveyed and reported dental, vision, and hearing care rehabilitation therapies as unmet needs (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001). Survivors also noted the specific symptoms of chronic fatigue and headaches as barriers to their adaptation processes (Lefebvre et al., 2005). Finally, Pickelsimer et al. (2007) discovered specific physical symptoms of balance, ambulation, and speech as barriers in receiving assistance only when survivors of TBI were asked to identify an important need about which they had not been previously asked (see Appendix A, Table A1).

Headache is one of the most prevalent physical symptom of mTBI. Headaches post-TBI may be acute or chronic (Riggio & Wong, 2009; Ruff, Ruff, & Wang, 2008; Uomoto & Esselman, 1993). In 2008, Ruff et al. explored headaches among combat veterans who were exposed to blasts in Iraq and Afghanistan and who had been diagnosed with mTBI. Results indicated that 93% of veterans with cerebral impairments

had a higher incidence of headaches than 13% of the veterans who had normal cerebral functioning. The data also demonstrated different headache characteristics among the combat veterans with mTBI. As a matter of fact, 60% of the veterans who had persistent neurocognitive deficits experienced headaches similar to migraines or mixed headaches while veterans who did not have cerebral impairments experienced tension-like headaches. Further, veterans with persistent cerebral impairments experienced headaches more frequently with a mean of 12.4 headaches per month compared to veterans without cerebral impairment with 4.5 headaches per month.

Like headaches, fatigue is a common physical symptom experienced post-TBI (Bushnik, Englander, & Wright, 2008; Riggio & Wong, 2009; Ziino & Ponsford, 2005). In 1999, Aaronson et al. described fatigue as “the awareness of a decreased capacity for physical and/or mental activity due to an imbalance in the availability, utilization, and/or restoration of [psychological or physiological] resources needed to perform activity” (p. 46). Years of education and time-since-injury have been found to be significant predictors of fatigue post-TBI whereas injury severity, age, anxiety, and depression were not found to be significant predictors of fatigue in survivors of TBI eight months post-injury (Ziino & Ponsford, 2005). There were no significant relationships noted between (a) fatigue and employment and (b) fatigue and medications, such as antidepressants, analgesics, anti-inflammatory medications, antispasmodic medications, and herbals. In 2008, Bushnik et al. reported that female survivors of TBI scored higher on different fatigue measures than male survivors, though the findings were not significant. Regardless, Bushnik et al. (2008) did find depression, poor sleep quality, pain, social integration, productive activity, somatic, motor, and memory/attention

difficulties significantly associated to fatigue at both one- and two-years post-injury. These findings indicate that fatigue may be a chronic symptom that impacts domains in these survivors' reintegration and recovery processes.

Along with fatigue, survivors of TBI often experience sleep disturbances, such as impaired sleep-onset, impaired sleep-maintenance, or mixed insomnia (Ouellet, Beaulieu-Bonneau, & Morin, 2006; Riggio & Wong, 2009). Milder TBIs, higher levels of fatigue, depression, and pain have been identified as risk factors for experiencing insomnia post-injury (Ouellet et al., 2006). Ouellet et al. (2006) reported that 50.2% ($N = 452$) of survivors of TBI reported symptoms of insomnia with 29.4% of the 452 survivors meeting the diagnostic criteria for insomnia syndrome. While 38% of the survivors who had an insomnia syndrome were survivors with mTBI, the average duration of insomnia post-TBI was 6.2 years. Further, the survivors of TBI reported the following perceived negative effects of insomnia in areas of their functioning: activities of daily living, e.g., eating, bathing, dressing (32.5%), mood (59.5%), cognitive performance (69.0%), social or leisure activities (57.1%), principal occupation (56.5%), and rehabilitation activities (45.8%).

Tinnitus is another physical symptom commonly reported by survivors of TBI (Ceranic, Prasher, Raglan, & Luxon, 1998; Henry et al., 2005; Lew, Jerger, Guillory, & Henry, 2007; Shucart & Tenner, 1981). Henry et al. (2005) described tinnitus as “an internally generated neural signal that is perceived as sound. The condition is symptomatic of some abnormal state of the auditory system and is not a disease entity in itself” (p. 95). Tinnitus is a subjective experience like pain and cannot be evaluated objectively (Henry et al., 2005). Even though tinnitus is commonly reported by military

personnel because of the hazardous noise levels in military settings, Lew et al. (2007) explored tinnitus in combat veterans with blast-related TBI. The study results demonstrated that 38% of combat veterans with TBI reported tinnitus. While these veterans adapt to perform daily activities, tinnitus can be problematic if it persists. According to Shucart and Tenner (1981), tinnitus post-injury is generally high-pitched, related to hearing impairments and injury to the temporal bone. Treatment is sometimes difficult, especially if a trauma survivor experiences constant ringing in the ears with little to no hearing loss and/or no radiological evidence of damage to the temporal bone (Shucart & Tenner, 1981). Education and self-management skills are elemental tools for survivors of TBI to effectively cope with tinnitus. Cognitive-behavioral therapy is one of the most common treatments for tinnitus and includes cognitive restructuring, attention control, imagery training, and relaxation training (Lew et al., 2007).

Emotions and Behaviors in the Context of mTBI

Anger. Managing or diminishing stress, temper, and emotional upsets also were acknowledged as needs during and at the end of the first year post-injury (Corrigan et al., 2004; Pickelsimer et al., 2007). Then again, the studies demonstrated that survivors of TBI conceded that managing stress and emotional upsets were persistent years post-injury and remained as one of their predominant unmet needs (Fraas et al., 2007; Heinemann et al., 2002; Rotondi et al., 2007). Specifically, aggression, impulsiveness, and irritability were identified as emotional behaviors that were barriers to adaptation of survivors of TBI (Lefebvre et al., 2005; Rotondi et al., 2007). Behavioral problems may be one of the greatest challenges presented post-TBI, and the persistence of these challenges may be underestimated by healthcare delivery systems (Corrigan et al., 2004).

Table A1 in Appendix A identifies the emotions and behavior findings in the studies reviewed.

Sohlberg and Mateer (2001) acknowledged that negative emotions and beliefs are frequently the consequence of mTBI. These factors can significantly influence performance and functional adjustment by survivors of mTBI. Individuals with mTBI and their family members recounted major challenges with irritability and swiftness to anger. Survivors of TBI may exhibit both verbal and physical inappropriateness such as verbal outbursts or combativeness (Riggio & Wong, 2009). These emotions may be the result of frustration and worsen with stress, or they may be the result of emotions surrounding loss of control, uncertainty, grief, depression, inadequacy, or failure. The self-esteem of survivors with TBI also may be affected because of cognitive impairments, a disruption in affect control, and a weakened sense of control that have resulted from the brain injury. Because irritability and other forms of emotional lability are observed early post-TBI, they are considered biologically based. In contrast, depression and anxiety most often have been interpreted as reactive responses associated with physical and cognitive consequences such as difficulties with concentration (attention), memory deficits, and executive functioning impairments (Sohlberg & Mateer, 2001).

Fear (uncertainty). As shown in Appendix A, Table A1, only two studies discussed the need for survivors of TBI to address fear or uncertainty (Lefebvre et al, 2005; Rotondi et al., 2007). Whereas Rotondi et al. (2007) reported that survivors of TBI experienced fear and anxiety pertaining to their future, Lefebvre et al. (2005) explored uncertainty from the viewpoint of survivors of TBI, their family members, and physicians and other healthcare professionals. Survivors of TBI and their family members

experienced uncertainty as a dynamic state wherein shifting occurred and corresponded with different stages of care and related concerns. While survivors of TBI shared explicit concerns about resuming the management of their lives, physicians and other healthcare professionals shared explicit concerns related to the uncertainty of the effects of their interventions at different phases of care and the clinical complexity of TBI. Even though each of the study participants perceived that uncertainty originated from the inadequacy of information, the prognosis at each phase of care was the predominant source of uncertainty. All participants acknowledged awareness of this uncertainty in each other, yet it was implicit. Physicians and other healthcare professionals reported that they did not share their uncertainty with survivors of TBI or their families. As a result, this weakened the relationship between the survivors of TBI and their families and the healthcare professionals; this, consequently, caused a decreased level of confidence and lack of support for uncertainty experienced by the survivors of TBI and their family members (Lefebvre et al., 2005).

Depression (sadness). Unmet needs encompassed the need for improved moods (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Rotondi et al., 2007; Sample & Darragh, 1998). More specifically, Rotondi et al. (2007) reported survivors of TBI *feeling blue* within the theme of emotional and mental health of survivors of TBI. Survivors of TBI and their caregivers also noted the loss of self-confidence and self-esteem and feelings of isolation, acknowledging the need to understand and accept changes to self post-injury (Rotondi et al., 2007). Other survivors of TBI experienced depression and the loss of self-esteem as consequences related to the

difficulty of obtaining a brain injury diagnosis in order to access neurorehabilitation services (Sample & Darragh, 1998). See Appendix A, Table A1.

Even though the literature reports the prevalence of depression in survivors of TBI to vary from 10% to 77%, depression is one of the most common behavioral symptoms experienced by survivors of TBI (Koenigs, et al., 2008; Malec, Testa, Rush, Brown, & Moessner, 2007; Pagulayan, Hoffman, Temkin, Machamer, & Dikmen, 2008; Riggio & Wong, 2009; Silver et al., 2009). Preinjury, injury, and postinjury factors all contribute to the incidence of depression post-TBI. For example, pre-existing psychiatric, psychosocial factors, and alcohol use are related strongly to the development of depression post-TBI. Additionally, injury factors such as the brain injury location also are associated to post-TBI depression. In fact, brain injuries located at the left ventrolateral and dorsolateral areas of the brain are highly correlated with post-TBI depression. Further, dysfunction of the neurotransmitter serotonin also has been determined to be correlated with post-TBI depression (Koenigs et al., 2008; Malec et al., 2007; Silver et al., 2009). Malec et al. (2007) noted protective factors from depression post-TBI as higher levels of education, greater perceived social support, and impaired self-awareness. It has been reported that self-assessment by survivors of TBI is correlated significantly to the development of both early and late depression, disregarding the injury factors of severity and type. On one hand, impaired self-awareness seemed to be a barrier in the development of depression post-injury. On the other hand, there was a strong positive relationship between self-assessment and depression at discharge and long-term follow-up.

While depression in survivors of mTBI has been correlated to the number and perceived severity of symptoms through subjective reports, depression may intensify other behaviors such as anger, aggression, cognitive impairments, and unfortunately, increased risk of suicide (Silver et al., 2009). Silver, Kramer, and Greenwald (2001) and Simpson and Tate (2007) noted key relationships between TBI and suicide. In fact, in a retrospective study, psychiatric patients who had a history of TBI with a loss of consciousness were four times more likely to attempt suicide than psychiatric patients who had not sustained a TBI (Silver et al., 2001).

Functional Status in the Context of mTBI

In the context of mTBI, two subcategories emerged: IADL and interpersonal relationships. The following sections discuss the specific IADL variables of finances, work/school, and leisure activities. Subsequent sections discuss the interpersonal relationship variables of communication, relationships, and support. See Figure 1 in Chapter One.

IADL. The studies listed in Appendix A, Table A1, indicate that survivors of TBI had unmet needs in their IADL in a variety of areas. These included job skills, leisure activities or recreation, support in activities, self-advocacy or empowerment skills, money management, household chores, travel within the community, and legal services (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004; Fraas et al., 2007; Heinemann et al., 2002; Leith et al., 2004; Man et al., 2004; Pickelsimer et al., 2007).

Finances. The findings demonstrate that survivors of TBI with all levels of injury severity disclosed that one of the most prevalent needs post-injury was assistance with

money management, particularly in paying bills (Corrigan et al., 2004; Heinemann et al., 2002). This is not an unexpected finding considering the cognitive impairments of attention, memory, and executive functioning deficits of the survivors of TBI.

Work/school. Unmet needs were reported by survivors of TBI in relation to work. Survivors of TBI in multiple studies reported the need to improve their job skills (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004; Heinemann et al., 2002; Man et al., 2004; Rotondi et al., 2007). Additionally, survivors of TBI reported unmet needs related to career counseling, job placement or job opportunities, work adjustment training, and advanced vocational training (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Corrigan et al., 2004; Pickelsimer et al., 2007). In fact, survivors of TBI reported experiencing decreases in income due to job skills post-injury, which resulted in working shorter hours per week, or re-entering the workforce with lower paying positions; whereas, other survivors of TBI reported unemployment post-injury (Man et al., 2004; Rotondi et al., 2007). Further, survivors of TBI acknowledged the unmet needs of employers to be supportive and flexible in post-injury work attendance and coworkers to understand what the survivor of TBI is experiencing (Rotondi et al., 2007).

The level of education post-injury was not measured in the studies reviewed (see Appendix A, Table A1). In only one study reviewed did the survivors of TBI recognize and acknowledge the need to increase their educational qualifications in order to improve employment opportunities post-injury (Heinemann et al., 2002). In general, this may be due to self-awareness deficits experienced by survivors of TBI.

Leisure activities. Leisure or recreational needs are not necessarily addressed in the management of many chronic conditions but are critical in the continuum of TBI rehabilitation. The studies reviewed merely mentioned the need for recreational activities and opportunities for survivors of TBI to socially participate but did not report specific findings related to these activities (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Heinemann et al., 2002; Pickelsimer et al., 2007). It is possible that many leisure or recreational activities had been integrated into the rehabilitation services of survivors of TBI and, therefore, were not perceived as an unmet need. Because many combat veterans have delayed diagnoses of mTBI, their rehabilitative programs differ and may be more fragmented. While combat veterans with mTBI participate in a comprehensive rehabilitation program that is community-based and not the traditional comprehensive facility-based programs that the survivors of TBI in the studies participated, their leisure/recreational needs may not be addressed. See Appendix A, Table A1.

Interpersonal Interactions in the Context of mTBI

Communication. Receiving accurate and thorough information post-TBI was not commonly experienced by survivors of TBI and was one of the most frequently reported unmet needs of survivors of TBI (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Fraas et al., 2007; Lefebvre et al., 2005; Leith et al., 2004; Pickelsimer et al., 2007; Rotondi et al., 2007; Sample & Darragh, 1998). Survivors of TBI experienced inadequate explanations, limited transmission of information, and inconsistent information delivery (Lefebvre et al., 2005; Rotondi et al., 2007). Leith et al. (2004) emphasized the need for providers to be thoroughly knowledgeable of TBI and the

consequences that may affect survivors of TBI and their families. While survivors of TBI expressed their desire for their questions to be answered comprehensively, they also desired opportunities to expand communication with providers. In fact, survivors of TBI shared that they wanted staff to listen to them regarding their capabilities and to include them in decision-making (Rotondi et al., 2007). Additionally, they perceived receiving of information about accessible services, such as community resources and referrals, as an unmet need (Lefebvre et al., 2005; Pickelsimer et al., 2007; Sample & Darragh, 1998). Survivors of TBI specifically reported receiving inadequate information related to TBI, disability legislation, prognosis and long-term implications, the impact of TBI on the caregiver and family, social isolation, and community reintegration (Fraas et al., 2007; Lefebvre et al., 2005; Rotondi et al., 2007). More so, survivors of TBI acknowledged unmet needs in relation to communicating and sharing family concerns as well as family and friends' ability to understand what the survivor of TBI was experiencing post-injury (Lefebvre et al., 2005; Rotondi et al., 2007). Further, they felt there was an unmet need to enhance public awareness of TBI and to promote societal acceptance of survivors of TBI (Rotondi et al., 2007). See Appendix A, Table A1.

Relationships. As shown in Appendix A, Table A1, researchers evaluated relationships among survivors of TBI, their family members, and healthcare professionals (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Lefebvre et al., 2005). It was reported that survivors of TBI perceived relationships with physicians and other healthcare professionals fulfilling when they received support from these professionals in their grieving and rehabilitation processes. Moreover, survivors of TBI described their most satisfying relationships as ones in which their providers listened

to them, allowing them to recount their experiences, express their distress, understand their challenges, and mark their successes. Conversely, survivors of TBI reported that relationships with providers were difficult when there were constraints which restricted time to establish trust. Interestingly, the survivors of TBI also identified these relationships as difficult when they perceived that their providers exhibited specific attitudes toward them as survivors of TBI. Survivors of TBI conveyed the need for professionals to interact with them constructively, without negative attitudes, and compassionately to enhance their self-esteem. They reported the lack of a holistic element in these relationships that also negatively affected their self-esteem (Lefebvre et al., 2005). Furthermore, friendships, intimate relationships, and human connectedness or social belonging were also reported as unmet needs (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Leith et al., 2004). The need for intimate relationships may increase over time. Man et al. (2004) reported a lower level of intimacy in survivors of TBI five years or more post-injury whereas survivors of TBI fewer than five years post-injury had a higher level of intimacy. A notable gap in the literature was the strengths and/or weaknesses of pre-injury relationships post-TBI (e.g., marital, familial, and friendships).

Support. The studies listed in Appendix A, Table A, reported several areas of support that survivors of TBI identified as unmet needs (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Fraas et al., 2007; Heinemann et al., 2002; Lefebvre et al., 2005; Leith et al., 2004; Ouellet et al., 2009; Pickelsimer et al., 2007; Rotondi et al., 2007; Sample & Darragh, 1998; Tate, 2004). Care coordination was recognized as an unmet need of high importance by survivors of TBI, especially as the

survivor of TBI leaves the medical facility and begins community reintegration (Heinemann et al., 2002; Lefebvre et al., 2005; Pickelsimer et al., 2007; Rotondi et al., 2007; Sample & Darragh, 1998). Moreover, survivors of TBI acknowledged the need for community-based service delivery to incorporate emotional support during this care transition (Leith et al., 2004). During this time, survivors of TBI may become vulnerable because care may be more fragmented; the continuity in care and services is critical. Survivors of TBI also reported their need to continually justify the necessity of essential services (Lefebvre et al., 2005) and financial difficulties in paying for treatments (Rotondi et al., 2007). Care coordination may assist in ensuring that survivors of TBI obtain the appropriate healthcare services and financial resources. In addition, care coordination can facilitate survivors of TBI in obtaining referrals and in locating and evaluating services as well as caring and supportive providers (Rotondi et al., 2007). The studies' findings also revealed the unmet need of a lack of support groups (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Rotondi et al., 2007) and support for caregivers (Fraas et al., 2007).

Characteristics of the Environment in the Context of mTBI: Community Reintegration

As shown in Appendix A, Table A1, characteristics of the environment found in the studies were minimal and are discussed below from the perspective of community reintegration. Community reintegration has been categorized by the following three variables: (1) return to combat unit, (2) adaptation to society, and (3) expectations of others.

Return to combat unit. Since the conflicts are contemporary and concurrent with this review, there is a gap in the literature. Thus, this review did not include studies that

explored the needs and concerns of combat soldiers or veterans with TBI. Although literature was lacking regarding needs and concerns related to soldiers, returning to combat was a recurring theme among combat veterans as reported during the data collection and analysis of this present study. Hence, the significance of this present study was more than identifying needs and concerns of veterans related to their combat-sustained TBI. It also acknowledged needs and concerns related to loss of identity as a soldier and the lack of structure post-deployment.

Adaptation to society. Table A1, Appendix A, includes studies that report the unmet needs related to the adaptation to society by survivors of TBI (Fraas et al., 2007; Heinemann et al., 2002; Lefebvre et al., 2005; Leith et al., 2004; Pickelsimer et al., 2007; Rotondi et al., 2007; Sample & Darragh, 1998). The majority of survivors of TBI reported an unmet need of finding places and opportunities to socialize with others (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Heinemann et al., 2002; Pickelsimer et al., 2007). Survivors of TBI fewer than five years post-injury and their family members revealed the need for human connectedness and social belonging post-injury. Survivors of TBI felt unmet needs existed for emotional support and services or accessibility to these services that would decrease their feelings of social isolation (Corrigan & The Traumatic Brain Injury Technical Assistance Center, 2001; Lefebvre et al., 2005; Leith et al., 2004). Survivors of TBI also acknowledged the need for an early, yet consistent, and comprehensive service delivery system to foster community reintegration. They identified the need for information and education in three distinct areas.

First, they acknowledged the information/education need of community resources to obtain specialized TBI services including adaptive/assistive devices and equipment, anger management, independent living skills, respite care, environmental modifications, vocational rehabilitation, and support groups.

Second, they reported the need for information/education for professional resources; for example, specialized TBI education and training for healthcare professionals and law/policy makers, in-service training for TBI agencies (e.g., Social Security and Department of Social Services), reimbursement for TBI services via the insurance industry, and professional (formal) advocates for TBI survivors and family members to improve communication, collaboration, and networking across the multidisciplinary teams, families, and survivors of TBI.

Third, they acknowledged individual needs for educational/informational resources such as banking assistance, re-employment assistance, legal assistance, and resources to learn about other survivors of TBI. Additionally, the survivors of TBI reported the need both for informal advocacy and for resourcefulness. While survivors and their family members reported the absence of outreach to them by professionals, they learned to become assertive and persistent in order to obtain information and help. In fact, they reported “resourcefulness sharing” with other survivors of TBI and their family members as an essential activity. Not only did this activity facilitate their needs to obtain information, network, and support, but they reported that this activity also provided a feeling of empowerment (Leith et al., 2004; Ouellet et al., 2009; Sample & Darragh, 1998). The review indicated that survivors of TBI reported a variety of factors that limited their access to community services including the need to travel distances due to

the logistics of essential services and difficulties in obtaining transportation to these services (Fraas et al., 2007; Pickelsimer et al., 2007; Sample & Darragh, 1998). Lefebvre et al. (2005) reported unmet needs in the adaptation process that included grieving, autonomy, and community participation in school, leisure, or volunteer activities. Likewise barriers to adaptation were reported including chronic physical symptoms, insecurity, behavioral deficits, the lack of resources, and the stigma of TBI. Interestingly, survivors of TBI perceived themselves as having a lower level of community participation; perhaps they may have limited themselves in community participation and responsibility (Man et al., 2004). Regardless, Rotondi et al. (2007) reported the unmet need of survivors of TBI to be active members of the community and the unmet need of increasing public awareness to promote the acceptance of survivors of TBI in society.

Expectations of others. Only two studies discussed unmet needs based on the expectations of others by survivors of TBI (Lefebvre et al., 2005; Rotondi et al., 2007). As previously reported, survivors of TBI reported the unmet need for family, friends, and coworkers to improve their understanding of what he or she was experiencing. Survivors of TBI acknowledged the unmet need of support from family and friends post-injury, more specifically, the need to be accepted “as you are” and contact with their pre-injury friends (Rotondi et al., 2007). See Appendix A, Table A1.

Strategies Used and Advice Given by Survivors of TBI

Strategies practiced and shared by survivors of TBI in relation to their unmet needs and concerns were extremely limited and demonstrated a lack of knowledge found in the TBI literature. Only one study discussed strategies that survivors of TBI and their family members utilized (Lefebvre et al., 2005). In respect to the emotion of uncertainty,

survivors of TBI and their family members conveyed that they managed uncertainty one day at a time. While some continued to seek additional information, others reported they avoided information as a strategy to manage their uncertainty. Survivors of TBI and their families identified other strategies to manage uncertainty related to TBI including isolation, writing, work, optimism (keeping up hope), and/or focusing on the TBI survivor's present rehabilitation progress.

The following section presents a review of TBI interventional studies. The specific details of each interventional study are found in Appendix A, Table A2.

A Review of Traumatic Brain Injury Interventional Studies

Rehabilitation of survivors with TBI is complex, encompassing diverse interventions. Cognitive behavioral therapy has been reported to improve psychosocial functioning and problem-solving skills in patients with TBI (Anson & Ponsford, 2006). Intensive cognitive rehabilitation also has demonstrated the facilitation of community integration and may enhance the quality of life for an individual subsequent to TBI (Cicerone, Mott, Azulay, & Friel, 2004). One study showed that a comprehensive neurorehabilitation program improved outcomes of patients with TBI (Sarajuuri et al., 2005). Telehealth and/or telemedicine and PDAs are alternative modes to deliver rehabilitative interventions by multiple healthcare disciplines. While these modalities are being implemented in TBI populations transitioning into their communities, the feasibility, acceptability, and effectiveness have yet to be demonstrated. (Bendixen et al., 2008; DePompei et al., 2008; Forducey et al., 2003; Gentry, Wallace, Kvarfordt, & Lynch, 2008; Hart, O'Neil-Pirozzi, & Morita, 2003; Ricker et al., 2002). Comprehensive

Web-based self-management programs designed to assist survivors of TBI in their community reintegration were not found in the existing literature.

Methods

A literature search was performed to identify recent interventional studies in brain injury rehabilitation. Two investigative techniques were utilized in this search. Initially, CINAHL, Cochrane Central Register of Controlled Trials, Medline, PsycBITE, and PsychINFO databases were explored using the keywords brain injury, traumatic brain injury, acquired brain injury, adult, rehabilitation, cognitive behavior, psychological therapy, and interventional studies. Each research publication identified from this search, written in English and published from January 1990 through December 2009, was analyzed for inclusion in this review. A subsequent search was completed incorporating keywords of personal assistant devices, telehealth, and telemedicine, which yielded an additional random control trials intervention study. One final random control trials intervention study was discovered in the review of veteran TBI literature.

Inclusion criteria for review were comprised of three elements: (1) Adults who had experienced brain injuries were the population of interest; (2) The analysis focused on rehabilitation interventions; and (3) The study design was either quasi-experimental or experimental in nature. The review was limited to published peer-reviewed sources.

Results

Seventeen studies met the inclusion criteria and were reviewed. One was published in 1997, two were published in 2004, four in 2005, seven in 2006, and the remaining three in 2008. Each study was published by a distinct research team with the principal investigator from the field of kinesiology, neuropsychology, occupational

therapy, psychology, or rehabilitation. Each study was peer-reviewed. Table A2, Appendix A, lists the 17 studies, including the sample demographics. The remaining published studies in the search were eliminated from this review because they did not meet the specific criteria of adult populations who participated in quasi-experimental or experimental studies, or the study did not occur during the rehabilitative phase of recovery.

Samples

The studies included data from a total of 1,385 adults who received diverse interventions to improve skills and management of deficits related to a TBI. The sample sizes varied (see Appendix A, Table A2). The power estimates generally were not reported and the studies may have been underpowered because the samples were small. The adult participants were selected based on a TBI diagnosis and the treatment phase.

The participants were predominantly male with a mean age range from 30 to 58 years. Educational status was reported in 10 of the studies and was predominantly at high school level. Caucasian was the prevalent ethnicity reported with two studies performed in Hong Kong and one in Finland. The severity of injury and time since injury varied significantly. Only 4 of the 17 studies (Bell et al., 2005; Carnevale, Anselmi, Johnston, Busichio, & Walsh, 2006; Tiersky et al., 2005; Vanderploeg et al., 2008) reported attrition, which ranged from 8% to 31%. In one study, 4 participants rescinded consent prior to protocol treatment, 29 were lost in follow-up, 6 were reported as deceased, and 15 were unable to participate in follow-up or were unable to be contacted (Vanderploeg et al., 2008). Other attrition was the result of an unrelated health emergency, a family

death, transportation issues, difficulty eliciting target behavior, scheduling, the presence of a psychiatric disorder, court obligations, and environmental change.

Designs

For this analysis, experimental and quasi-experimental designs were selected (see Appendix A, Table A2). Nine of the studies (Bell et al., 2008; Bell et al., 2005; Carnevale et al., 2006; Driver, Rees, O'Connor, & Lox, 2006; Gemmell & Leathem, 2006; Man, Soong, Tam, & Hui-Chan, 2006; Soong, Tam, Man, & Hui-Chan, 2005; Tiersky et al., 2005; Vanderploeg et al., 2008) were random control trials. Two-stage process of random sampling, drawing from service and patient lists, was used in four of the random control trials (Driver et al., 2006; King, Crawford, Wenden, Moss, & Wade, 1997; Man et al., 2006; Soong et al., 2005). Blind randomization (Bell et al., 2008; Carnevale et al., 2006; Tiersky et al., 2005; Vanderploeg et al., 2008) and the computer-generated block method (Bell et al., 2008; Bell et al., 2005; Vanderploeg et al., 2008) were also utilized in studies reviewed.

Two of the quasi-experimental studies used non-random control trial designs (Cicerone et al., 2004; Sarajuuri et al., 2005) with group assignments based on time-since-injury and disability. Selection of control group members was determined by similar demographics and functional status. One of the quasi-experimental studies using pretest-posttest with control group (Cheng & Man, 2006) randomized by admission sequence.

Theoretical Frameworks

The applications of theoretical frameworks directing the interventions fluctuated and usually were not explicit. Most studies implied models that guided the research.

The health-promoting behavior theory was integrated with aquatics as an intervention to promote self-care behaviors with adults with TBI (Driver et al., 2006). Research has indicated exercise is a health-promoting behavior that can influence positively both physical and psychosocial variables, thus improve quality of life. According to Driver et al. (2006) exercise historically has not been included in TBI rehabilitation programs.

Similarly, Bandura's et al. (1982) model proposes that self-efficacy enables one to attain a higher level of functional independence and, perhaps, a higher level of self-concept. Traditionally, self-efficacy has played a critical role in rehabilitation for chronic conditions such as arthritis, cardiac disorders, stroke, and developmental disabilities in children. Self-efficacy of patients with TBI may be essential for positive outcomes from cognitive rehabilitation (Man et al., 2006).

Intervention Integrity

Most interventions reviewed in the studies (Bell et al., 2005; Cheng & Man, 2006; Man et al., 2006; Marshall et al., 2004; Tiersky et al., 2005) were delivered individually from post-acute to 7.6 years of time since injury (see Appendix A, Table A2). The interveners were behavior technicians, psychologists, cognitive therapists, neuropsychologists, and/or research care managers.

The duration of the intervention phases fluctuated from four weeks to nine months. Two studies (Sarajuuri et al., 2005; Tiersky et al., 2005) presented rationale for the duration of the interventions, attributing the fluctuations to the duration of previous studies. Due to the diversity of the interventions, no observable trend was noted to

indicate that the longer intervention durations were more effective than the shorter ones in this set of studies.

Nearly all of the reviewed studies reported intervention intensity. These varied from minutes to hours and weekly to day-long sessions five to six days per week. Two studies (Cicerone et al., 2004; Sarajuuri et al., 2005) provided precise details for the individual and group cognitive and/or neuropsychological therapy. Gemmell and Leatham's Tai Chi interventional study (2006) reported that the frequency and duration of their planned sessions were altered as a consequence of memory problems experienced by the participants.

In contrast, few of these studies discussed the integrity of the interventions. Gemmell and Leatham (2006) reported employing an independent tester to administer all tests and a principal Tai Chi instructor to preserve intervention integrity. Man et al. (2006) utilized regular phone contact in order to maintain intervention integrity by validating that the participants did not receive any additional training that might have enhanced their problem-solving skills and/or self-efficacy. Further, Anson and Ponsford (2006) acknowledged that individual psychological therapy was delayed for the duration of the group program because it was perceived to confound the group influence, potentially compromising the intervention integrity. Finally, Cheng and Man (2006) reported not adhering to a double blind study and used the same therapists, and thus compromised the integrity of their intervention.

In eight of the studies using control groups, the researchers described treatment as standard, conventional, or follow-up only (Bell et al., 2008; Bell et al., 2005; Cheng & Man, 2006; Cicerone et al., 2004; Dou, Man, Ou, Zheng, & Tam, 2006; King et al., 1997;

Man et al., 2006; Sarajuuri et al., 2005). In two studies, the control groups were allocated to waiting lists (Gemmell & Leathem, 2006; Tiersky et al, 2005). Two additional studies (Carnevale et al., 2006; Driver et al., 2006) provided vocational rehabilitation for the control group.

Outcomes

Table A2, Appendix A, identifies the outcomes measured in these interventional studies. The most recurring themes in the 17 studies were problem-solving and neurobehavioral functioning with various instruments employed to operationalize the outcomes, complicating cross-study comparisons. Two studies (Man et al., 2006; Soong et al., 2005) used identical skill training strategies of computer-assisted, online interactive, and therapist-administered in cognitive rehabilitation with self-efficacy as a dependent variable. In 2005, Soong et al. used these interactive strategies to determine the effect of self-efficacy with problem-solving skills measured by Lawton Instrumental Activities of Daily Living (Lawton & Brody, 1969; Soong et al., 2005) and the Halstead-Reitan Neuropsychological Test Battery (Reitan & Wolfson, 1993, 1996; Soong et al., 2005). Subsequently, Man et al. (2006) employed daily problem-solving quizzes and a problem-solving rating scale as outcome measures with pretest-posttest mean scores and the within group *p* value as the key statistics. Further, Marshall et al. (2004) applied the interactive strategy of modeling training to problem-solving with Rapid Assessment of Problem Solving as the outcome measure.

Six additional studies had a common theme of neurobehavioral functioning (Bell et al., 2005; Carnevale et al., 2006; Cicerone et al., 2004; Dou et al., 2006; Tiersky et al., 2005; Vanderploeg et al., 2008). Bell et al. (2005) used a composite score

as the main outcome measure of scheduled telephone interventions to determine the primary end point on intent-to-treat. Carnevale et al. (2006) examined behavioral management implemented in community settings and employed the Neurobehavioral Functioning Inventory to measure the percentage of improvement in target behaviors and to assess significance between group differences by ANOVAs (Carnevale et al., 2006; Kreutzer, Marwitz, Seel, & Serio, 1996). Dou et al. (2006) utilized the Neurobehavioral Cognitive Status Examination to assess neurobehavioral skills of survivors of TBI who had participated in computerized errorless learning-based memory training (Northern California Neurobehavioral Group, 1995). Repeated measures of the analysis were completed to compare the three groups for each outcome (Dou et al., 2006). See Appendix A, Table A2.

Reliability and validity of outcome measures were addressed in five studies (Anson & Ponsford, 2006; Cheng & Man, 2006; Cicerone et al., 2004; Man et al., 2006; Marshall et al., 2004). Cronbach's alpha was reported for various scales and ranged from 0.77 to 0.94 while the test-retest-reliability was reported from 0.82 to 0.92. One study (Man et al., 2006) reported 75.6 % variability, and experts in cognitive rehabilitation supported the validity of the problem-solving self-efficacy questionnaire. Marshall et al. (2004) also reported the use of examiners who validated the measurement reliability of the Rapid Assessment of Problem Solving.

Effectiveness of Interventions

The interventions varied in the degrees of effectiveness; see Appendix A, Table A2. Though Bell et al. (2005) performed scheduled telephone sessions that demonstrated significant improvement in functional status and quality of well-being at the one-year

follow-up of survivors of TBI, survivors participating in scheduled telephone sessions in 2008 demonstrated improvement only in outcome for symptoms and not general health outcome at six months post-injury (Bell et al., 2008). While Soong et al. (2005) found analogy problem-solving to be effective despite the delivery modalities, Marshall et al. (2004) indicated that patients with TBI improved in problem-solving abilities after interactive strategy modeling training with significant differences between pre-training and post-training times. Driver et al. (2006) found significant differences and large effect sizes between the pre-post-programme scores of the aquatics group (experimental group) that indicated improved health promoting behaviors after exercise, physical self-concept, and self-esteem. Significant results and large effect sizes were reported for the following variables: health responsibility, $t(9) = -2.675, 0.91$; physical activity, $t(9) = -3.109, 1.24$; nutrition, $t(9) = -4.199, 0.66$; spiritual growth, $t(9) = -4.013, 0.82$; and inter-personal relationships, $t(9) = -7.791, 1.12$. Additional findings included significant results and moderate-large effect sizes between the pre-post-programme scores of the aquatics group for the following variables: self-esteem, $t(9) = -8.500, 2.09$; coordination, $t(9) = -5.237, 2.66$; body fat, $t(9) = -5.200, 0.51$; strength, $t(9) = -9.798, 0.83$; flexibility, $t(9) = -6.547, 0.99$; and endurance, $t(9) = -6.457, 2.33$. There were no significant differences or effect sizes noted between the pre-post-programme scores of the control group. In addition, the Tai Chi interventional study (Gemmell & Leathem, 2006) revealed effectiveness with patients with TBI by significant group differences before and after practice and between group differences at four time periods on all dimensions of Visual Analogue Mood Scale, excluding the Visual Analogue Mood Scale fatigue subscale (Gemmell & Leathem, 2006; Stern, 1997). Sarajuuri et al. (2005) reported significant data that supported a

comprehensive neurorehabilitation program to be predictive of productivity status, and the evaluation by Cicerone et al. (2004) of the effectiveness of an intensive cognitive rehabilitation program significantly showed improvements in community integration. Some interventions were limited in the effectiveness based on the results of the specific outcome measures.

Threats to Validity

Threats to validity and/or limitations were acknowledged in all but two studies (Driver et al., 2006; Man et al., 2006). Limitations noted in most of the studies included small sample sizes, heterogeneity of participants' brain injuries, and limited settings, thus impacting external validity. Sarajuuri et al. (2005) reported that the non-randomization method weakened the conclusions of their match-control study design because the control group was not selected to match the interventional group based on pretreatment productivity. Five studies (Anson & Ponsford, 2006; Gentry et al., 2008; Marshall et al., 2004; Soong et al., 2005; Vanderploeg et al., 2008) did not use control groups. Cicerone et al. (2004) reported that the interpretation of the results and generalizability of the results were affected by limitations in sampling. More specifically, a systematic selection bias occurred during the enrollment phase. While subjects who were further post-injury with residual disabilities were enrolled in the more intensive and holistic rehabilitation program, subjects with injuries that were more recent received limited rehabilitative services. Tiersky et al. (2005) acknowledged that many of their study participants were in litigation concerning their brain injuries and recognized that this might have produced a tendency toward non-response to treatment or result in a reporting bias. Dou et al. (2006) perceived limited treatment approaches or lack of other models for comparisons as

limitations to the study. They also reported that the sensitivity of their outcome measures may have been affected by the short duration of computer-assisted memory training and therapist-administered memory training for the two intervention groups as well as short duration of follow-up with intervention groups. A major limitation of one study (Anson & Ponsford, 2006) was the termination of individual psychological therapy for the duration of the study. It is possible that some of the participants might have received supportive contact in allied health therapies that could have influenced their psychological adjustment.

Discussion

In general, it was challenging to compare the results of 17 studies given that significant differences existed between the interventions and the outcome measures. The populations in the samples were predominantly males between the ages of 30-58 years. In general, the study designs were random control trials or quasi-experimental and published between 1995 and 2009. While 12 of the studies reported using a control group, very few used an explicit theoretical framework to conduct the interventions. The interventions were delivered most often to individuals and not in group design. The majority of the studies' interventions were diverse. Two studies (Man et al., 2006; Soong et al., 2005) used identical skill training strategies of computer-assisted, interactive online, and therapist-administered in cognitive rehabilitation with self-efficacy as a dependent variable but had different outcome measures. While one study (Dou et al., 2006) used only computer-assisted and therapist-administered training with additional outcome measures, Gentry et al. (2008) introduced the use of PDAs in occupational therapy. Methods to decrease threats of validity would include larger sample sizes that are more

homogeneous in the nature and extent of brain injuries. Samples from multiple treatment sites would reduce the selection bias thus also lessening the threats to external validity.

From this review, it is evident that adult survivors of TBI have complex, long-term needs that are challenging for themselves and their healthcare providers. To date, TBI interventions and the outcome measures are diverse in nature as noted in this review. The following section reviews the use of Web-based technologies that have recently been introduced in TBI rehabilitation.

Evolving Web-based Rehabilitation in TBI

As demonstrated by the preceding literature review of TBI interventions, the present use of technology in comprehensive self-management mTBI rehabilitation care is particularly limited. Web-based technologies may be a practical resolution to address health disparities of survivors of TBI and their families who live in rural or underserved areas (Forducey et al., 2003; Ricker et al., 2002). Extending rehabilitation services into home- and community-based settings through advanced technologies may improve the functioning of survivors of TBI, decrease long-term disability, and decrease long-term healthcare costs by the means of responsive actions identified throughout ongoing monitoring (Ricker et al., 2002).

Burns et al. (1998) defined telerehabilitation as “the use of telecommunications technology to provide rehabilitation and long-term support to people with disabilities” (p. 127). Telerehabilitation has a variety of applications including mentoring, monitoring, consulting, educating, supervising, and providing teletherapy. In fact, telerehabilitation, an interdisciplinary service modality, has revealed potential opportunities to facilitate TBI follow-up and to deliver skilled neurorestorative therapies in home- and

community-based settings for survivors of TBI who have limited or no access in their post-acute settings. Potentially, telerehabilitation could become an alternative mode of delivering healthcare to survivors of TBI through three approaches: telemedicine, telehealth, and the use of PDAs. (Forducey et al., 2003). According to Forducey et al. (2003), telemedicine can be described as “the provision of health care and consultative services to individual patients and the transmission of information related to care, over distance, using telecommunications technologies” (p. 104).

The novel term *telehealth* is frequently utilized and indicates the inclusion of preventative care in addition to the purposes of diagnostic and treatment applications, using Web-based technology (Forducey et al., 2003). In 2002, U.S. Health Resources and Services Administration defined telehealth as the “use of electronic information and telecommunications technologies to support long-distance clinical healthcare, patient and professional-related education, public health, and health administration” (U.S. Department of Health Resources and Services, 2002). While telehealth can increase access to healthcare and eliminate barriers of distance and travel for survivors of TBI, it also can provide frequent opportunities to provide early interventions that may decrease the impact of TBI, enhance diagnostic and prognostic capabilities of healthcare providers, and allow survivors of TBI to submit vital healthcare information to care providers. Most importantly, telehealth can address unmet needs that have been formerly reported by survivors of TBI. Not only can telehealth provide a holistic team approach through care coordination, it can provide a mode of care delivery to ensure patient-centered treatment and increase adherence as patients with TBI receive feedback from their healthcare providers (Bendixen et al., 2008).

As previously mentioned, applications of Web-based approaches currently are being initiated in TBI populations. In 2003, Forducey et al. reported successful outcomes with physical teletherapy among severely injured survivors of TBI 13 years post-injury. These survivors demonstrated improvements in both physical and neuropsychological functioning after a 24-week intervention. Survivors of TBI have indicated greater satisfaction with telerehabilitation psychotherapy than with the traditional services (Schopp, Johnstone, & Merveille, 2000). Additionally, survivors of TBI indicated considerable interest in accessing telerehabilitation services that may assist them in their memory, attention, and executive functioning deficits as well as in their performance of activities of daily living. Most importantly, survivors of TBI frequently reported benefits of telerehabilitation services as reduced feelings of isolation and receipt of education related to medical and cognitive consequences of brain injury (Ricker et al., 2002).

Recent research has been conducted to investigate the practical applications of PDAs in TBI populations to assist with cognitive deficits (DePompei et al., 2008; Gentry et al., 2008; Hart et al., 2003). The use of PDAs and smart phones with survivors of TBI has demonstrated success in a variety of settings including home, school, and community. While survivors of TBI exhibited an increased level of independence using a PDA than using a handwritten planner, multiple factors related to the success of the PDA intervention were identified. These included motivation, the audible reminder function of the PDA, support for programming and troubleshooting, modifications of functions, and variation in available features to motivate (DePompei, et al., 2008). Severely injured survivors of TBI who had behavioral memory problems and who reported difficulties managing time, tasks, money, and medications, received one-to-one home-based training

by an occupational therapist for use of a PDA as a cognitive aid (Gentry et al., 2008); all participants utilized cognitive aids prior to the study, predominantly *sticky-notes* and calendars. The findings demonstrated significant improvement in performance and satisfaction with performance of daily tasks after receiving PDA training. Change in participation level also was found to be significant in the domains of cognitive independence, mobility, and occupation after receiving the PDA intervention (Gentry et al., 2008).

In summary, studies exploring the specific needs and concerns of survivors of TBI were limited and the studies' findings were organized by subjective healthcare issues identified by combat veterans with mTBI as depicted in the conceptual model in the context of cognitive impairments from mTBI (see Figure 1 in Chapter 1). The needs and concerns specifically centered on the subcomponents of the model and included (1) physical symptoms (headaches, fatigue/insomnia, and tinnitus); (2) emotions and behaviors [anger, fear (uncertainty), and depression (sadness)]; (3) functional status [IADL (finances, work or school, and leisure activities) and interpersonal interactions (communication, relationships, support)]; and (4) characteristics of the environment (return to combat unit, adaptation to society, and expectations of others). The majority of the needs and concerns studies reviewed in the literature did not report strategies used by survivors of TBI or the advice they would have given to other survivors. Considering the incidence, complexity, and lifelong effects of TBI, interventional research involving adult populations with TBI was limited. Not only may this be the result of the heterogeneity of adult brain injuries but also may be the result of the post-injury impairments such as memory and executive functioning for participants to successfully participate and

complete interventions for the duration of studies. Then again, interventions using Web-based technologies are now emerging in TBI literature and may allow unique opportunities to provide ongoing assessments, scheduled interactions, and early interventions for survivors of TBI as they reintegrate into their communities and ongoing support for their chronic deficits.

Based on the preceding TBI intervention review, recommendations for future research include TBI interventions that are based on methodology that incorporates power estimates to determine appropriate sample sizes. Future research needs to test the reliability of the various outcome measures presented in the review. Moreover, theoretical models are necessary and should be developed and/or utilized to conduct all phases of future interventional studies with patients with TBI, including the intervention development, testing, and implementation. Researchers must be persistent to discover effective interventions that are feasible for the patients with TBI as they are challenged daily with the effects of this lifelong disability. The following section will explain how the VETSCARE Web-based intervention will add to existing knowledge.

VETSCARE Intervention

The Department of Veterans Affairs has developed integrative healthcare teams in certain urban communities to provide care for combat veterans with mTBI; yet, comprehensive self-management interventions to facilitate community reintegration do not exist. It is critical that one encompasses key components of assessment, symptom monitoring, and self-management across multiple domains when designing new interventions for this veteran population. Further, these interventions need to be

technologically savvy to ensure acceptability and adoption, mobile for flexibility, and Internet-based for accessibility in both urban and rural settings.

Hence, comprehensive self-management interventions are needed urgently to facilitate the community reintegration of veterans with mTBI who have recently returned from deployment in combat zones. This study resulted in the development of the content for a future intervention that was based on data provided by veterans and was validated by expert TBI researchers and clinicians.

Unlike the TBI interventions reviewed, the VETSCARE Web-based intervention is a theoretically-based intervention designed to guide care. It is based on a sound conceptual model supported by the literature that focuses on characteristics of the individual, physical symptoms (headaches, fatigue/insomnia, tinnitus), emotional/behavioral symptoms [anger, fear (uncertainty), depression (sadness)], functional status [(IADL (finances, work/school, leisure activities), interpersonal interactions (communication, relationships, support)], and characteristics of the environment (community reintegration or return to combat unit, adaptation to society, expectations of others), all in the context of mTBI. The conceptual model in the context of mTBI provided a holistic approach to develop the VETSCARE Web-based intervention and also will be utilized in its future testing and implementation. See Figure 1 in Chapter 1.

VETSCARE was based on actual expressed needs and concerns of combat veterans with mTBI within the first year of their diagnosis, unlike existing intervention studies that were based solely on issues that healthcare professionals believed were important. While combat veterans' needs and concerns were incorporated into the

subcomponents of the conceptual model in the context of cognitive impairments from mTBI, each need and concern was assessed through algorithms that will be incorporated into an appropriate Web-based program.

Interventional studies of TBI found to be efficacious incorporated ongoing monitoring, online interaction, problem-solving skill-building, computer-based memory training, and behavioral management (Bell et al., 2005; Carnevale et al., 2006; Dou et al., 2006; Man et al., 2006; Marshall, Karow, Morelli, Iden, & Dixon, 2003; Marshall et al., 2004; Soong et al., 2005). While the VETSCARE intervention incorporates each of these strategies, a wide range have strategies have been embedded to assist veterans with mTBI. Not only do these the strategies address their cognitive and behavioral impairments, the strategies also address symptom management, functioning in IADL and interpersonal interactions, and the veterans' community reintegration. The VETSCARE intervention also adds self-assessment skills, step-by-step processes, problem-specific resources, and reinforcement. Most importantly, the basis of the VETSCARE intervention is incorporating nursing care management for ongoing monitoring via Web-based design in order to provide early interventions to this veteran population who are facing challenges in multiple domains as they are reintegrating into the community.

Furthermore, VETSCARE addresses a significant gap noted in the present literature because it incorporates strategies used and advice given provided by survivors of TBI as a result of their experienced healthcare issues post-injury. In response to this gap, actual strategies employed and advice shared by combat veterans with mTBI guided the strategies that were developed and integrated into the self-management elements of the VETSCARE intervention. Additionally, the VETSCARE intervention addresses

combat veterans' needs and concerns, strategies used, and advice given in the context of cognitive impairment from mTBI. Most importantly, the content validity of the VETSCARE intervention was assessed by VA TBI experts who rated the problem relevance, accuracy, feasibility, and acceptability to ensure it contained the most important assessment components and strategies for veterans with mTBI.

After completion of the dissertation study, future funding will be sought to load the VETSCARE intervention content into a Web-based system wherein a prototype can be tested for feasibility with a small group of combat veterans with mTBI. Further research will then be designed for a random control trial to explore the efficacy of the VETSCARE intervention, with the long-term goal of implementing the VETSCARE intervention into practice to improve lives of combat veterans with mTBI returning from deployment.

Summary

In summary, the current body of TBI intervention research is limited; the existing interventions are not theoretically-based to guide the design or intervention components for care. Additionally, present interventions are not subjectively based on the needs and concerns, and strategies used and advice given by survivors of TBI. Web-based interventions that have been assessed by experts for content validity can provide an alternative mode of delivery for a comprehensive self-management program to veterans with mTBI who are technologically savvy and geographically dispersed. The VETSCARE intervention was designed based on data from combat veterans with TBI, content-validated by VA TBI experts, and has the capability to be delivered using technology to veterans in both urban and rural areas. Further, it has adaptability to be

utilized with adult civilian survivors of TBI. The next chapter presents the specific methods used in collecting data regarding the needs, concerns, strategies used, and advice given from veterans with mTBI, the development of the VETSCARE intervention components, and the methods of testing the content validity of the VETSCARE intervention.

CHAPTER THREE

METHODOLOGY

The purpose of this study was to develop a comprehensive self-management intervention for veterans with mTBI to facilitate their community reintegration upon returning from deployment to combat zones. Specifically, based on a conceptual model derived from Ferrans' et al. conceptual model of HRQOL (2005), the following steps were taken: (1) Needs, concerns, strategies used, and advice given were identified; (2) A checklist of identified needs and concerns was developed based on the identified needs and concerns; (3) Strategies were developed to address each need or concern listed on the checklist form; (4) Algorithms of the assessment process and delivery of the targeted strategies that can be programmed into the Web-based program were developed; and (5) Content validity ratings of the checklist of identified needs and concerns, algorithms, and strategies from a group of TBI healthcare and research experts were obtained.

This study was conducted in two distinct phases. Phase I entailed collecting qualitative data regarding needs, concerns, strategies used, and advice given from veterans with mTBI guided by a conceptual model derived from Ferrans et al. (2005). This resulted in the development of the VETSCARE intervention and the algorithms for the delivery of the intervention. Phase II entailed obtaining expert review of the VETSCARE intervention components and algorithms to provide evidence of content validity for the intervention.

Phase I: Qualitative Data Regarding Needs, Concerns, Strategies, and Advice for Model
and Intervention Development

Design

A qualitative descriptive design was used to subjectively explore the most relevant needs, concerns, strategies used, and advice given by new combat veterans with a mTBI. Qualitative descriptive studies have been viewed as categorical and entail the presentation of facts (Sandelowski, 1995; Sandelowski, 2000). Qualitative descriptive design is the desired approach when researchers want to know the who, what, and where of events (Sandelowski, 2000). According to Sandelowski (2000), the goal of qualitative descriptive studies is to comprehensively summarize every day events. When one desires straight descriptions of a phenomena, qualitative descriptive studies are the method of choice. Qualitative description answers questions of particular relevance to practitioners and policymakers. The veterans also were asked to describe strategies they used to adapt to their needs living with mTBI and their recommendations for other veterans who have experienced a mTBI.

Semi-structured interviews were conducted with explicit open-ended questions guiding the inquiry to assess these veterans' common needs and concerns and to determine priority areas for intervention development. The veterans also were asked to describe the strategies they used to adapt to their needs while living with mTBI and their recommendations for other veterans who have experienced a TBI.

Sample

The participants for this study were eight combat veterans with mTBI who were being followed the first year they were enrolled within the polytrauma unit at a large Midwest VA medical center. The sample size was considered adequate once data saturation occurred on the convenience sample. The inclusion criteria of the sample were as follows:

1. Veteran must be 21 years or older.
2. Veteran must have served active duty in Iraq and/or Afghanistan.
3. Veteran was diagnosed with mTBI sustained during active duty.
4. Veteran must be English-speaking.
5. Veteran must be able to provide a written informed consent.
6. Veteran must score four or higher on the six-item Mini-Mental State Exam (Callahan, Unverzagt, Hui, Perkins, & Hendrie, 2002).

The exclusion criteria of the sample were as follows:

1. Veteran had the inability to communicate or have the cognitive ability to answer questions appropriately due to the severity of the brain injury.
2. Veteran had a hearing impairment to the degree he/she could not hear normal telephone conversation.
3. Veteran had a speech deficit.

Procedures

After approvals from Indiana University–Purdue University Indianapolis Institutional Review Board (see Appendix B) and from the local VA Research and Development Review Board (see Appendix C) were attained, study participants were

recruited from one VA polytrauma unit in the Midwest. Recruitment letters (see Appendix D) were signed by the participants' polytrauma rehabilitation medicine physicians and by the TBI care manager who had the initial contact with the veteran with mTBI. The recruitment letter described the study's purpose, a statement of voluntary participation, and the nature in how the veteran would be contacted by the investigator.

The veterans then were referred to the investigator by the VA polytrauma TBI care manager. The polytrauma TBI care manager mailed study packets to each prospective participant. The study packet included a recruitment letter brochure signed by TBI health care providers and two copies of the written informed consent (see Appendix E). Subsequently, the polytrauma TBI care manager notified the investigator of the veterans' contact information for the purpose of recruitment. Approximately one week later, the investigator telephoned each veteran to assess his or her interest of participation and to determine his or her eligibility. For those veterans who were not interested in participation, they were assured that they would not be re-contacted in the future.

Willing participants were interviewed after their eligibility was determined, screening for inclusion and exclusion criteria was conducted, and informed consent was obtained. Participants were instructed to retain a copy of the informed consent statement. Audiotaped telephone interviews were conducted at a mutually agreed upon time, and participants were asked questions using an approved interview guide that contained a demographic form.

Once the interview was completed, each participant was mailed a \$20 Wal-Mart gift card as a token of appreciation. An additional benefit to the study participants was the perception that they provided important information that may help fellow comrades with

mTBI as they reintegrate in their communities. Each telephone interview lasted approximately one hour.

Protection of Human Subjects

Veterans were provided a complete description of the study, including the purpose and potential risks as well as benefits of the study. Each veteran was informed that participation in the study was voluntary and that he or she could cease participating at any time. The veterans also were informed that they could choose not to answer any question with which they felt uncomfortable. In the event that a veteran became distressed, a VA national lifeline number for veterans in crisis, 1-800-273-TALK (8255), was provided to them. In the event that suicidal thoughts were expressed by the veteran to the investigator, the investigator had access to the veteran's VA healthcare provider on the veteran's behalf so that the provider could contact the veteran directly to determine if treatment was necessary. Prior to conducting the interviews, the investigator participated in VA suicidal prevention training at a Midwest VA medical center and had an approved suicide protocol to follow (see Appendix F) in response to this type of situation.

Efforts were made to protect the confidentiality of the veteran participants. Telephone calls to the veterans were made to a telephone number provided by the veteran at a convenient time for the veteran and were made from a private location. Each audiotaped interview was transcribed verbatim by a local transcription service that was VA-contracted and approved by both institutional review boards. Data were double checked for accuracy in transcription. At the end of the study, the audiotapes were destroyed. Questionnaires, audiotapes, and transcripts were assigned a study ID number,

removing all identifying information. The investigator was the only one to match the numbers with the names.

All files, transcribed and taped, were stored separately in locked file cabinets only accessible to the investigator. Contact information for veterans was stored separately and on a password-protected computer accessible only by the investigator. Transcribed information was stored in a Microsoft Word document on a secure server that was backed up and supported by the VA medical center in a password-protected folder accessible only to the investigator. Veterans' informed consents were stored separately in a locked file cabinet. The veterans were informed that they would not be identified in any reports or manuscripts from the study data. The printed copies of the completed interview schedules will remain in a locked cabinet for at least seven years following the study at which time they will be shredded.

Measures

In Phase I, mTBI veteran characteristics, needs, concerns, strategies used, and advice given were measured. A description of how each variable was operationalized follows.

Veteran Characteristics

The characteristics of veterans examined in this study during their first year of VA enrollment post-deployment were as follows: (1) demographic and clinical data, including age, gender, race, ethnicity, marital status; (2) highest level of education; (3) recipient of a VA service-connected pension; (4) number of deployments to combat in Iraq and/or Afghanistan; (5) living arrangements; (6) adequacy of household income; (7) employment status; (8) co-morbidities; and (9) symptoms related to mTBI. A

demographic survey was designed by the investigator to operationalize the characteristics of Iraq and Afghanistan veterans noted above and in Appendix G. Sample inclusion criteria were noted previously in this chapter in the *Sample* section.

Needs and Concerns of Veterans with mTBI

The needs of veterans with mTBI were perceived needs that had not been fulfilled post-deployment through the characteristics of the environment, the VA healthcare system, and/or community resources, for successful community reintegration. The concerns of veterans with mTBI were issues that had a direct effect on or were a matter of significance related to their unfulfilled perceived needs and community reintegration. Specific questions in the semi-structured interview were designed to operationalize the needs and concerns of veterans with mTBI during the first year of their follow-up care.

The interview questions were:

1. Describe a normal day in providing care for yourself.
2. What have been your greatest concerns or problems since you were discharged from the hospital and/or service?

Strategies Used and Advice Given

Strategies used were compensatory behaviors employed by veterans to address deficits that had resulted from mTBI, learned through rehabilitation services or self-taught. Advice given were the recommendations that veterans with mTBI proposed for other veterans with mTBI who were returning from deployment, based on veterans' specific strategies and individual experiences. Strategies used and advice given were also operationalized by specific questions in the semi-structured interview. The interview questions were:

1. What strategies have helped you cope with these concerns or problems?
2. What advice would you give a comrade once he or she has been diagnosed returning from deployment.

Data Analysis

First, descriptive statistics were used to summarize the sample of the eight veterans. This demographic data frequencies included age, gender, race, ethnicity, marital status, highest level of education, VA pension, number of deployments to combat, living arrangements, adequacy of household income, and employment status. In addition, frequencies were calculated on clinical data related to co-morbidities and symptoms related to mTBI.

Content analysis was conducted using a thematic matrix based on a conceptual model derived from Ferrans' et al. (2005) HRQOL model and the literature to categorize the needs, concerns, strategies used, and advice given of veterans with mTBI (Miles & Huberman, 1994). According to Sandelowski (1995) and Miles and Huberman (1994), an a priori framework (e. g., conceptual model derived from Ferrans' et al. (2005) model and the literature) can be used not only to systematically organize data based on key concepts of the framework but also for data reduction. As previously mentioned, Ferrans' et al. (2005) model has also been utilized to guide and organize HRQOL nursing reviews for TBI studies (Daggett et al., 2009; Petchprapai & Winkelman, 2007). Accordingly, a conceptual model derived from Ferrans' et al. (2005) model and the literature was utilized to guide and organize the content analysis in this study.

Two members of the research team independently categorized the themes and met to compare findings and attain consensus. The data were categorized into six key themes:

cognitive impairment, physical symptoms, emotions and behaviors, IADL, interpersonal interactions, and community reintegration. An audit trail then was employed to attain consensus of three additional researchers for the representative quotes of the veterans' needs, concerns, strategies used, and advice given for each of these key themes (Miles & Huberman, 1994). Using a response scale that ranged from 0 (*not at all*) to 4 (*extremely*), the rating forms specifically requested the researchers to rate the degree of representativeness to each of the six themes for each quote.

A checklist (see Appendix H) was developed to detail the specific needs and concerns in each of the six themes. The strategies used and advice given by combat veterans with mTBI also were organized by the six themes and were incorporated into the intervention materials. The checklist detailing the specific needs and concerns, as well as the strategies used and advice given, provided further support for the Conceptual Model in the Context of mTBI that framed the assessment and intervention components in Phase II of this study.

Trustworthiness of the qualitative data was determined by examining the criteria of credibility, transferability, reliability, and confirmability (Davies & Dodd, 2002; Frankel, 1999; Lincoln & Guba, 1985). Criteria were achieved by the following determinants:

1. Credibility of the study findings was established during data collection and analysis through data saturation, interview notes, and transcripts.
2. Transferability in study findings was demonstrated in the data presented and the potential application into a Web-based intervention.

3. Reliability was achieved by the review of the transcripts, coding, and themes by two members of the research team, and confirmed through an audit trail with three additional researchers, resulting in the six final overarching themes.
4. Confirmability was demonstrated partially in this study since the results reflected the participants' various perceptions, including their beliefs and values. Further evidence of confirmability included voluntary participation and informed consent of the participants.

Confirmability will be determined further in a future study using focus groups with veterans with mTBI to validate the findings.

Phase II: Establishing Content Validity for the Intervention and Algorithms

Design

Utilizing the needs, concerns, and strategies checklist derived from the conceptual model in Phase I, the components of the VETSCARE intervention were developed for each categorical theme in the context of cognitive impairments from mTBI and included algorithms and strategies for each subcomponent of the conceptual model. These then were forwarded to national TBI experts for evaluation of content validity and recommendations for modifications.

Sample and Procedures

In Phase II, the development of the VETCARE intervention, six TBI experts who were selected purposively for their research and/or diverse clinical skills in caring for combat veterans rated the content validity ratings of the VETSCARE intervention components. They were recruited nationally from various disciplines in TBI care.

The VETSCARE intervention was created to enable veterans with mTBI to develop self-management strategies in the context of mTBI in six areas: (a) cognitive impairments, (b) physical symptoms, (c) emotions and behaviors, (d) IADL, (e) interpersonal interactions, and (f) community reintegration. Fourteen algorithms were developed for the most relevant items derived from the veterans needs and concerns checklist. They are illustrated in the Conceptual Model in the Context of mTBI (see Figure 1 in Chapter 1). The content of each algorithm was derived from qualitative interviews of combat veterans of mTBI and existing literature. The experts were asked to rate the degree or problem relevance to which the content in each algorithm addressed veterans' needs and concerns identified on the checklist developed in Phase I. This was consistent with the definition of content validity for interventions proposed by Trochim in 2001, translating a cause construct (content) into an observation (intervention) (Bakas et al., 2009; Trochim, 2001). In addition, the experts were asked to rate the accuracy of the information, feasibility of strategies, and acceptability of the strategies for veterans with mTBI using methods similar to Bakas et al. (2009). The experts also were asked to provide recommendations for editorial changes and improvements in the strategies and the algorithms.

Measures

In Phase II of this study, demographics of TBI experts, content validity ratings, and qualitative feedback regarding the VETSCARE intervention strategies and algorithms were obtained. A description of how each variable was operationalized follows.

TBI Expert Characteristics

The TBI expert characteristics examined in this study per self-report (see Appendix I) were: (1) type of expert, (2) age, (3) gender, (4) education, (5) type of degree, (6) years as a professional, (7) years of experience providing TBI care, and (8) years of research or practice within the VA, if employed within the Department of Veterans Affairs. A demographic survey designed by the investigator operationalized the TBI experts' characteristics noted above. TBI experts were selected a priori and consisted of experts in multiple disciplines including speech-language pathology, advance practice nursing in rehabilitation, telerehabilitation, occupational therapy, polytrauma rehabilitation medicine, and neuropsychology.

Content Validity

Content validity ratings for the VETSCARE intervention were obtained using investigator-developed forms that focused on accuracy, feasibility, acceptability, and problem relevance of the VETSCARE intervention components and algorithms using a response scale that ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). The rating forms specifically requested the experts to rate the degree to which the content in each algorithm addressed the need or concern of veterans with mTBI or problem relevance from which it was created. TBI experts also were asked to provide qualitative comments and recommendations for improvement in the VETSCARE intervention content. See an example of rater forms in Appendix J.

Data Analysis

First, descriptive statistics were used to summarize the sample characteristics of the six experts. This included frequencies for discrete demographic data, and means,

standard deviations, and ranges for continuous demographic data. Content validity data then was analyzed using descriptive statistics to summarize the ratings provided by the experts. The means of expert ratings (accuracy, feasibility, acceptability, and problem relevance) were evaluated to assess the content validity of the 14 veterans needs and concerns checklist-based algorithms. The experts also rated the relevance of the veterans' needs and concerns checklist for veterans with mTBI and rated the degree to which they thought it would be feasible for veterans with mTBI to receive the intervention using a Web-based program. Qualitative comments from experts will be used to further revise and enhance the VETSCARE intervention strategies and algorithms.

Summary and Conclusion

This chapter detailed the methods used to develop and test content validity for the VETSCARE intervention. Phase I procedures focused on the collection of qualitative data from eight veterans who returned from combat with mTBI. These data, guided by a conceptual model derived from Ferrans' et al. conceptual model of HRQOL (2005), were used to develop the checklist to identify needs and concerns, strategies, and algorithms for the VETSCARE intervention. Phase II procedures focused on testing content validity of the VETSCARE intervention using a sample of six TBI experts. Based on content validity ratings and qualitative comments provided by the TBI experts, the VETSCARE intervention was revised. Chapter Four provides the results for Phase I and Phase II.

CHAPTER FOUR

RESULTS

This chapter details the results of this study that was guided by the Conceptual Model in the Context of mTBI (Figure 1 in Chapter One).

The results are presented as Phase I and Phase II, respectively. In Phase I, qualitative data regarding needs, concerns, strategies used, and advice given were collected from eight veterans with mTBI. In Phase II, content validity ratings for the mTBI Veterans Needs and Concerns Checklist and 14 algorithms making up the VETSCARE invention were obtained from 6 TBI experts. Descriptions of the veteran sample and experts and the results specific to each aim for each phase are also presented.

Phase I: Qualitative Data Regarding Needs, Concerns,
Strategies Used, and Advice Given for Model and Intervention Development

Individual Characteristics of Veterans with mTBI

Twenty-four Iraq and Afghanistan veterans who had been diagnosed with mTBI were contacted for recruitment. Multiple recruitment attempts were made for 10 of these veterans who did not return calls. Four additional veterans refused to participate because they had no interest in this study, and one veteran refused because he was already participating in another VA research study. Eight of the 24 veterans who were contacted met inclusion criteria and provided informed consent. All of the veterans were non-Hispanic, Caucasian males with the mean age of 32.0 years. All of the veterans had been deployed to Iraq, and one veteran also had been deployed to Afghanistan. While four (50.0%) of the veterans were married, four (50.0%) of the veterans lived with their parents or friends. All of the veterans had graduated from high school, and four (50.0%)

of the veterans had received some college education. While four (50.0%) of the veterans reported having *just enough* household income, only two were receiving the benefit of a combat-related VA disability pension. Seven veterans with mTBI reported new onset of headaches post-TBI, while one veteran reported more severe headaches post-TBI than headaches experienced prior to deployment. Other co-morbidities reported post-injury included musculoskeletal conditions, hypertension, PTSD, and Gastroesophageal Reflux Disorder. Table 2 lists the veteran participants' demographics and co-morbidities post-deployment.

Table 2.

Individual Characteristics of Veterans with mTBI

Characteristics	Frequency ^a	<i>M</i>	Range
Age (yrs)	8(100.0)	32.0	24.0–36.0
Gender: Male	8(100.0)		
Ethnicity: non-Hispanic	8(100.0)		
Race: Caucasian	8(100.0)		
Marital status			
Married	4(50.0)		
Single	3(37.5)		
Divorced	1(12.5)		

(table continues)

Characteristics	Frequency ^a	<i>M</i>	Range
Employment			
Full-time	4(50.0)		
Part-time	2(25.0)		
Unemployed	2(25.0)		
Education (yrs)	8(100.0)	13.4	12.0–17.0
Income			
Comfortable	3(37.5)		
Just enough	4(50.0)		
Not enough	1(12.5)		
VA disability pension			
Yes	2(25.0)		
No	6(75.0)		
Living arrangements			
House	7(87.5)		
Independently	3(37.5)		
With parents/friend	4(50.0)		
Apartment	1(12.5)		
Number of deployments tours	8(100.0)	1.13	1.0–2.0

(table continues)

Characteristics	Frequency ^a	<i>M</i>	Range
Post-deployment conditions			
Headaches	7(87.5)		
Musculoskeletal	4(50.0)		
Hypertension	3(37.5)		
PTSD	2(25.0)		
GERD	1(12.5)		

^a*n*, Frequency(%) (Possible)

Phase I entailed collecting qualitative data regarding needs, concerns, strategies used, and advice given by eight veterans with mTBI, guided by a conceptual model derived from Ferrans' et al. (2005) HRQOL model and the TBI literature. Six key categories and predominant themes emerged providing further support for the model (cognitive impairments, physical symptoms, emotions and behaviors, IADL, interpersonal interactions, and community reintegration). Guided by the conceptual model, a mTBI Veteran Needs and Concerns Checklist and 14 algorithms making up the VETSCARE intervention were developed. The checklist with examples of the veterans' identified needs and concerns and examples of their strategies used and advice given living with mTBI are listed in Appendix H. Exemplar narrative quotes within each theme presented by the veterans are presented in Table A3 in Appendix K. Selected quotes by

the veterans that support each need and concern, strategies used, and advice given are in reported in the following section.

Cognitive Impairments: Memory, Concentration, Executive Functioning

Needs and concerns. The eight veterans with mTBI reported a variety of cognitive impairments that included memory deficits, concentration (attention) deficits, and/or difficulties with executive functioning. They all described issues related to memory from short-term memory loss to long-term memory loss and difficulty retrieving information.

One veteran explained how his memory deficits had affected his daily life by stating

My memory is not that sharp anymore....I mean, I just can't remember things that I have done. I lose stuff. ...I've lost big chunks of time. I don't remember things that happen....Somebody can tell me that I did this or that and I'll have no memory of it....I can sit here and have an entire conversation and forget it.

Another veteran described the affects of both short-and long-term memory loss:

I have short-term and long-term memory loss. I have trouble remembering people, places, things...anything before the explosion...dates...childhood memories in general....I'd run into people after I got out and I didn't know who they were and I was friends with them at school, but I didn't know them anymore. When I talked about my past, I didn't remember events...didn't remember childhood memories. And then short- term, I have trouble remembering times, dates, appointments.

One veteran who had been receiving speech-language therapy for his memory deficits stated, "I have been doing this for a year, and there are some days I cannot remember."

Strategies used and advice given. Each veteran had developed strategies to compensate for his memory deficits. Each has been utilizing PDAs supplied by the VA to remind him of work commitments and appointments. Additionally, some of the veterans have had a spouse or parents accompany them to medical appointments. Other strategies used included making lists, keeping notebooks, and using visual prompts. One veteran

stated, “[I] write myself notes all the time...so when I wake up in the morning or I come home from work, I know exactly what I’ve got to do.”

The veterans did not report any strategies they used to address their concentration and/or executive functioning deficits or offer any advice for other veterans returning with mTBI.

Symptoms—Physical: Headaches, Fatigue/Insomnia, Tinnitus

Needs and concerns. Veterans with mTBI experienced distinct physical symptoms of brain injury, including headaches, insomnia, fatigue, imbalance, and tinnitus. Some of the veterans also coped with chronic pain from blast injuries, musculoskeletal injuries from combat, or PTSD. One veteran described his headaches:

I was told they’re a little more severe than a migraine like I can’t get out of a bed, can’t focus, can’t open [my] eyes, sunlight hurts. I take some pretty strong doses of headache medicine for them. I really can’t function. Then eventually, they go away and I be back in the saddle.

Another veteran who was recently employed expressed concerns related to his symptoms of fatigue and insomnia:

I’m trying to keep up...but if I have to work past my normal time....When I come home at the end of the day, I usually take an hour’s nap...you know then I’m okay, and then I go to bed between 9 and 10. And I’m usually up by 1:30, 2:00 every day because I can’t sleep.

Symptoms of tinnitus were also shared such as this veteran’s description:

I had a hearing test. They said my hearing is fine, but like it is someone is trying to talk to me and there’s like a TV on in the background or something...or like other people are talking in the background.

Strategies used and advice given. The veterans did not elaborate on strategies used or advice given to manage symptoms of fatigue/insomnia or tinnitus. They did not specify whether they were able to manage these symptoms. The veterans did share the

need of prescribed medications to manage their headaches. Yet one veteran explained his hesitancy to take prescription medication due to side effects he experienced and his consequent decision to use milder over-the-counter medications:

Oh, basically I take my different meds, and sometimes I won't take them because the side effects....Usually, if I had a bad headache, I'll just take a couple of aspirin or something like that to try and make it go away....Sometimes I just have to ride it through.

Symptoms—Emotions and Behaviors

Needs and concerns. Each veteran had his own set of emotions and behaviors that he was enduring. These were categorized as anger, uncertainty (fear), and depression (sadness). While two veterans attributed their emotions and behaviors of anger to PTSD, emotions of uncertainty and depression were also experienced by some of the veterans. This statement shows one veteran's experience with anger: "I didn't notice the dilemma. A friend did. I'm more harsh, as they call it. I'm more blunt." The same veteran shared his feelings of uncertainty regarding his future health and potential disabilities by stating,

What are the long-term effects going to be....later on down the road, you know, health problems....If that's going to affect anything. As I age, yeah...after I get into the fear area of life and stuff after. Is it going to lead to Alzheimer's always going to have to have medical assistance and stuff like that.

Another described his feelings of failure as he attempted to obtain meaningful employment in this way:

I wound up settling. I wound up going to a trailer factory. I said okay, I won't be able to finish school. I guess I'll just do...something I told myself I would never do. So I settled. And I went and did something like that. It was really a disappointing feeling...like I was a failure.

Strategies used and advice given. While the veterans who experienced symptoms of PTSD had developed a few strategies to cope with their anger, they had yet to develop

strategies to cope with uncertainty (fear) in their future. One Marine veteran shared how his mother helped him cope with episodes of anger:

Surround yourself with people who can tell you things and be there for you and cope with you and help you through it....There's days where I'm not pleasant to be around and she always reminds me that this is not the Marine Corps. You can't treat your employees like the Marine Corps. She's usually the only one that can settle me down and makes me understand that civilians do make mistakes.

This veteran described how his family and friends supported him with anger management and this advice:

Don't get frustrated. I mean, I was getting frustrated for a little bit and then friends and family helped out with that, so...emotional and physical stuff like that, you know. It's the whole thing is, you know, they're there for you if you forget something, you know. They'll remind you and stuff like that, so you know, don't...you're not alone in this.

Another stated:

I like the silent method, where I just walk away, go do my own thing....I go to the basement, work in my shop...separation...from whatever is bothering me....I bought an old house and I've been remodeling it. And I found some old dressers from an old house, I've been refinishing those.

IADL: Employment/School, Finances, Leisure Activities

Needs and concerns. Employment, school, finances, and leisure activities were the key IADL that the eight veterans discussed. Although they identified their needs and concerns, they did not report specific strategies they used to cope with these issues or advice to share with returning soldiers with mTBI. The veterans explained their needs and concerns with attaining regular employment and returning to school. One stated,

We get two weeks of classes on jobs that we can't even get...like jobs they were telling us about, I couldn't apply for and they taught me how to write a resume. Well, my resume is pretty short. Who wants to hire someone who's trying to kill people?

Another veteran shared his concerns about increasing his educational qualifications in this way:

If I go to school, am I going to be able to, you know, to make it? Am I going to be with my memory and everything like that...I mean, what I remember of being in school was a lot of tests, a lot of stuff, you know, stuff like that. I don't know if I could do it or not.

Yet another explained his frustration with attaining regular employment like this:

I think the hardest thing for me is just getting back...the job thing...holding down a job now is much harder than it used to be and it's not just my brain injury stopping me from...having gainful employment. I've got more than one problem, so I don't know what to attribute to the brain injury....I just do not have a steady job. I do cash work, odds and ends.

This same veteran addressed his financial concerns by stating, "I'm scraping by. Let's see, I really don't have enough to make ends meet, but I do somehow....I'm unemployed...not because of my brain injury but because of my other injury."

Another veteran related his medical and financial concerns regarding vocational training to become a helicopter pilot by stating:

I was going to get...a little more than a year's experience doing helicopter hydraulics so that way when I came back, I'd have an alright shot of maybe trying to get a job...but they have taken me off that deployment....Because of all this medical stuff going on, I'm probably never going to apply for flight school....My whole entire dream of eventually becoming a helicopter pilot completely went away....I have been hearing it's like 75, 80 thousand dollars to try and be trained as a helicopter pilot as a civilian.

Additionally, the veterans shared some changes in participation of leisure activities. One veteran discussed his decreased physical ability to participate in golf and to perform at the level he had before his combat injuries; another veteran expressed his decreased interest in leisure activities that he had enjoyed prior to receiving the mTBI. He

stated, “I used to love to work out, and for some reason, I don’t...I have plenty of time to.” Another veteran stated:

I like sports and that....When I first got back, I tried to play some golf, but my shoulder just bugged me too much and it just took away a lot from me....I would screw up a shot and get upset, so I would walk off the golf course with friends. So, I basically put my clubs up until I start feeling better.

Strategies used and advice given. The veterans disclosed only a handful of strategies and advice that could assist new combat veterans returning home with mTBI with their IADL. One veteran recommended:

I would tell them not to settle....Take a little breather. I’d tell them to start off slow. Don’t start off where they had been....I tried to jump back into school and do everything I was doing before I left...and it all just didn’t work out.

Interpersonal Interactions: Communication, Relationships, Support

Needs and concerns. The veterans reported difficulty in three areas of interpersonal interactions: communication, relationships, and support. Even though some of the veterans discussed their combat experiences with spouses and with veterans at veteran service organizations, they reported that they were selective about what they shared and with whom they shared their experiences. They discussed post-deployment relationships and how they perceived their personal support and access to community support such as VA healthcare services. Regarding sharing combat experiences, a veteran stated, “The biggest thing...Veterans do not open up to people that do not relate to them because they don’t feel that they know what...they’ve been through.” One veteran stated “there are some guys out there that they kind of bottle their selves up and they do not tell their wives anything. I do not know if that is good or bad.” Another reflected on a change in relationships with friends since he had returned from deployment, “I really had a lot of

friends I before I left....I don't go out and hang out with my friends anymore....It doesn't bother me either. Is that weird?"

While changes in relationships occurred with some of the veterans in pre- and post-deployment friendships, changes in relationships also occurred within families. One veteran disclosed, "I get irritable real quick. That's my biggest problem between my wife and I right now....I don't have no patience with her or the kids....especially my youngest....It just seems like we have drifted apart because of patience."

Another veteran described his concerns related to the lack of community support at the time of transition into the community in this way:

All they told me when I got out was to go to a service organization and they'll help you....They'll square you away....But the numbers of people that are going to service organizations are...more than they've had in years...Hundreds of people are coming back, and they've only got two or three counselors. So they're swamped.

Yet another veteran shared:

But there was never anyone there. Like every time I would call they were in Washington DC training op, where I would leave a message, and they'd never call me back so I would leave another one. But you know, I'm being told this entire time that there are only a few people...because they weren't prepared for the amount of people that were going to come back injured. And when all these people started coming back, they were just overwhelmed.

Strategies used and advice given. Not one of the eight veterans shared strategies used to address his needs and concerns related to interpersonal interactions. Nor did any of them share any advice to assist other combat veterans returning with mTBI.

Characteristics of the Environment (Community Reintegration): Return to Combat Unit, Adaptation to Society, Expectations of Others

Needs and concerns. These veterans discussed difficulties they encounter as they attempt to reintegrate into their communities. These concerns centered on their desires to

return to a combat unit in Iraq, on their adaptation to society, and on the expectations of others. One veteran stated, he “just really could not function...I just wanted back in the Army, and I didn’t want to be out here.” One veteran compared recruitment “courting” processes to his transition into the community.

The transition could be better....When you are recruited in the service...you get calls nonstop. You have to go and meet with them once a week. You have to go to all these little events. You have to do this. You’ve got to do that...getting you prepped to go to boot camp. Coming home, there is no one....There’s no transition or recruiters when you come out to guide you and make sure everything is in line. It’s all on you. Well, if you don’t know where to look, how the hell are you going to get it?...You see this stuff on the news...ex-service...goes crazy....He’s mentally f----- up in the head....Their theory is that he slipped through the cracks of the system....He didn’t slip through nothing.

And yet another veteran described his transition as, “When you come home, you get tossed back into your setting...your family expects you...everyone expects you to be who you were.”

Strategies used and advice given. Strategies used and advice offered to returning veterans for their community reintegration reflected the strategies and advice previously noted in the findings. They advised new veterans be patient during this phase, taking a step at a time. Additionally, they expressed the importance that new veterans recognize and accept that they may not be able to immediately return and participate in all of their pre-deployment activities. Most importantly, the veterans acknowledged the importance of allowing oneself time to reintegrate.

Veterans’ Recommendations for Future VA Programs

The eight veterans recommended areas for improving and/or enhancing VA services for returning soldiers with mTBI. One emphasized the use of empowerment in

treatment options by recommending that veterans obtain second and third medical opinions when necessary:

I would tell them to remember they're in charge of their body, not their doctor...just because a doctor might say this is what you have to do or you should do, doesn't mean you have to do it, if you don't feel comfortable with it.

All veterans used lists or notes to manage their memory deficits. One stated that he writes himself notes, "constantly [writing] everything down so I remember." Another veteran acknowledged the need for more programs to teach speech and memory skills and to activate the mind:

Probably something like what speech is doing, you know, trying to teach you memory, how to do your memory, try to activate it, you know your mind. I guess the memory part of your mind, try to regenerate it or however that works.

Other veterans identified the need for knowledge of available VA services and qualifying benefits. They also identified the need for additional education to increase/reinforce their own knowledge of the effects of mTBI, to educate their parents and families, and to educate the community such as staff and administration at local universities. One veteran stated, "You know, educating what could have happened, might have happened, or is happening, like the who, what, where, and when, and all of that."

They also felt the need for VA support programs and programs to assist with the adaptation from the war zone to the community. Another acknowledged that there exists a need for more communication regarding accessible VA health care services. He described it in this manner:

We were forgotten in some ways. I know guys right now that are out there that have no idea that they can get help or that they can get free medicine or that they can get anything through the VA. They haven't even filed a claim, and you know, it's the kind of crap when we get out of the service...pushed out of the gate.

In next exemplar, a veteran expressed the need for competent VA liaisons to facilitate processes in filing service-related benefit claims.

Like a liaison which they do now....They got people that will help newly soldiers navigate the benefits side which is something they definitely need to do...If...nobody tells you anything, so you have to find out on your own. And people don't know all the benefits they're entitled to....People don't know how to properly word what they are trying to say on paper, and they can get the wrong exam. They got to redo the whole thing....It takes up to a year.

He compares the need to the recruitment process by stating it should be “set up like in the beginning...when you get out there should be a rep that comes to your house or calls you consistently until you come in to them.” He goes on to state, “and that’s another thing. They tell me to go online. Well, I’m sorry, but not everyone has a computer.”

Specific Aims for Phase I

The three aims of Phase I of this study, generally accomplished, are discussed below. The relationships of these findings to previous studies are discussed in Chapter Five.

Specific Aim 1

Specific Aim 1 asked, “What are the most relevant needs and concerns of combat veterans with mTBI?” Its purpose was to identify needs, concerns, strategies used, and advice given by combat veterans with mTBI, guided by a conceptual model derived from Ferrans’ et al. (2005) conceptual model of HRQOL.

Aim 1a was achieved. Based on the model derived from Ferrans’ et al. (2005) conceptual model of HRQOL and the literature, the veterans’ needs and concerns were consistent with the six components of cognitive impairments, physical symptoms, emotional/behavioral symptoms, IADL, interpersonal interactions, and community reintegration. Utilizing qualitative descriptive design, combat veterans with mTBI

expressed needs and concerns in the six main areas (cognitive impairments, physical symptoms, emotional/behavioral symptoms, IADL, interpersonal interactions, and community reintegration). The veterans' needs and concerns within each theme were further subcategorized and were identified as the following: memory deficits, concentration (attention) deficits, executive functioning deficits, headaches, fatigue/insomnia, tinnitus, anger, uncertainty (fear), depression (sadness), work/school, finances, leisure activities, communication, relationships, support (community/familial), return to combat, adaptation to society, and expectation of others. Within these identified needs and concerns, the veterans' most frequently identified needs and concerns related to memory loss, headaches, anger, uncertainty, work/school, finances, adaptation to society, and support. Less frequent needs and concerns identified were concentration, executive functioning, finances, leisure activities, return to combat, and expectations of others.

Aim 1b asked, "What are the strategies used and advice given by combat veterans with mTBI?"

Aim 1b was partially met. Strategies in the context of cognitive impairments were partially identified by the veterans for their needs and concerns. All of the veterans shared the adopted strategies they used to facilitate both long- and short-term memory deficits, e.g., making lists or notes, using their phone for appointments and reminders, relying on family members to recall childhood memories, and participating in speech and language therapy to develop new neural pathways. However, the veterans did not share strategies that they had adopted to compensate for their concentration deficits or executive functioning deficits.

The veterans employed limited strategies to manage their physical and/or emotional and behavioral symptoms. For example, veterans used strategies of medication management and avoiding bright lights to manage mild to severe headaches. On the other hand, the veterans did not report the symptom management strategies they used to manage their fatigue/insomnia or tinnitus. Nevertheless, veterans did report specific strategies they had adopted to manage their anger. While some veterans used anger management strategies including separating (the silent method), “doing my own thing,” relying on family support, obtaining professional counseling, and using medications, other veterans had not adopted anger management strategies. Veterans advised newly returned veterans with mTBI to “not get frustrated” and to “surround yourself with people who can tell you things and be there for you.”

Veterans did not identify strategies they utilized to address needs and concerns related to their IADL of work/school or finances. Only two veterans identified leisure activities they enjoyed, and only one of them had actually acted on increasing his participation in leisure activities, e.g., remodeling a house, refinishing old dressers, doing yard work, and exercising on a treadmill. Advice given by veterans to newly returned veterans with mTBI included taking it “one step at a time,” starting “off slow, don’t start where they had been,” and advising that “it’s going to take time.”

The veterans did not report any strategies that they used to address their needs and concerns related to communication, relationships, support, return to combat unit, adaptation to society, or expectation of others. Nor did they have advice to share related to these specific needs and concerns. The selected exemplars above show the results and

when applicable they have been embedded as proposed strategies in the algorithms used in the VETSCARE intervention in Phase II.

Specific Aim 2

Specific Aim 2 asked, “What are the categories and items of a checklist to identify the needs and concerns of combat veterans with mTBI?” Its aim was to develop a checklist to identify the needs and concerns of combat veterans with mTBI guided by a conceptual model derived from Ferrans’ conceptual model of HRQOL (Ferrans et al., 2005).

Aim 2 was accomplished. Consistent with the model derived from Ferrans’ et al. (2005) conceptual model, the literature, and narrative quotes from the veterans interviewed in this study, the six areas reflected in this checklist included (a) cognitive impairments (memory deficits, concentration, executive functioning deficits); (b) physical symptoms (headaches, fatigue/insomnia, or tinnitus); (c) emotional and behavioral symptoms; (d) IADL; (e) interpersonal interactions; and (f) community reintegration. The checklist reflects the veterans’ needs and concerns in items subcategorized as memory deficits, concentration (attention) deficits, executive functioning deficits, headaches, fatigue/insomnia, tinnitus, anger, uncertainty (fear), depression (sadness) work/school, finances, leisure activities, communication, relationships, support (community/familial), return to combat, adaptation to society, and expectation of others. The mTBI Veterans’ Needs and Concerns Checklist is located in Appendix H.

Specific Aim 3

The purpose of Specific Aim 3 was to develop algorithms and strategies in the context of cognitive impairments that addresses the needs and concerns listed on the checklist.

Specific Aim 3a asked, “What are the strategies in the context of cognitive impairments that address the needs and concerns on the checklist? Using the derived model from Ferrans’ et al. (2005) conceptual model, the literature, and the veteran narrative needs and concerns, strategies used and advice given, strategies in the context of cognitive impairments that addressed the veterans’ needs and concerns on the checklist were identified and adopted. Specifically, the strategies included exemplar strategies and advice shared by the veterans, effective strategies demonstrated in the TBI scientific literature and evidence-based clinical guidelines, and strategies used by TBI experts. The strategies were selected on diversity and were content-specific to each identified need and concern subcategory. For example, some key strategies for dealing with memory deficits include the use of memory books, PDAs, visual prompts, family support, and limiting the number of activities at a given time and environmental noise. Other memory strategies included are step processes, such as self-talk, and techniques to remember individuals’ names. The results are embedded in the 14 algorithms that were developed during Phase II: Development of the VETeranS Compensate, Adapt, REintegrate Intervention.

Specific Aim 3b asked, “What algorithms can be developed to deliver the assessment and strategies to combat veterans with mTBI by the VETSCARE Web-based intervention?”

Aim3b was achieved. Using the model derived from Ferrans' et al. (2005) conceptual model, the literature, the narrative veteran quotes, and the developed mTBI Veterans Needs and Concerns Checklist, the following 14 algorithms were developed to deliver the assessment and strategies to combat veterans with mTBI by the VETSCARE intervention: memory, concentration, executive functioning, headaches, fatigue/insomnia, tinnitus, anger, uncertainty (fear), depression (sadness), work/school, finances, leisure activities, interpersonal interactions (communication, relationships, support), and community reintegration (return to combat unit, adaptation to society, expectations of others). A framework was designed to develop each algorithm systematically. This framework included self-assessment of need and/or concern, self-assessment of management, presentation of suggested strategies and steps in strategies if applicable, local and national resources, and reinforcement. Subsequently, the content validity of the algorithms and overall VETSCARE intervention, which was conducted by TBI experts, are presented in the results of Phase II of this study along with their recommendations.

Phase II: Development of the
VETeranS Compensate, Adapt, REintegrate Intervention

Characteristics of TBI Experts

Six experts provided ratings and qualitative feedback regarding the needs and concerns checklist and the 14 algorithms making up the VETSCARE intervention. The experts included a behavior therapist, a neuropsychologist, a TBI neurologist, two advanced practice nurses in rehabilitation science, and a speech-language pathologist. The mean age of the experts was 42.4 years with mean years of professional practice of 16.4. The mean years of TBI experience was 15.0 years with only two TBI experts

practicing within the VA with a mean years of 2.5. The experts had doctoral degrees except for one who had a master’s degree in nursing. One TBI expert did not complete the expert demographic survey that has been calculated as missing data in the Table 3.

Table 3.

Characteristics of TBI Experts

Characteristics	Frequency ^a	<i>M</i>	Range
Age (years)	5(83.3)	42.4	32.0–54.0
Missing	1(16.7)		
Gender			
Male	2(33.3)		
Discipline			
Behavior Health	1(16.7)		
Neuropsychology	1(16.7)		
Neurology, Medicine	1(16.7)		
Rehabilitation Nursing	2(33.3)		
Speech-Language	1(16.7)		
Pathology			
Total education (years)	5(83.3)	20.6	17.0–24.0
Missing	1(16.7)		

(table continues)

Characteristics	Frequency ^a	<i>M</i>	Range
Highest level of education			
Masters	1(16.7)		
Doctoral	4(50.0)		
Missing	1(16.7)		
Type of degree			
Medicine	1(16.7)		
Nursing	2(33.3)		
Rehabilitation Science	1(16.7)		
Speech-Language	1(16.7)		
Pathology			
Missing	1(16.7)		
Credentials			
BCBA-D	1(16.7)		
CNRN	2(33.3)		
SLP	1(16.7)		
MD, Neurologist	1(16.7)		
Missing	1(16.7)		
Total Practice (years)	5(83.3)	16.4	6.0–33.0
Missing	1(16.7)		

(table continues)

Characteristics	Frequency ^a	<i>M</i>	Range
Practice in TBI Care (years)	5(83.3)	15.0	5.0–29.0
Missing	1(16.7)		
Practice/research in the VA (years)	2(33.3)	2.5	3.0–5.0
Missing	1(16.7)		

^a*N* = 6, Frequency (%)

Content Validity

Table 4 demonstrates the TBI expert ratings for the algorithms within the 14 areas of the veterans' needs and concerns and the overall VETSCARE intervention. The TBI expert ratings presented evidence of content validity for the 14 algorithms (problem relevance 3.92, accuracy 3.73, feasibility 3.80, acceptability 3.84). An abbreviated Memory algorithm is illustrated in Appendix L. The average overall expert rating for the VETSCARE intervention was 3.82. Some algorithms were rated lower than others. For example, the finance algorithm received an overall rating of 3.50, however, this algorithm seemed to primarily address how to manage finances, as opposed to how to obtain financial resources from the VA system. This was a theme found in the analyses and reflected in the checklist. Improvement of this algorithm by providing more information about how to navigate the VA system in obtaining resources would likely improve future expert ratings.

Table 4

Mean Content Validity and Ranges of Expert Ratings for the VETSCARE Interventional Algorithms

Category ^a	Problem Relevance		Accuracy		Feasibility		Acceptability		Overall
	<i>M</i>	<i>Range</i>	<i>M</i>	<i>Range</i>	<i>M</i>	<i>Range</i>	<i>M</i>	<i>Range</i>	Ratings <i>M</i>
Memory	4.17	4-5	3.83	1-5	3.50	1-5	4.00	3-5	3.88
Attention	4.00	1-5	3.83	1-5	3.33	2-5	4.00	2-5	3.79
Executive functioning	3.83	2-5	3.00	2-4	2.83	1-4	3.33	2-5	3.25
Headaches	3.33	1-5	3.67	2-5	3.67	2-5	3.67	2-5	3.59
Fatigue/Insomnia	3.67	2-5	3.40	2-5	3.83	2-5	3.83	2-5	3.68
Tinnitus	4.33	4-5	4.00	2-5	4.33	4-5	4.00	2-5	4.17
Anger	4.00	2-5	3.80	2-5	4.00	2-5	4.00	2-5	3.95
Fear (uncertainty)	3.75	1-5	3.75	2-4	3.60	1-5	3.80	2-5	3.73
Depression (sadness)	4.33	2-5	4.00	2-5	4.00	2-5	3.83	2-5	4.04

(table continues)

Category ^a	Problem Relevance		Accuracy		Feasibility		Acceptability		Overall
	<i>M</i>	<i>Range</i>	<i>M</i>	<i>Range</i>	<i>M</i>	<i>Range</i>	<i>M</i>	<i>Range</i>	Ratings <i>M</i>
Finances	3.67	2-5	3.00	1-5	3.67	1-5	3.67	1-5	3.50
Work/School	3.33	2-5	3.67	2-5	3.83	2-5	3.67	2-5	3.63
Leisure	4.20	3-5	4.00	2-5	4.20	2-5	3.80	2-5	4.05
Interpersonal Interactions	4.00	2-5	4.20	3-5	4.20	2-5	4.00	2-5	4.10
Community reintegration	4.33	3-5	4.00	3-5	4.17	3-5	4.17	3-5	4.17
Column averages	3.92		3.73		3.80		3.84		3.82

^aResponse scale: 1 (*strongly disagree*), 2 (*disagree*), 3 (*neither agree or disagree*), 4 (*agree*), 5 (*strongly agree*)

The TBI expert ratings presented further evidence for the overall intervention utilizing a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In particular, ratings were 3.33 for the general format of the algorithms; 4.00 for the language used in the algorithms; and 3.50 for expert ratings regarding the feasibility of the veterans to use the strategies in the algorithms. Using the same response scale, the relevancy of the mTBI Veteran Needs and Concerns Checklist was 3.33 (see overall rating form in Appendix J).

TBI Experts' Recommendations

The TBI experts provided qualitative data on how to improve the components of the VETSCARE intervention and the checklist. The provided comments varied for each algorithm and by each expert. The recommendations included additions and/or deletions of strategies, rewording text in the strategies to make them more clear and concise, and suggestions on how to improve processes within the algorithms. For example, one recommended improvement of the memory algorithm was to provide step-by-step coaching for each of the embedded memory strategies. Other recommendations included adding algorithms for balance/dizziness and other pain. The majority of the recommendations were written directly on the algorithm diagrams. One TBI expert reported that the checklist seemed narrow in scope and recommended expanding items on the mTBI Veteran Needs and Concerns Checklist. These recommendations will be evaluated more extensively during the next phase of this research in which the algorithms and checklist will be revised before piloting with mTBI veterans.

Specific Aim for Phase II

Specific Aim 4. To determine the evidence of content validity for the components of the VETSCARE web-based intervention.

Specific Aim 4a asked, “What evidence of content validity was provided for the checklist to identify the needs and concerns?”

Aim 4a was achieved. Evidence of content validity was demonstrated in the expert content ratings of the mTBI Veterans Needs and Concerns Checklist with a positive mean relevancy of 3.33.

Specific Aim 4b asked, “What evidence of content validity was provided for the strategies that address the needs and concerns?”

Aim 4b was achieved. Evidence of content validity was demonstrated in the expert ratings of algorithms including relevancy 3.92, accuracy 3.73, feasibility 3.80, and acceptability 3.84 as shown in Table 4.

Specific Aim 4c asked, “What evidence of content validity was provided for the planned algorithms of the VETSCARE Web-based intervention that address the checklist to identify the needs, concerns and strategies?”

Aim 4c was achieved. Evidence of content validity was provided for the planned algorithms of the VETSCARE Web-based intervention and demonstrated in the expert rating of overall intervention 3.82 as shown in Table 4.

Summary

To summarize, this chapter presented the results of Phase I, identifying veterans’ needs and concerns, strategies used and advice given by veterans who have returned home from deployment with mTBI and were enrolled in the VA health care system. An

overview of the development of the mTBI Veteran Needs and Concerns Checklist, based on the derived model of Ferrans' et al. (2005) conceptual model, the TBI literature, and the veterans' narrative quotes, was provided. In Phase II, 14 algorithms were developed using a systematic framework. The content of these algorithms was derived from the checklist, the model, the TBI literature, and the veterans' narrative quotes. These algorithms then were integrated to compose the VETSCARE intervention. Six TBI experts provided positive content validity ratings for the checklist, the algorithms, and the overall intervention. Once revised, the mTBI Veteran Needs and Concerns Checklist and the VETSCARE intervention will be tested for feasibility in a future pilot study with veterans with mTBI who have recently returned from combat zones in Iraq and Afghanistan. Chapter Five provides interpretation and discussion of these findings, relevant TBI literature, the limitations of this study, and the implications to theory, research, and practice.

CHAPTER FIVE

DISCUSSION

This chapter provides a discussion of the results of Phase I, the needs and concerns, strategies used and advice given of mTBI veterans, and the results of Phase II, content validity of the VETSCARE intervention. Theoretical, research, and practice implications follow, along with study limitations that were proposed previously in Chapter One.

Phase I: Needs and Concerns, Strategies Used and Advice Given

Needs and Concerns

This qualitative pilot study explored the needs and concerns of, and strategies used and advice given by, combat veterans with mTBI during the first year of their enrollment in VA healthcare services. The findings were categorized into six major themes: cognitive impairment, symptoms, emotions and behaviors, instrumental activities, interpersonal interactions, and community reintegration.

Consistent with findings by Heinemann et al. (2002) and Corrigan et al. (2004), the veterans in this study underscored the needs and concerns related to cognitive impairments post-TBI. This was consistent with Heinemann et al. (2002) who stated that improving memory was one of the two most prevalent unmet needs in survivors of TBI with a median time post-injury of seven years. Corrigan et al. (2004) concurred that the cognitive impairment of memory deficit was one of the most frequent unmet needs experienced by TBI survivors at one year post injury. Interestingly, Corrigan et al. (2004) also reported that almost 75% of the study participants had mild brain injuries at the time of hospital admission. This finding demonstrated that survivors of TBI with less severe

brain injuries had ongoing rehabilitation needs at one year post-injury. While the veterans in this present study had been diagnosed with mTBI, some of their diagnoses were not confirmed immediately post-injury. Thus, treatments were delayed and some of the veterans experienced ongoing issues with memory at one year post-VA enrollment.

Comparable to Lefebvre's et al. (2005) findings, combat veterans in this study also emphasized needs and concerns in managing multiple physical symptoms post-TBI. As previously reported, the most frequently reported physical symptoms by veterans in this study were headaches, fatigue/insomnia, and tinnitus. In 2005, Lefebvre et al. identified the management of fatigue and headaches as unmet needs in survivors of TBI who associated the inability to manage fatigue and headaches as barriers in their adaptation post-injury. On the other hand, previous TBI studies did not reveal the management of tinnitus as an unmet need.

Regardless, tinnitus has been demonstrated as a physical symptom commonly experienced by survivors of TBI (Ceranic et al., 1998; Henry et al., 2005; Lew et al., 2007; Shucart & Tenner, 1981). Lew et al. (2007) emphasized that survivors of TBI can manage their tinnitus effectively if they acquire education, cognitive-behavioral therapy, and self-management skills, which are all key tools within the tinnitus content of the VETSCARE intervention.

Similarly, managing stress and emotional upsets and improving mood were identified frequently as needs and concerns of survivors of TBI in previous studies (Corrigan et al., 2004; Heinemann et al., 2002; Lefebvre et al., 2005; Pickelsimer et al., 2007; Rotondi et al., 2007). Likewise, the veterans reported the management of emotional/behavioral symptoms of anger and depression as needs and concerns.

Lefebvre et al. (2005) was the one study that reported needs and concerns associated to uncertainty of their disabilities and prognosis by survivors of TBI. Veterans in this present study related identical needs and concerns regarding disabilities and prognosis.

Obtaining employment, improving job skills, and increasing educational qualifications were relevant needs and concerns reported by survivors with TBI in previous studies (Heinemann et al., 2002; Pickelsimer et al. 2007; Rotondi et al., 2007). These findings were identical to the IADL and concerns among the veterans.

Heinemann et al. (2002), Pickelsimer et al. (2007), and Sample and Darragh (1998) reported consistent financial challenges among survivors of TBI as well as the need to increase their income. Similarly, veterans reported financial needs and concerns as they attempted to return to civilian life post-deployment.

In 2004, Corrigan et al. reported that survivors of TBI had additional financial needs that included managing their money and paying their bills. This was also a finding demonstrated with the veterans with mTBI.

In 2005, Lefebvre et al. reported the need of survivors of TBI to increase their participation in leisure activities. Decrease in leisure activities was a consistent finding among the veterans.

While Lefebvre et al. (2005) further acknowledged the need for community involvement in supporting survivors of TBI to return to work/school, and as well leisure activities, their findings also indicated the need for survivors of TBI to have improved relationships with their healthcare team. Man et al. (2004) and Leith et al. (2004) identified needs of social relationships and fostering social relationships. Similarly, the

veterans with mTBI reported needs and concerns related to interpersonal interactions of communication, relationships, and support. While the veterans reported needs to open up and share their deployment or injury experiences, they had concerns about sharing these experiences with nonveterans. Therefore, they were selective with whom and what information they disclosed. Other veterans remained silent about their deployment experiences and/or injuries even though they thought silence might not be the best strategy. Some veterans had concerns related to significant changes in relationships with their families and/or friends and had needs to reconnect.

Furthermore, Leith et al. (2004) reported that survivors of TBI desired not only professional services to assist them in obtaining reimbursements through the Department of Social Services and Medicaid, TBI survivors also acknowledged the need for TBI in-service training for service-related agencies. Findings were similar among veterans who revealed concerns and needs related to the lack of support at veteran service organizations. While they expressed a need to increase the number of staff to effectively respond to new veterans' claims, they also expressed the need to have staff who have been appropriately trained in benefit claim processes.

Lefebvre et al. (2005), Leith et al. (2004), and Rotondi et al. (2007) each reported that survivors of TBI identified seamless transition processes from one setting to another as needs and concerns for community reintegration. This was a consistent finding among the veterans studied.

Other community reintegration needs and concern themes were unique to the veterans and were not found in previous TBI needs and concerns studies. The veterans in this study shared needs and concerns of return to combat unit and expectation of others.

Perhaps these findings generally are related to all soldiers returning home from combat/deployment and not so much specifically related to combat soldiers with mTBI; at this time, this is unknown. Regardless, the veterans with mTBI had mixed emotions about returning to combat units. While some veterans experienced transition difficulties from active duty to civilian life and desired to return to a unit in Iraq, others had concerns about an upcoming scheduled redeployment. While this theme did not emerge from all the veterans in this study or from previous TBI studies, this theme was included because of its uniqueness. Again, this may not be a theme exclusively related to veterans with mTBI. Comparative studies need to be conducted in the future to determine if there is a difference in these two themes among Iraq and Afghanistan soldiers with and without mTBI and civilian survivors of TBI. Nevertheless, these factors may augment the challenges that combat veterans with mTBI face upon their return and community reintegration.

Strategies and Advice

Previous studies reported a rather limited number of strategies that survivors of TBI utilized. Lefebvre et al. (2005) reported strategies that survivors of TBI utilized daily to manage their uncertainties related to their disabilities and prognosis. While some survivors of TBI reported seeking TBI information as a strategy, others reported avoiding information as a strategy. Isolation, journaling, working, optimism, and focusing on self-progress also were strategies used to attend their uncertainty. In contrast, the veterans did not share any strategies they use to manage their uncertainty.

In 2004, Leith et al. identified the need to foster empowerment among survivors of TBI but did not report any strategies used by survivors of TBI. Interestingly, while the

theme of empowerment did not emerge among the veterans with mTBI, one veteran did advise that other veterans returning home with mTBI and other combat injuries seek second and third opinions in their rehabilitation treatments as necessary.

Other veterans shared a variety of strategies they used to address other needs and concerns. For example, all eight veterans had specific strategies to compensate for their memory deficits. Veterans also shared strategies they used to manage specific physical and emotional/behavioral symptoms.

Unfortunately, the veterans did not report strategies that they used to address their concentration deficits, depression, uncertainty, or difficulties with interpersonal interactions. Only a limited number of strategies were reported that would assist other veterans with mTBI to assist in IADLs. Regardless, veterans did provide other advice for veterans with mTBI including recommendations that new veterans returning home with mTBI give themselves time to adjust. They also emphasized the significance of support from family and friends in their recovery and transition processes.

Recommendations for Future Programs

TBI literature shows service gaps in TBI education and lack of knowledge in availability/accessibility of care and services (Leith et al., 2004; Pickelsimer et al., 2007; Sample & Darragh, 1998). Leith et al. (2004) identified increasing public awareness as an ongoing need for survivors of TBI. TBI literature consistently reported the need for comprehensive care on a continuum as well as care/service coordination (Heinemann et al., 2002; Lefebvre et al., 2005; Leith et al., 2004; Pickelsimer et al., 2007; Sample & Darragh, 1998). Similarly, the veterans reported consistent needs for future TBI programs. The veterans openly shared ideas to improve services for veterans with mTBI.

They identified diverse educational needs including accessible VA services/benefits, effects of mTBI for self and family, and increased public awareness. While one veteran advocated for a liaison program to facilitate filing VA benefit claims, another veteran suggested more programs like speech therapy to assist with cognitive impairments. Other veterans identified the needs for improved transition processes, education on available VA services, and education related to the pathophysiology of mTBI.

Phase II: Content Validity Expert Ratings for the VETSCARE Intervention

When developing new interventions, it is vital to confirm content validity from experts in the field (Bakas et al., 2002). In this study, TBI experts from multiple disciplines (rehabilitation science advanced practice nursing, behavior therapy, neurology, neuropsychology, and speech-language pathology) provided positive ratings for the algorithms that constructed the VETSCARE intervention and a positive rating for the overall VETSCARE intervention. Moreover, the TBI experts also provided recommendations to strengthen specific areas in the VETSCARE intervention prior to piloting with veterans with mTBI. Recommendations included incorporating two additional components into the intervention: other pain and balance. Lower expert ratings in executive functioning and finances, and expert comments indicated that these areas need significant revision in the content and strategies. Obtaining expert content validity was a key process early in the development of the VETSCARE intervention. Expert content validity provided direction and an opportunity to reassess the weaknesses and strengths in the intervention components and identify potential gaps to improve the overall intervention in the next phase of this research.

Limitations

Even though this study consisted of a small sample of eight combat veterans with mTBI, the results demonstrated the needs and concerns, strategies used and advice given by veterans who have sustained a mTBI in combat during their first year of enrollment in the VA. The findings disclosed critical areas of the needs and concerns of veterans with mTBI that have not been identified in other TBI or veteran populations. This is crucial in the development of interventions in response to an urgent need to assist new combat veterans in their community reintegration. Regardless, this study had limitations. First, the sample was not diverse in ethnicity and gender since it consisted of totally non-Hispanic Caucasian males. It is most likely that the needs and concerns, strategies used, and advice given by these veterans with mTBI may vary based on ethnicity/race and gender. Minority veteran populations with mTBI may have different needs and concerns and familial expectations/support issues that need to be addressed. A second limitation of the study design was conducting telephone interviews that excluded veterans who had hearing impairments to the degree that they could not hear normal telephone conversation and/or who had a speech impairment. Hearing impairments have been a noted finding in new combat veterans with TBI who have experienced blast injuries (Lew et al., 2007). This may limit the usefulness of the mTBI Veteran Needs and Concerns Checklist.

Another limitation of this study was the cross-sectional design. Although this design decreased the burden in the interview processes of cognitively impaired veterans, there was not the opportunity to revalidate the themes with the veterans because they were only interviewed once. Approximately 50.0% of the veterans had enrolled late into

the VA healthcare system and not immediately post-deployment. They may have not reported strategies that they had already adopted over time. Additionally, it could not be determined if the needs and concerns reported were related specifically to mTBI, PTSD, and/or other physical problems. Future studies need to determine when injury occurred and diagnosis of mTBI was made whenever possible. To address this limitation, themes will be revalidated in a future study that will test the VETSCARE intervention with veterans with mTBI. Furthermore, while data from the current study led to the development of the preliminary mTBI veterans' needs and concerns checklist, the checklist needs to be revised based on TBI experts' and researchers' recommendations. Subsequently, this checklist needs to be tested further with a larger mTBI sample because it may not be fully representative of this vulnerable population. Other needs and concerns, strategies used, and advice given as well may emerge for additional testing of the checklist.

A limitation noted from Phase II is the TBI experts' rating the content validity of the algorithms, the mTBI Veteran Needs and Concerns Checklist, and the overall intervention may not have been fully representative of VA healthcare team members. The content validity ratings of one TBI expert were consistently low for most algorithms, the checklist, and the overall VETSCARE intervention. Perhaps the instructions for reviewing the content of the VETSCARE intervention were not clearly articulated prior to this evaluation, resulting in lower overall mean scores of the 14 algorithms, the mTBI Veteran Needs and Concerns Checklist, and the overall VETSCARE intervention.

Theoretical, Research and Practice Implications

Theoretical

Significant theoretical implications evolved from this study. First, this study demonstrated how a theoretical model can be used to guide the development of a new intervention, e.g., VETSCARE. Theoretical models are essential for interventional nurse researchers, especially when approaching complex care issues of returning combat veterans with mTBI. Nurses can adapt existing conceptual models, such as Ferrans' et al. (2005) conceptual model of HRQOL, and apply them to diverse health conditions, such as traumatic brain injury (Daggett et al., 2009; Miles & Huberman, 1994; Petchprapai & Winkelman, 2007; Sandelowski, 1995). This study was guided by a conceptual model derived from Ferrans' et al. (2005) HRQOL, a comprehensive model that incorporates consistent domains and concepts that are applicable to diverse health care conditions. While Ferrans et al. (2005) identified the main domains of the model as biological function, symptoms, functional status, general health perceptions, and overall HRQOL, they also recognized how the characteristics of individual and the characteristics of the environment influence each domain. Ferrans et al. (2005) also noted that interrelationships exist between each domain, which may cause dynamic changes in healthcare outcomes.

The Conceptual Model in the Context of mTBI was derived from Ferrans' et al. (2005) HRQOL, the literature reviewed, and qualitative data from veterans. This model was developed to categorize and organize the identified needs and concerns of veterans with mTBI that can be modified through nursing interventions. This derived model includes the two domains of symptoms and functional status and the influences of

characteristics of the individual and characteristics of the environment. Six main components reflect themes that emerged from narrative quotes and include cognitive impairments, symptoms (physical and emotions/behaviors), IADL, interpersonal interactions, and community reintegration. Secondly, this study demonstrated how a theoretical model was used to develop a new clinical assessment tool, the mTBI Veteran Needs and Concerns Checklist.

Moreover, conceptual models can facilitate nurse researchers in conducting systematic evaluations of new interventions, such as the expert content validity in this study. Conducting these evaluations in a systematic manner assists nurse researchers in identifying weaknesses in newly designed interventions and provides them opportunities to improve content prior to piloting with patients. Furthermore, theoretical models can assist researchers in organizing research findings systematically for dissemination.

Research

In 2007, McCabe et al. evaluated community reintegration interventions and strategies for survivors of TBI. Within this systematic review, it was reported that only one random control trial was discovered and the majority of the interventions were supported solely by limited evidence. McCabe et al. (2007) concluded that further research via interventional approaches needed to be conducted to advance evidence of community reintegration of survivors with TBI.

To develop interventions and to assist in community reintegration of survivors with TBI, researchers must first understand the needs and concerns that exist among these survivors. As a result of the ongoing conflicts in Iraq and Afghanistan, the needs and concerns of veterans with mTBI who served in these combat zones had not previously

been explored. The findings of this qualitative study identified the needs and concerns of combat veterans with mTBI in six main areas. Even though data saturation was reached, these themes were not revalidated with the eight veterans. Thus, future research needs to be conducted to revalidate the veterans' needs and concerns that emerged in this present study (e.g., a pilot study in which veterans with mTBI evaluate the feasibility and acceptability of the content and design of the VETSCARE intervention). Future pilot work may incorporate findings of Nolin, Villemure, and Heroux (2006) who found that survivors of mTBI reported significantly more symptoms in "suggested response" interviews (when a list was read to them) than in semi-structured interviews using open-ended questions. Once the feasibility and acceptability have been established, the VETSCARE intervention needs to be tested further in a random control trial to test its effectiveness. Given that the needs and concerns of veterans with mTBI may change or resolve over time, future studies also need to be conducted at different time points to ensure that any new or ongoing needs are addressed. Future research methods need to include processes that include veterans with mTBI who have a hearing impairment as a result of blast injuries to the extent they cannot hear a normal telephone conversation, and include veterans who have motor speech deficits. Additionally, future research needs to be conducted with this veteran population to determine the positive and negative correlations among the variables in the derived model. Knowledge gained from correlational studies may assist researchers in providing support for a conceptual model that can be used to guide analyses designed to test the future efficacy of the VETSCARE intervention. Further, it is essential that the mTBI Veteran Needs and Concerns Checklist

be evaluated by healthcare providers to assess their satisfaction, acceptability, and feasibility of the tool.

Practice

The strengths of this study can directly impact clinical practice. To begin, the Conceptual Model in the Context of mTBI provides a framework for healthcare providers, especially nurse care managers, to deliver comprehensive care to veterans with mTBI. This model was derived from Ferrans' et al. (2005) HRQOL, which is a comprehensive model and provides consistent domains and concepts.

Secondly, the VETSCARE intervention is an innovative approach to deliver nursing care management services to veterans with mTBI. This intervention was based on the derived model, the TBI literature, and veteran qualitative data that allow nurses to direct care to relevant needs and concerns of veterans with mTBI. Nurse care managers are in key positions to implement interventions in the VA healthcare system. In the VA, care management includes the intake (initial assessment) of veterans post-deployment and the coordination of their healthcare needs and referrals to specialty services. Care management is a vital resource for not only returning combat veterans with mTBI and their families, but also for civilian survivors of TBI and their families.

Presently, the VA supports diverse modalities in delivering care to veterans with TBI. These include virtual reality programs, telemedicine, and care coordination (Girard, 2007). Until now, comprehensive nursing interventions for veterans or civilian survivors of TBI did not exist. TBI interventions are not always integrated into care management. In this study, the VETSCARE intervention was designed and developed to address the needs and concerns of combat veterans with mTBI, integrating self-management skills,

monitoring of symptoms, and nursing care management. After the revision of VETSCARE intervention, it will be accessible by mobile devices, which will enhance the acceptability of the intervention among this new generation of veterans and enhance the responsiveness and delivery of nurses' tailored interventions. More importantly, the VETSCARE intervention will have the capability to deliver care management services to veterans in diverse geographical regions.

A further strength of this study is the development of the mTBI Veteran Needs and Concerns Checklist. Findings from this study may increase the awareness of VA nurses and assist their skill development in identifying underlying needs and concerns of returning veterans with mTBI using the mTBI Veterans Needs and Concerns Checklist. VA nurses may also utilize a checklist of needs and concerns of veterans with mTBI to share with other veterans with mTBI upon their enrollment to the VA.

Summary

Conceptual models can assist researchers in developing interventions and assessment tools that are comprehensive and can be tailored to meet individualized needs and concerns of veterans with cognitive impairments. It is possible that some of the algorithms might be applicable to veterans without mTBI (e.g., community reintegration). This study outlined a process to develop a new intervention by identifying needs and concerns of the veterans with mTBI and developing 14 algorithms that were based on the derived model, the TBI literature, and veteran qualitative data. This study also outlined the process of testing expert content validity of a new intervention.

This study revealed the needs and concerns of eight combat veterans with mTBI, the strategies they utilize to cope with their mTBI, and advice they may offer to other combat veterans with TBI. Cognitive impairments, symptoms, emotions and behaviors, instrumental activities, interpersonal interactions, and community reintegration were the six major themes that emerged from this study, guided by a conceptual model derived from Ferrans' et al. (2005) model and the scientific TBI literature. Though the VETSCARE intervention is in the process of further development and revision, positive findings regarding the accuracy, feasibility, and acceptability were obtained in this study. Further testing of the VETSCARE intervention based on these findings is warranted.

Successful reintegration of combat veterans with mTBI is likely to be compromised by TBI-associated long-term cognitive deficits because the diagnosis of mTBI is often delayed. The VETSCARE intervention can assist veterans with their community reintegration because it provides strategies and ongoing monitoring to assist them in multiple domains of their daily functioning, including symptom management.

APPENDICES

Appendix A
Literature Review Tables

Table A1

Studies of Needs and Concerns of Survivors of TBI

Source	Sample and Design	Variables/Instruments	Findings and Comments
<p>Corrigan & The Traumatic Brain Injury Technical Assistance Center (2001)</p>	<p>Comparative analysis of 11 different states to evaluate state processes used for TBI survivors/their families: (1) to identify needs for the development of community-based service; (2) coordination of /interaction among providers and services; (3) existing resources and programs, gaps in services, assessment of existing information; (4) existing registries, barriers to accessing services; (5) strong community-based models; (6) standards of care, critical pathways, quality assurance, and outcome measures to ensure services are appropriate.</p> <p>State surveys in IL, WI, GA, OK, & WV</p> <p>Total $N = 2304$ Age (yrs): $M = 40$ Caucasian (%): 85.3 Male (%): 65.6 Single marital status (%): 45.3 Education 12 yrs (%): 41.0 Living in private residence/alone (%): 85.8/22.8</p> <p>Employment varied from unemployed to part-time to full-time, seeking and not seeking.</p>	<p>COGNITIVE IMPAIRMENTS</p> <p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>EMOTIONS/BEHAVIORS</p> <p>IADL (INTERPERSONAL INTERACTIONS: RELATIONSHIPS, SUPPORT)</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION)</p> <p>Mailed/telephone surveys, roundtable discussions, focus groups, TBI Rehabilitation Survey, Resource assessment Survey, town meetings, and listening sessions.</p>	<p>Unmet needs identified</p> <p>Illinois: >50% Improved memory Higher income >40% Job skills Social opportunities Education Stress management skills 30%–40% Improved mood Employment To express needs better To control temper Intimate relationships Better health</p> <p>Wisconsin: >20% Cognitive retraining Friendships Recreation/socialization Job skills/placement, occupational training Support group 10-15% Dental/vision/hearing care Rehabilitation therapies Advanced vocational training Career counseling Support on the job Family education Transportation</p> <p>Georgia: >70%</p>

			<p>Information about benefits/legal issues Public understanding Responsive local government 60%–70% Affordable/lifelong healthcare</p> <p>Information about services available at the time of injury Information about financial resources/disability legislation 50%–60% Coordinated services Employment opportunities Neurobehavioral rehabilitative services Job training programs Reduced social isolation Self-advocacy skills</p> <p>Oklahoma: >20% Counseling Physical therapy 10%–15% Job placement Occupational therapy Cognitive training Speech therapy Daily living skills training Personal care</p> <p>West Virginia: >35% Financial assistance Vocational training Job placement Job coach Vocational counseling 25%–30% Work adjustment training</p>
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			<p>Pre-vocational training Occupational therapy Family counseling/training in behavior management Leisure/recreational services Speech education services Physical therapy Frequent medical follow-up.</p> <p>Limitations: Convenience sample for mailed surveys Questionable validity in using a needs and resource discrepancy approach.</p>
Corrigan, Whiteneck, & Mellick (2004)	<p>Random sample of all people hospitalized with TBI in the state of Colorado during 2000 (Colorado Traumatic Brain Injury Registry and Follow-up Study (CTBIRFS). Patients or proxies were interviewed, $N = 1802$.</p> <p>Age: ≥ 16</p> <p>Injury severity: Mild, $n = 613$ (34.1%) Moderate, $n = 320$ (17.8%) Severe, $n = 868$ (18.2%)</p> <p>Time since injury (yrs): 1</p> <p>Male (%): $n = 1284$ (71.3%)</p> <p>Caucasian (%): $n = 1532$ (85.0%)</p> <p>Single marital status (%): $n = 1133$ (62.9%)</p> <p>Education (%): High school or less, $n = 810$ (45.2%)</p> <p>Pre-injury variables: Employed, $n = 1266$ (70.8%)</p>	<p>COGNITIVE IMPAIRMENTS</p> <p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>EMOTIONS/BEHAVIORS</p> <p>FUNCTIONAL STATUS (IADL)</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION)</p> <p>Telephone survey self-reported needs for assistance in 13 areas of functioning</p>	<p>Experienced at least 1 unmet need during the yr following the injury (58.8%).</p> <p>Experienced at least 1 unmet need 1 year following the injury (40.2%).</p> <p>Most frequent experienced needs: improving memory, solving problems better (34.1%); managing stress, emotional upsets (27.9%); managing money, paying bills (23.3%); traveling in the community (19.7%)</p> <p>Needs remaining unmet: improving memory, solving problems (27.2%), managing stress, emotional upsets (15.5%), controlling temper (13.4%), and improving job skills (11.2%).</p> <p>18.7% of total population had received services and no longer were experiencing needs.</p> <p>Relationships among perceived needs: – Increasing independence in activities of daily living and obtaining a personal care assistant/attendant – Increasing independence in household chores and traveling in the community. – Managing stress, emotional upsets controlling temper & improving memory, solving problems better.</p>

	<p>School, <i>n</i> = 245 (13.6%) Government healthcare, <i>n</i> = 168 (9.3%) Living in private residence, <i>n</i> = 1696 (94.0%)</p> <p>Prospective cohort design</p>	<ul style="list-style-type: none"> – Improving job skills and finding paid employment <p>Risks for experiencing needs:</p> <ul style="list-style-type: none"> – Demographics: age, gender, minority status, high school or less education, single marital status – Pre-morbid variables: working at time of injury, in school injury, government funded insurance, living in a private residence – Injury-related: cause of injury (transport/violence/sports/fall/other) – Discharge disposition – Yr 1 status variable (function, social integration, alcohol intake, employment) – Y 1 symptoms in excess of pre-injury <p>Perceived needs suggest that cognitive/behavioral problems present the greatest challenges.</p> <p>Healthcare delivery systems may underestimate the persistence of cognitive and behavioral problems.</p> <p>Limited availability of qualified providers, financial restrictions on access to services and inadequate funding for research on effective interventions may all play a role in these needs going unmet.</p> <p>Unmet needs for employment-related issues, both training and assistance finding work. Results emphasized what previous studies found, unemployment with TBI persons to be a significant problem.</p> <p>Limitations: Generalizability of results as sample limited to TBI surveillance system.</p>
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			<p>Identified cases relied on the accuracy of diagnostic codes.</p> <p>Follow-up biased as subjects lost in 1 yr follow-up.</p> <p>Analysis may be limited to small sample of observations.</p>
<p>Fraas, Balz, & Degrauw (2007)</p>	<p>33 participants with acquired brain injury (ABI) in New England:</p> <p>Cerebral vascular accidents ($n = 10$) TBI ($n = 19$) Brain tumor ($n = 2$) Multiple sclerosis ($n = 2$)</p> <p>Caregivers ($n = 16$)</p> <p>Student interns ($n = 39$)</p> <p>TBI survivor data: Mean age (yrs): 45.37 ± 14.32</p> <p>Time since injury: Mean (yrs): 8.58 ± 8.50</p> <p>Gender, race, living arrangements, education, employment, income, and insurance variables were not reported.</p> <p>Mixed method design</p>	<p>COGNITIVE IMPAIRMENTS</p> <p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>EMOTIONS/BEHAVIORS</p> <p>IADL (INTERPERSONAL INTERACTIONS)</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION, SUPPORT): 44-item Participant Perception of Programme Effectiveness Survey (PPPE) to evaluate the effectiveness of a community-based program (Stepping Stones) in meeting the long-term needs of ABI survivors.</p> <p>30-item Clinician Validation of the Literature (CVL) Focus groups</p>	<p>Responses differed among ABI survivors, caregivers & student interns. Survey indicated that emotional, social and transportation were significant long-term needs of ABI survivors. Survivors felt that the emotional/social needs were not being met effectively by the community-based program as well as their transportation needs.</p> <p>Focus groups indicated the key long term needs as: Emotional (26.6%) Social (23.3%) Cognitive (20.0%)</p> <p>Identified unmet needs: Support of caregivers Adequate transportation Awareness of community resources Community education</p> <p>Limitations: Validation of literature predominantly conducted by speech-language pathologists, thus responses may have been bias and they may have lacked experience in community-based programs.</p> <p>Unequal representation in focus groups based on random selection.</p> <p>Results were not compared to other community-based programs.</p>

<p>Heinemann, Sokol, Garvin, & Bode (2002)</p>	<p>895 TBI survivors from Illinois Brain Injury Association</p> <p>Age (yrs): (Median = 37)</p> <p>Injury severity: Severe (69%)</p> <p>Time since injury (yrs): (Median = 7)</p> <p>Male (%): 65.0%</p> <p>Caucasian (%): 80.0%</p> <p>Single marital status (%): 51.0%</p> <p>Education (%): ≤11 years, 16% High school graduate, 43%</p> <p>Employed: Full-time 16% Part-time 17% Seeking work 11%</p> <p>Income (monthly): Range \$445–\$1300 (<i>M</i> = \$654) Descriptive</p>	<p>COGNITIVE IMPAIRMENTS</p> <p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>EMOTIONS/BEHAVIORS</p> <p>IADL (INTERPERSONAL INTERACTIONS)</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION, SUPPORT)</p> <p>27-item mailed survey (assessment of needs and utilization of services)</p>	<p>Persons with greater needs tended to receive fewer services and reported lower life satisfaction, worse medical health/psychological well-being since injury (especially if younger, single, black with more recent injury and dependent in one or more daily activities.</p> <p>Most prevalent unmet needs: – Improving memory/problem-solving skills (51.9%) – Increasing income (50.5%) – Improving job skills (46.3%) – Finding places/opportunities to socialize (41.6%) – Increasing educational qualifications (40.2%) – Managing stress/emotional upsets (40.2%)</p> <p>Most prevalent services received: – Transportation assistance (40.4%) – Money management assistance (34.7%) – Legal services (28.2%) – IADL and health service (27.4%) – Participation in religious or spiritual activities (24.9%) – Daily living assistance (24.7%) – Personal care services (25.3%)</p> <p>Common pattern of unmet needs; emphasized the importance of statewide assessment of services, needs and developing policies. Unmet needs highlight importance of resource and service coordination.</p> <p>Limitation: Low response rate Self-reported data Cross-sectional design</p>
<p>Lefebvre, Pelchat, Swaine, Gelin, & Levert (2005)</p>	<p>53 participants; TBI survivors (<i>n</i> = 8); family members (<i>n</i> = 14); healthcare professionals from varied disciplines</p>	<p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>EMOTIONS/BEHAVIORS</p>	<p>Five major themes: (1) Information: communicating and sharing family concerns, TBI, disabilities, prognosis, limited transmission; inconsistency in how</p>

	<p>(<i>n</i> = 22); physicians (<i>n</i> =9)</p> <p>TBI survivor data: Age (yrs): (<i>M</i> =28.4)</p> <p>Injury severity: Moderate 25.0% Severe 75.0% Time since injury (yrs): (<i>M</i> = 2.8)</p> <p>Male (%): 75.0%</p> <p>Single marital status (%): 75.0%</p> <p>Education: Secondary 12.5% incomplete Secondary 50.0% College 12.5% University 25.0%</p> <p>Race, employment status, living arrangement, & income not reported.</p> <p>Qualitative design</p> <p>Conceptual framework: Self-determination</p>	<p>(UNCERTAINTY)</p> <p>FUNCTIONAL STATUS (INTERPERSONAL INTERACTIONS: COMMUNICATION, RELATIONSHIPS, SUPPORT)</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION TO SOCIETY, SUPPORT)</p> <p>Semi-structured interviews based on the circumstance of the TBI, experiences at each stage of care, relationships with patient/ family and professionals, and continuity of services.</p>	<p>information was delivered.</p> <p>(2) Uncertainty: All participants experienced and identified that inadequate information/prognosis were the primary sources of all participants' uncertainty. TBI survivors had higher uncertainty at time of social reintegration. Participants aware of each other's uncertainty yet professionals did not discuss their uncertainty with survivors/families. TBI survivors/families strategized to cope with uncertainty: day-to-day, information seeking or avoiding information, isolation, writing, work, optimism, and/or appreciating current rehab state.</p> <p>(3) Relationships: TBI survivor/care team, – Satisfied with care team when given support through grieving/rehab processes, especially when listened to re: suffering, difficulties and successes. – Difficult relations when there are time constraints (inability to develop trust), attitudes of professionals re: TBI patients, lack of human dimension in care where TBI patient feels like an object, decreases self-esteem.</p> <p>(4) Continuity of care/services: Adequate during acute and rehab phases. More complicated during social reintegration. Resources more accessible if they are funded. Have to constantly justify their needs. Lack of resources when TBI survivors return home.</p> <p>Quality of care usually satisfactory but there is dissatisfaction with limited professional resources which results in exhaustion of the professionals, compromising quality care. Collaboration between facilities satisfactory but can cause destabilization with diverse structures in environments, loss/separation from professionals.</p> <p>(5) Adaptation: grieving process; autonomy is critical;</p>
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			<p>community participation; school/leisure/volunteer activities Barriers to adaptation: chronic fatigue, headaches, insecurity, aggressiveness, impulsiveness, confusion. Social isolation as network disappears. Lack of resources. The stigma of TBI.</p> <p>Limitations: Small sample size, generalizability Recall bias Response bias</p>
Leith, Phillips, & Sample (2004)	<p>21 TBI survivors & family members living in SC</p> <p>TBI survivor data: Age: ≥ 15 yrs of age</p> <p>Injury severity: Mild to severe</p> <p>Time since injury: <5 yrs</p> <p>Male (%): $n = 7, 70.0\%$</p> <p>Caucasian (%): $n = 7, 70.0\%$</p> <p>Single marital status (%): $n = 6, 60.0\%$</p> <p>Education (%): < High school, $n = 1, 10.0\%$ High school, $n = 4, 40.0\%$ > High school, $n = 5, 50.0\%$</p> <p>Living arrangement (%): Living alone, $n = 3 (30.0\%)$ Living with family, $n = 6 (60.0\%)$</p>	<p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>FUNCTIONAL STATUS (INTERPERSONAL INTERACTIONS: COMMUNICATION, RELATIONSHIPS, SUPPORT)</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION TO SOCIETY, SUPPORT)</p> <p>Semi-structured questions, focus groups</p>	<p>Unmet needs: – Early, continuous comprehensive service delivery – Information/education – Formal/informal advocacy – Empowerment of persons with TBI/families – Human connectedness/social belonging.</p> <p>Service needs perceived unorganized, uneducated, unresponsive, and uncaring. Effective strategies needed to link services into ongoing continuum of TBI care, increase TBI-specific education, awareness, and foster social integration.</p> <p>Treatment has shifted to the post-acute, community-based service delivery that incorporates emotional support. Efforts to integrate care often end when TBI person leaves the medical facility.</p> <p>Need responsive decision-making for the needs of TBI persons; need providers thoroughly knowledgeable of TBI & the consequences that affect TBI persons/families.</p>

	<p>Assisted/other group facility, $n = 1$ (10.0%)</p> <p>Insurance at injury(%): No insurance, $n = 4$ (40.0%) Private insurance, $n = 5$, (50.0%) Private/public insurance, $n = 1$, (10.0%)</p> <p>Employment and income not reported.</p> <p>Qualitative content analysis</p> <p>Collaboration with the Brain Injury Alliance of South Carolina (BIASC)</p>		<p>Limitations: Small sample size One geographical location Response bias Selection bias</p>
Man, Lee, Tong, Yip, Lui, & Lam (2004)	<p>35 TBI survivors enrolled in Self-help Group for the People with Brain Injury in Hong Kong.</p> <p>TBI survivors data: Mean age (yrs): 48.74 ± 11.14</p> <p>Injury severity: Not reported.</p> <p>Time since injury: Mean (yrs): 6.20 ± 4.49</p> <p>Male (%): $n = 22$ (62.9%)</p> <p>Single marital status (%): $n = 13$ (37.1%) Average employment rate post-injury (years): 6.4</p> <p>Race, living arrangements, education, income, & insurance variables were not reported.</p>	<p>COGNITIVE IMPAIRMENTS: Comprehensive Quality of Life Scale – Intellectual/Cognitive Disability (ComQoL-15)</p> <p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>EMOTIONS/BEHAVIOR: Positive and Negative Affect Scales (PANAS)</p> <p>FUNCTIONAL STATUS : IADL (FINANCES, WORK)</p> <p>INTERPERSONAL INTERACTIONS: RELATIONSHIPS, SUPPORT)</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION TO SOCIETY, SUPPORT)</p> <p>Rehabilitation checklist assessed subjects' perception of importance/satisfaction</p>	<p>TBI survivors did not achieve a high level of QoL ($M = 64.69$) on ComQoL-15 scores, maximum score 105.</p> <p>Material well-being, place in community & productivity were relatively lower on QoL range while safety and health were relatively higher on the QoL scale.</p> <p>– 90% unemployed post injury. – employed were unskilled, working shorter working hrs per week, less income. – post-injury employed survivors scored significantly higher in safety, ($t = 2.400$, $df = 33$)*</p> <p>TBI survivors perceived selves as having lower level of community participation. Might have restricted selves in community participation and responsibility.</p> <p>Younger participants (<45 yrs of age) had higher QoL score than older ones (>45 yrs of age), ($X^2 = 3.803$)</p>

			<p>Post-injury group ≥ 5 yrs had significantly lower score of intimacy ($y = -0.473$)*; those with fewer yrs post injury < 5 yrs had higher intimacy scores, ($t = -2.865$, $df = 33$)**</p> <p>A positive PANAS score was a predictor of intimacy on the ComQoL.</p> <p>Top health services of importance:</p> <ul style="list-style-type: none"> - Medical - Occupational - Physiotherapy - Vocational services - Social work <p>High satisfaction in score for medical, occupational/ physiotherapy but speech therapy and rehabilitative aids services rated high in satisfaction but low in importance. Vocational counseling, social work & dietician rated low in satisfaction & high in importance.</p> <p>Limitations: Lack of generalizability due to sample size.</p> <p>Reliability of measures</p>														
Ouellet, Sirios, & Lavoie (2009)	<p>405 trauma survivors, 239 with TBI</p> <p>TBI survivors data: Time since injury (yrs): 2-4</p> <p>Injury Severity: Glasgow Coma Score 9.9 ± 4.5 Index Severity Score 27.9 ± 9.1</p> <p>Mean age (yrs): 37.4 ± 14.5</p> <p>Male (%): $n = 155$ (64.9%)</p>	<p>EMOTIONS/BEHAVIOR: Short Form-12 mental health scales</p> <p>CHARACTERISTICS OF THE ENVIRONMENT: Survey of perceived needs for mental health services and access limitations</p>	<p>Variables related to lower mental health post trauma with or without TBI:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="text-align: right;">Odds Ratio</th> </tr> </thead> <tbody> <tr> <td>Age</td> <td style="text-align: right;">0.97*</td> </tr> <tr> <td>Gender</td> <td style="text-align: right;">0.46*</td> </tr> <tr> <td>Time since injury</td> <td style="text-align: right;">0.62*</td> </tr> <tr> <td>Social support</td> <td style="text-align: right;">0.96*</td> </tr> <tr> <td>Pain rating</td> <td style="text-align: right;">1.43*</td> </tr> <tr> <td>Cognitive impairments</td> <td style="text-align: right;">5.81*</td> </tr> </tbody> </table> <p>Women with trauma demonstrated greater lower mental health than men with trauma.</p>		Odds Ratio	Age	0.97*	Gender	0.46*	Time since injury	0.62*	Social support	0.96*	Pain rating	1.43*	Cognitive impairments	5.81*
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	<p>Ethnicity/race: not (76.2%)</p> <p>Single marital status (%): $n = 111$ (46.8%)</p> <p>Education (years): 1–7, $n = 17$ (7.2%) 8–12, $n = 123$ (51.9%) 13–15, $n = 59$ (24.9%) > 16, $n = 38$ (16.0%)</p> <p>Employment: Working/studying/home maker, $n = 92$ (38.8%) Retired, $n = 25$ (10.5%) Disability leave, $n = 120$ (50.6%)</p> <p>Cross-sectional</p>		<p>TBI persons demonstrated more mental health problems and need for mental health services yet the trauma persons without TBI reported more limitations in access to care.</p> <p>Limitations: Severely physically or cognitively impaired trauma persons were excluded from the study as they could not consent for selves. Bias in recruitment.</p> <p>No evaluation of low mental health prior to injury.</p> <p>Results based on self-reported retrospective data may have been bias, e.g., memory loss, social desirability, or exaggerated reports.</p>
Pickelsimer, Selassie, Sample, Heinemann, Gu, & Veldheer (2007)	<p>1830 community-dwelling TBI survivors from the SC TBI Follow-up Registry (SCTBIFR)</p> <p>Age (yrs): ≥ 15</p> <p>Injury Severity: Mild, $n = 596$ Moderate, $n = 447$ Severe, $n = 787$</p> <p>Time since injury: 1 yr after hospital discharge</p> <p>Male (%): $n = 1133$ (61.9%)</p> <p>Caucasian (%): $n = 1394$, (76.2%)</p> <p>Single marital status (%): $n = 1087$ (59.4%)</p>	<p>COGNITIVE IMPAIRMENTS: Cognitive status (Alertness Behavior Scale of the Psychosocial Dimension of the Sickness Impact Profile)</p> <p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>EMOTIONS/BEHAVIORS (ANGER): SF-36 mental health subscale</p> <p>FUNCTIONAL STATUS (IADL: FINANCES, WORK; INTERPERSONAL INTERACTIONS: RELATIONSHIPS, SUPPORT): SF-36 functional status subscale</p> <p>Limitation in activities of daily living (questions adapted from the National Health Interview Survey)</p>	<p>Reported at least 1 unmet need 1 year post hospital discharge (35.2%) Had unrecognized needs (51.5%) Reported at least one barrier to receiving help (47.0%)</p> <p>Unrecognized needs: – Controlling alcohol/drug use. – Improving mood, managing stress or emotional upsets – Finding paid employment – Getting services or managing them – Paid personal assistant or personal care attendant – Finding places and opportunities to socialize – Increasing independence in housekeeping, cooking or shopping</p>

	<p>Living situation (%): Alone, <i>n</i> = 284 (15.5%) Not alone, <i>n</i> = 1546 (84.5%)</p> <p>Annual income (%): <\$10,000, <i>n</i> = 679 (37.1%) \$10,000-\$25,000, <i>n</i> = 612 (33.4%) \$25,000-\$50,000, <i>n</i> = 304 (16.6%) >\$50,000, <i>n</i> = 116 (6.3%)</p> <p>Education (%): < High school, <i>n</i> = 592 (32.3%) High school graduate, <i>n</i> = 608 (33.2%) Some college, <i>n</i> = 414 (22.6%) College graduate, <i>n</i> = 213 (11.6%)</p> <p>Insurance (%): Uninsured, <i>n</i> = 261 (14.3%) Medicaid, <i>n</i> = 290 (15.8%) Medicare or other government, <i>n</i> = 320 (17.5%) Private, <i>n</i> = 959 (52.4%)</p>	<p>SYMPTOMS: SF-36 general</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION TO SOCIETY, SUPPORT): Social support (3 questions from Inventory of Socially Supportive Behaviors)</p> <p>Employment (defined by number of hours/ compensation)</p> <p>Satisfaction with life (Satisfaction with Life Scale-SWLS)</p>	<p>Barriers: – Lack of awareness, advocacy, or case management – Transportation problems – Lack of financial resources – Health and medical problems – Service inflexibility – Adverse psychological factors – Other, lack of motivation or complacency, prevents receipt of services</p> <p>Perceived need was significantly less than unrecognized need in 5 categories, “The need to receive information post injury that may be available to you” was cited most often (26.1%)</p> <p>Referral to necessary services is a need to optimize opportunities for full recovery.</p>
<p>Rotondi, Sinkule, Balzer, Harris, & Moldovan (2007)</p>	<p>80 TBI survivors 85 family caregivers/support persons in PA</p> <p>TBI survivors data: Age (yrs) % 18–39 19 30–49 42 50–69 26 70–89 13</p>	<p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>EMOTIONS/BEHAVIORS</p> <p>FUNCTIONAL STATUS: INTERPERSONAL INTERACTIONS (COMMUNICATION, RELATIONSHIPS SUPPORT)</p> <p>CHARACTERISTICS OF THE</p>	<p>Theme 1, “Understanding injuries, treatments, and consequences”: the only theme that occurred at all 4 phases.</p> <p>Phase 1: inadequate explanations</p> <p>Phase 2: need to understand long-term changes and implications of injury.</p>

	<p>Time since most severe injury (yrs): ($M = 5.8$) Injury severity: Not reported.</p> <p>Male (%): 57.0%</p> <p>Caucasian (%): 94.0%</p> <p>Single marital status (%): 37.0%</p> <p>Education and living arrangement not reported.</p> <p>Income (yearly): <\$10,000 32.0% \$10,000–\$19,000 20.0% \$20,000–\$29,000 11.0% \$30,000–\$49,000 ≥\$50,000 22.0%</p> <p>Qualitative</p>	<p>ENVIRONMENT: ADAPTATION & EXPECTATIONS OF OTHERS</p> <p>Semi-structured interviews based on Critical Incident Technique (CIT) at 4 phases, acute care, inpatient rehabilitation, return home, and post-return home.</p>	<p>Phase 3: information needs re: role as primary caregiver, family adjustment, & social isolation. Phase 4: needs re: family's survival & community integration; need for family, friends, & coworkers to better understand what he/she is going through.</p> <p>Theme 2, Emotional and mental health of TBI survivor: management of emotions and behaviors (irritability, aggression, feeling blue); anxiety about the future, reactions of others, loss of confidence/self-esteem, isolation, & reaction to the trauma. Need to understand & accept changes to self.</p> <p>Theme 3, Financial assistance: difficulty paying for treatments, loss of employment or reduced work hours, and re-entering workforce with lower paying position.</p> <p>Theme 4, Guidance: desired that all questions were answered thoroughly and opportunities to expand communication with providers.</p> <p>Theme 5, Family emotional & mental health</p> <p>Theme 6, Finding & evaluating providers: Need for a directory to find & method to evaluate services/providers (expertise). Desire for services to address specific issues.</p> <p>Theme 7, Quality of services: concerns if receiving the best/all of the appropriate services.</p> <p>Theme 8, Involved in decision-making: the need for staff to listen to TBI person re: capabilities.</p> <p>Theme 9, Discharge from hospital: need to be prepared and have skills to return to work, community activities, & address fears.</p>
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			<p>Theme 10, Support from professionals: Need for staff to be caring/supportive.</p> <p>Theme 11, Employer support: need to miss work without consequences.</p> <p>Theme 12, Periodic reassessment & treatment for TBI survivors: need for ongoing services for all problems (behavioral control, concentration, memory, judgment, mobility).</p> <p>Theme 13, Community integration: need to be an active member of the community & increase public awareness re: TBI to promote acceptance.</p> <p>Theme 14, Having a support group</p> <p>Theme 15, Obtaining support from family & friends: being accepted “as you are” & contact with each pre injury.</p> <p>Theme 16, Care coordination</p> <p>Theme 17, Respite services</p> <p>Theme 18, Life planning</p> <p>Limitations: Geographical study may affect the generalizability to other regions and ethnicities.</p> <p>Memory recall of TBI survivors</p>
Sample & Darragh (1998)	<p>21 women with ABI recruited from CO Brain Injury Association</p> <p>TBI (rural), <i>n</i> = 10 TBI (urban), <i>n</i> = 8 Brain tumor, <i>n</i> = 2 Toxicity, <i>n</i> = 1</p> <p>Injury severity: Not reported</p>	<p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>EMOTIONS/BEHAVIORS</p> <p>FUNCTIONAL STATUS (IADL): FINANCES; INTERPERSONAL INTERACTIONS: COMMUNICATION,</p>	<p>Theme 1, Issues surrounding diagnosis: Difficulty obtaining diagnosis of brain injury in order to access neurorehabilitation services, experienced personal/professional consequences, loss of self-esteem and depression, <i>n</i> = 10 (48.0%) Both rural & urban TBI survivors experienced limited treatment for experiences & symptoms, (60.0%).</p>

	<p>Time since injury (yrs): ($M = 6.9$)</p> <p>Caucasian (%): $n = 20$, (95.2%)</p> <p>Living situation (%): Alone, $n = 3$ (14.3%) With family, $n = 5$ (23.8%) Supported living, $n = 5$ (23.8%)</p> <p>Employment, education, income, & insurance variables were not reported. Qualitative phenomenological design</p>	<p>RELATIONSHIPS, SUPPORT)</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION TO SOCIETY, SUPPORT)</p> <p>Individual interviews, utilizing an interview guide with 4 broad questions</p>	<p>Theme 2, barriers to accessing care: All participants experienced barriers to care. Subcategories included:</p> <ul style="list-style-type: none"> – problems with services/service providers –financial challenges – must travel for services – lack of information/services or inability to get referral for services – lack of care coordination – funneling (providers referring to only service providers they knew) <p>Changes needed in the system of care access.</p> <p>Reimbursement do not allow for service providers to travel to remote communities. This can be changed through education, training, & policies. Need for early care coordination and interventions</p>
Tate (2004)	<p>67 TBI survivors who had been admitted to brain injury rehabilitation unit Age (yrs): ($M = 24.0$)</p> <p>Injury severity: Severe</p> <p>Time since injury: 20–26 years.</p> <p>Gender, race, employment, education, income, & insurance variables were not reported.</p> <p>Descriptive</p>	<p>CHARACTERISTICS OF THE INDIVIDUAL</p> <p>CHARACTERISTICS OF THE ENVIRONMENT (ADAPTATION TO SOCIETY, SUPPORT): Supervision Rating Scale (SRS)</p> <p>SYMPTOMS (PHYSICAL) & FUNCTIONAL STATUS: Craig Handicap Assessment and Reporting Technique (CHART) subscales: physical, mobility, cognitive, occupational, social</p> <p>Sydney Psychological Reintegration Scale (SPRS)</p> <p>Care and Needs Scales (CANS)</p>	<p>Independent in mobility and activities of daily living (77.6%); required aids/assistance (16.4%); dependent (6.0%)</p> <p>Classified having a good psychosocial reintegration (22.4%), limited (50.7%), poor (26.9%).</p> <p>Lived in own home (92.5%); supported environment (3.0%); nursing homes (4.5%, $n = 3$)</p> <p>Only 28.4% fully independent & reported no needs for assistance, supervision or support. 25.4% had daily needs from 11–24 hrs per day; 46.3% had intermediate needs less than daily, few days a week to weekly to intermittently.</p>

			<p>Study indicated preliminary evidence that the CANS is sensitive, valid as it showed strong correlation to the SRS ($r_s = 0.75$), CHART SPRS scores (range $r_s = -0.46$ to -0.85). Further testing needs to be conducted re: psychometric properties.</p>
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* $p < 0.05$, ** $p < 0.005$, *** $p < 0.001$

Table A2

TBI Intervention Studies

Source	Sample/Design	Interventions: IG ^a CG ^b	Variables/ Instruments	Key findings
Anson, & Ponsford (2006)	<p>N = 33</p> <p>Mean age (yrs): 38.0</p> <p>Male: 82.0%</p> <p>Time since injury: 37% < 6 months 21% 6–12 months 18% 1–2 years 12% 3–7 years</p>	<p>IG 1: Group A IG 2: Group B No CG</p> <p>Both groups received Coping Skills Group intervention, duration of baseline phase varied.</p> <p>Post-test: 1 & 5 weeks following the treatment</p>	<p>Anxiety, depression, coping, self-esteem, sickness impact, anger expression, reading, self-awareness</p> <p>Rey Auditory Verbal Learning Test (RAVLT)</p> <p>Patient Competency Rating Scale (PCRS), six elements (executive skill)</p>	<p>Pearson correlation % change post-treatment:</p> <p>Depression-PCRS $r = -0.631^{**}$</p> <p>Anxiety-RAVLT $r = -0.390^*$</p> <p>Depression-six elements $r = -0.416^*$</p>
Bell, Hoffman, Temkin, Powell, Fraser, Esselman, et al. (2008)	<p>N = 366</p> <p>Mean age (yrs): 32.0</p> <p>Male: 124 (64.0%)</p> <p>Caucasian: 125 (65.0%) Injury severity: mild</p> <p>Education: High school, Graduate or GED: 89 (46.0%)</p> <p>RCT</p>	<p>IG: Received scheduled telephone interventions the first 3 months post-injury, the standard patient instruction handout, a study wallet card, & CDC booklet, <i>Facts about Concussion and Brain Injury and Where to Get Help</i>, and usual care.</p> <p>CG: Received usual ER standard of care for mTBI, including a patient instruction handout & standard outpatient treatment.</p>	<p>Head Injury Symptom Checklist</p> <p>Short Form Health Survey-12 (SF-12)</p> <p>Modified Perceived Quality of Life (PQOL)</p> <p>Patient Health Questionnaire (PHQ-9)-Depression</p> <p>Panic/Anxiety</p> <p>Questions related to change in major role performance and community participation</p>	<p>IG had better outcomes for symptoms than CG, Diff. Means (95% CI): 6.6 (1.2, 12.0)*</p> <p>No difference noted between in general health outcome composite scores.</p>

<p>Carnevale, Anselmi, Johnston, Busichio, & Walsh (2006)</p>	<p><i>N</i> = 37</p> <p>Mean age (yrs): 40.5</p> <p>Male (%): 75.7%</p> <p>Caucasian (%): 83.8%</p> <p>Time since injury (yrs): 7.6</p> <p>Education: 18.9% < 12 years 21.6% HS 29.7% vocation or some college 8.1% Associate 5.4% Bachelor 16.2% Masters</p> <p>RCT</p>	<p>IG: 8-wk aquatic exercise, 3 times a week, each session lasted 1 hour (Natural Setting Behavior Management -NSBM)</p> <p>CG: 8-wk vocational rehabilitation class, focusing on improving reading/ writing skills post-injury. Length of class unknown.</p> <p>Post test: post baseline at 7, 16, & 30 wks</p>	<p>Primary Outcome: Changes in frequency of targeted problematic behaviors, neuro-behavioral functioning</p>	<p>Frequency changes $F = 3.32^*$</p> <p>IG: Improved (% , n/N) IG 1 NSBM 100.0% (10/10) IG 2 Education 40.0% (4/10) 8.42***</p> <p>CG: Improved (% , n/N) 66.7% (8/12)</p>
<p>Cheng, & Man (2006)</p>	<p><i>N</i> = 21</p> <p>Mean age (yrs): 54.9 (IG) 58.1 (CG)</p> <p>Male (%): 63.6% (IG) 60.0% (CG)</p> <p>Time since injury: post acute</p> <p>Education IG: 18.2 % primary or below 63.6% secondary 18.2% tertiary CG: 30.0% primary or below 70.0% secondary</p> <p>Q</p>	<p>IG: Awareness intervention program (AIP) focusing on education & experiential functional activities, individual training for 2 sessions a day, 5 days per week for 4 weeks.</p> <p>CG: Conventional, comprehensive physical, functional, & cognitive group therapy, averaging 2-3 sessions per day for 4 wks.</p> <p>Post test at end of wk 4</p>	<p>Self-Awareness of Deficits (SADI)</p> <p>Functional Independence Measure (FIM)</p> <p>Lawton Instrumental Activities of Daily Living Scale (IADL)</p>	<p>IG: Awareness Intervention SADI 8.000 SADI $z = -2.956$ FIM $z = -2.936$ IADL $z = -2.941$</p> <p>Conventional Group FIM $z = -2.805$</p>

<p>Dou, Man, Ou, Zheng, & Tam (2006)</p>	<p><i>N</i> = 37</p> <p>Mean age (yrs): 38.1</p> <p>Male (%): 73.0</p> <p>Injury severity: varied</p> <p>Time since injury: > 3 months post-operative</p> <p>Q</p>	<p>IG 1: Computer-assisted memory training group (CAMG)</p> <p>IG 2: Therapist-administered memory training group (TAMG)</p> <p>Both CAMG & TAMG, received total of 20, 45 minute sessions 6 days per wk for 1 month.</p> <p>CG: No intervention.</p> <p>Post test at 1 month after treatment</p>	<p>Neurobehavioral Cognitive Status Exam (NCSE)</p> <p>Rivermead Behavioral Memory Test (RBMT)</p> <p>Hong Kong List Learning Test (HKLLT)</p>	<p>NCSE: IG 1 CAMG/CG, $F = 5.166^*$ IG 2 TAMG/CG, $F = 4.762^*$</p> <p>RBMT: CAMG/CG, $F = 1.747^*$ TAMG/CAMG, $F = 1.849^*$</p> <p>HKLLT R = random B = block</p> <p>CAMG/CG: Encode R, $F = 7.384$ Storage R, $F = 7.158^*$ Retrieval R, $F = 9.221^*$ Encode B, $F = 8.085^*$ Storage B, $F = 6.691^*$</p> <p>TAMG/CG: Storage R, $F = 4.361^*$ Retrieval B, $F = 4.202^*$</p>
<p>Driver, Rees, O'Connor, & Lox (2006)</p>	<p><i>N</i> = 18</p> <p>Mean age (yrs): 37.8 IG 35.3 CG</p> <p>Male (%): 55.6 IG 55.6 CG</p>	<p>IG: 8-wk aquatic exercise sessions completed 3 times a week, each session lasted 1 hour.</p> <p>CG: 8-week vocational rehabilitation class, focusing on improving reading & writing skills post-injury. Length of class unknown.</p>	<p>Health Promoting Lifestyle Profile II (HPLP-II)</p> <p>Physical self-concept, self-esteem (subsets of Physical Self-Description Questionnaire-PSDQ)</p>	<p>HPLP-II Pre-Post Scores (effect size): Responsibility 0.91* Physical 1.24* Nutrition 0.66* Spiritual 0.82* Relationships 1.12*</p>

	Time since injury: 40.3 months IG 41.2 months CG RCT	Post test after 8 wks of aquatics or control program.		PSDQ Pre-Post Scores (effect size): Self-esteem 2.09* Coordination 2.66* Body fat 0.51* Strength 0.83* Flexibility 0.99* Endurance 2.33*
Gemmell, & Leathem (2006)	<i>N</i> = 18 Mean age (yrs): 51.2 Male (%): 50.0 Injury severity: Mild to severe Time since injury (yrs): 8.7 RCT	IG: Tai Chi 2 times weekly, 45 minute sessions, for 6 wks for symptom management. CG: Placed on a waiting list for Tai Chi. Post test at 3, 6, & 9 week intervals after treatment initiation	SF-36 Rosenberg Self-Esteem Scale (RSES) Visual Analogue Mood Scale (IG only)	VAMS (<i>t</i> scores) Afraid 3.049* Confused 3.877** Sad 5.295 Angry 4.441** Energetic 7.197 Happy 3.904** Tense 6.735
Gentry, Wallace, Kvarfordt, & Lynch (2008)	<i>N</i> = 23 Median age (yrs): 36.5 Male 70.0% Time since injury (years): ≥ 1 Q (Pre-Post design)	IG: 8 wks of training by an occupational therapist to use PDAs as cognitive aids 3-6 90-minute home visits within a 30-day period. Post test 8 weeks after intervention	Canadian Occupational Performance Measure (COPM) Craig Handicap Assessment and Rating Technique-Revised (CHART-R)	COPM: Paired samples <i>t</i> -test showed significant improvement in performance & satisfaction with performance in daily tasks after intervention. Performance: (<i>t</i> = 11.36)*** Satisfaction: (<i>t</i> = 9.88)*** CHART-R: Participation level in 6 domains of physical independence, cognitive independence, mobility, occupation, social integration, & economic self-sufficiency.

				<p>Results between pre-post training subscores: Cognitive independence, ($t = 5.85$)***</p> <p>Mobility, ($t = 2.92$)***</p> <p>Occupation ($t = 3.18$)**</p>
King, Crawford, Wenden, Moss, & Wade (1997)	<p>$N = 579$</p> <p>Age range: 16–65 yrs</p> <p>Injury severity (%): Mild, $n = 213$ (68%) Moderate, $n = 77$ (25%) Severe, $n = 18$ (6%) Very Severe, $n = 5$ (2%)</p> <p>Time since injury: 7–10 days post-injury</p> <p>RCT</p>	<p>IG1: Received telephone contact, advice, & information</p> <p>IG2: Seen face-to-face, assessed, & given advice & information.</p> <p>IG3: Received more help/support from the head injury team via telephone.</p> <p>IG4: Received further face-to-face contact or further referrals to other services.</p> <p>CG: Received only postal information.</p> <p>Post tests 6 months after intervention</p>	<p>Short Orientation Memory and Concentration Test (SOMC)</p> <p>Impact of Event Scales (IES)</p> <p>Hospital Anxiety and Depression Scale (HADS)</p>	<p>At 6 months $n = 252$, 101 (40.0%) had no problems, 136 (54.0%) needed further assistance, & 15 (6.0%) required further intervention. The majority of the patients at 6 months needed reassurance, advice, or other services. Those with higher level of severity needed higher levels of service, e.g., anxiety management, counseling/ support, cognitive behavior psychotherapy, PTSD intervention, anger management, symptom management, OT, PT, or SLP</p>
Man, Soong, Tam, & Hui-Chan (2006)	<p>$N = 83$</p> <p>Mean age (yrs): 43.9</p> <p>Male (%): 55.0</p> <p>Time since injury (yrs): 4.0</p>	<p>IG 1: Computer-assisted skill-training (CCRG)</p> <p>IG 2: Online interactive computer-assisted skill-training (OCRG)</p>	<p>Problem-solving self-efficacy</p>	<p>No significant mean scores pre-post tests</p> <p>Within-group, $p < 0.002$ IG 3 TCRG</p>

	<p>Education: 18% primary 67% secondary 14% tertiary</p> <p>RCT</p>	<p>IG 3: Therapist-administered training group (TCCG), conventional method</p> <p>CG: No intervention 20 sessions of training for each participant, length of sessions not specified.</p> <p>Post tests 2 months after intervention</p>		
Marshall, Karow, Morelli, Iden, Dixon, & Cranfill (2004)	<p><i>N</i> = 20</p> <p>Mean age (yrs): 35.6</p> <p>Male (%): 50.0</p> <p>Injury severity: varied</p> <p>Time since injury (months): 66.0</p> <p>Mean education (yrs): 13.2</p> <p>Q</p>	<p>IG: Interactive strategy modeling training (ISMT) on problem-solving for a period of time (length of time not specified).</p> <p>No control group</p> <p>Post test after training and 1 month follow-up</p>	Rapid Assessment of Problem Solving (RAPS)	<p>(Pre/Post/ Follow-up) Less questions to solve 5.40/4.35/4.38*</p> <p>Constraint seeking 76.0/93.0/95.0*</p> <p>Question efficiency 47.02/71.90/70.26*</p>
Sarajuuri, Kaipio, Koskinen, Niemela, Servo, & Vilkki (2005)	<p><i>N</i> = 39</p> <p>Mean age at injury (yrs): 30.5 IG 29.5 CG</p> <p>Male (%): 84.2 IG 85.0 CG</p> <p>Injury severity: Moderate to severe</p>	<p>IG: Individualized Neuropsychological Subgroup Rehabilitation Program (INSURE), post-acute, interdisciplinary, 6-wk, inpatient program, 8.5 hrs each day for 5 days each wk.</p> <p>CG: Conventional clinical care/rehabilitation</p> <p>Post test 2 years after treatment programs</p>	Status of productivity	<p>IG % (n/N) 89.0% (17/19) IG vs. CG: OR = 6.96 95% CI, 1.26-38.44*</p> <p>CG % (n/N) 55.0% (11/20)</p>

	<p>Time since injury: Post acute</p> <p>Mean education (yrs): 11.3 IG 12.2 CG</p> <p>Q</p>			
Soong, Tam, Man, & Hui-Chan (2005)	<p><i>N</i> = 83</p> <p>Mean age (yrs): 38.6 IG 1 (CCRG) 35.6 IG 2 (OCRG) 37.4 IG 3 (TCRG)</p> <p>Male (%): 20.0 (CCRG) 40.0 (OCRG) 60.0 (TCRG)</p> <p>Time since injury (yrs): 7.1 IG 1 (CCRG) 4.1 IG 2 (OCRG) 4.8 IG 3 (TCRG)</p> <p>Education: Primary, secondary/tertiary (%) IG 1 CCRG 20/60/20 IG 2 OCRG 40/60/0 IG 3 TCRG 20/80/0</p> <p>RCT</p>	<p>IG 1: Computer-assisted skill-training (CCRG)</p> <p>IG 2: Online interactive computer-assisted skill-training (OCRG)</p> <p>IG 3: Therapist-administered training group (TCCG)</p> <p>Each group participated in 20 sessions of problem-solving based on analogies (10 scenarios)</p>	<p>Self-efficacy & problem-solving skills</p> <p>Lawton IADL</p> <p>Halstead-Reitan Test Battery (HRTB)</p>	<p>IG 1 CCRG IG 2 OCRG IG 3 TCRG</p> <p>No significance between groups for IADL, HRTB, or self-efficacy</p>

<p>Tiersky, Anselmi, Johnston, Kurtyka, Roosen, Schwartz, et al. (2005)</p>	<p><i>N</i> = 20</p> <p>Mean age (yrs): 46.9</p> <p>Male (%): 45.0</p> <p>Caucasian (%): 90.0</p> <p>Injury severity: Mild 90.0%</p> <p>Time since injury (yrs): 6.25</p> <p>Education (% , degree): 10.0% HS 15.0% some college 5.0% Associate 55.0% Bachelor 15.0% Masters</p> <p>RCT</p>	<p>IG: 50 min. of cognitive-behavioral psychotherapy & 50 min. of cognitive remediation, individual 3 times per wk for 11 wks.</p> <p>CG: Wait-list, treatment received after conclusion of follow-up.</p> <p>Post test at 11 wks after intervention, 1 & 3 months follow-up</p>	<p>Generalized Symptom Index (GSI),</p> <p>Depression, anxiety, coping, attention, neuro-psychological function</p>	<p>CBT/remediation</p> <p>Primary endpoint GSI totals score. GSI (SCL-90R) Score changes: 0.86 ± 0.41* PASAT score changes: 135.55 ± 30.71*</p>
<p>Vanderploeg, Schwab, Walker, Fraser, Sigford, Date, et al. (2008)</p>	<p><i>N</i> = 360 (adult veterans or active duty military service members)</p> <p>Pre-injury: Mean age (yrs): 33.2 IG 1 31.7 IG 2</p> <p>Male (%): 91.7% IG 1 94.4% IG 2</p> <p>Caucasian (%): 68.0% IG 1 69.3% IG 2</p>	<p>IG 1: Cognitive-didactic protocol treatment that included trial-and-error learning, building self-awareness, & targeted executive functions: working memory, prospective memory, awareness of functional communication problems, & executive self-awareness. Individual treatment, 1:1 in an office setting in 1.5 to 2.5 hr daily sessions plus an additional 2.0 to 2.5 hrs daily of occupational & physical therapy over a period of 20-60 days.</p>	<p>Primary Outcome Measures:</p> <p>Functional independence in living & returning to work or school.</p> <p>Secondary Outcome Measures:</p> <p>Functional Independence Measure (FIM)</p> <p>Disability Rating Scale (DRS)</p> <p>Items from the Present State Exam</p> <p>Apathy Evaluation Scale</p>	<p>Cognitive treatment group improved better than the functional cognitive performance group in the short-term in the secondary outcome measures.</p> <p>Cognitive-didactic group (27.3±6.2)</p> <p>Functional-experiential group (25.6±6.0, $t_{332} = 2.56^*$)</p>

	<p>Single marital status (%): 45.3% IG 1 51.4% IG 2</p> <p>Education (yrs): IG 1 < 12 4.5% 12 61.5% 13-15 24.6% ≥ 16 9.5%</p> <p>IG 2 < 12 8.3% 12 54.4% 13-15 31.7% ≥ 16 5.6%</p> <p>Active duty time of injury (%): 58.4% IG 1 67.8% IG 2</p> <p>Mean time since injury (days): 48.9 IG 1 51.1 IG 2</p> <p>RCT</p>	<p>IG 2: Functional-experiential included errorless learning, developing functional abilities or skills, & targeted: compensation techniques, environmental management, & task-specific checklists 1.5 to 2.5 hours in group settings & natural environments.</p> <p>Post tests at 1-yr follow-up</p>	<p>Neurobehavioral Rating Scale</p>	<p>Higher rate of returning to work or school in the cognitive intervention than the functional intervention group.</p> <p>At 1 yr post-treatment, participants in the functional group who were > 30 years of age & higher levels of education had higher rates of independent living group vs. than similar participants in the cognitive group.</p>
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Note. RCT = random controlled trial; Q = quasi-experimental.

^aIntervention group. ^bControl group.

* $p < 0.05$, ** $p < 0.005$, *** $p < 0.001$.

Appendix B

Indiana University–Purdue University Indianapolis

Institutional Review Board Approval

INTERDEPARTMENTAL COMMUNICATION
Research Compliance Administration (RCA)
Indiana University - Purdue University Indianapolis

DATE: June 23, 2008
TO: Tamlyn Bakas
Adult Health
NU 417
IUPUI
FROM: Maggie French
Research Compliance Administration
SUBJECT: Final Approval

Study Number: 0605-64B

Study Title: The Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury - Sponsor: N/A

The study listed above has received final approval from the Institutional Review Board (IRB-01) under Expedited Categories 6 & 7. The IRB has granted a waiver of authorization for recruitment only under 45CFR164.512(i). Please note that subjects must be provided with and sign a current informed consent document containing the IRB approval stamp.

Special requirements for the inclusion of prisoners: Please note that unless your study has received approval for the inclusion of prisoners, you may not enroll and/or otherwise involve a prisoner in your study. Special requirements apply if an individual enrolled on the study either is a prisoner or has become a prisoner during the course of his/her study participation (and the study has not been previously granted approval for the enrollment of prisoners as a subject population). If the investigator becomes aware that a subject is a prisoner, all research interactions and interventions with the prisoner-participant must cease. If the investigator wishes to have the prisoner-participant continue to participate in the research, Research Compliance Administration (RCA) must be notified immediately (317-274-8289). In most cases, the IRB will be required to re-review the protocol at a convened meeting before any further research interaction or intervention may continue with the prisoner-participant. Refer to the IUPUI/Clarian Standard Operating Procedure (SOP) on *Involving Prisoners in Research* for further information. The SOP can be found at <http://www.iupui.edu/~respoly/human-sop/human-sop-index.htm>.

As the principal investigator of this study, you assume the responsibilities as outlined in the SOP on *Responsibilities of Principal Investigators*, some of which include (but are not limited to):

- CONTINUING REVIEW** - No less than annually, a status report must be filed with the IRB. The RCA staff will generate these reports for your completion. This study is approved from June 16, 2008 to June 16, 2009. If your study is not re-approved by this date, the study will automatically expire, which means that all research activities, including enrollment of new subjects, interaction and intervention with current participants, and analysis of identified data, must cease.
- STUDY AMENDMENTS** - You are required to receive prospective approval from the IRB for ANY changes to the research study, including changes to protocol design, dosages, timing or type of test performed, population of the study, and informed consent statement, prior to implementation. This request is made via an amendment form, which can be obtained at: <http://www.iupui.edu/%7Eresgrad.spon/download2.htm>.
- UNANTICIPATED PROBLEMS INVOLVING RISKS TO SUBJECTS OR OTHERS AND NONCOMPLIANCE** - You must promptly report to the IRB any event that appears on the **List of Events that Require Prompt Reporting to the IRB**. Refer to the SOP on *Unanticipated Problems Involving Risks to Subjects or Others and Noncompliance* for more information and other reporting requirements. The SOP can be found at: <http://www.iupui.edu/~respoly/human-sop/human-sop-index.htm>. NOTE: If the study involves gene therapy and an event occurs which requires prompt reporting to the IRB, it must also be reported to the Institutional Biosafety Committee (IBC).
- UPDATED INVESTIGATIONAL BROCHURES, PROGRESS REPORTS and FINAL REPORTS** - If this is an investigational drug or device study, updated clinical investigational brochures must be submitted as they occur. These are submitted with an amendment form. Progress or final reports must be provided to the IRB with your written assessment of the report, briefly summarizing any changes and their significance to the study.
- ADVERTISEMENTS** - You can only use IRB-approved advertisements to recruit participants for your study. If you will be advertising to recruit study participants and the advertisement was not submitted to the IRB at the time your study was reviewed and approved, a copy of the information contained in the advertisement and the mode of its communication must be submitted to the IRB as an amendment to the study. These advertisements must be reviewed and approved by the IRB PRIOR to their use.
- STUDY COMPLETION** - You are responsible for promptly notifying the IRB when the study has been completed (i.e. there is no further subject enrollment, no further interaction or intervention with current participants, including follow-up, and no further analysis of identified data). To notify the IRB of study completion, please obtain a close-out form at http://www.iupui.edu/%7Eresgrad.spon/iro_submit.htm and submit it to the RCA office.
- LEAVING THE INSTITUTION** - If the principal investigator leaves the Institution, the IRB must be notified as to the disposition of EACH study.

PLEASE REFER TO THE ASSIGNED STUDY NUMBER AND THE EXACT TITLE IN ANY FUTURE CORRESPONDENCE WITH OUR OFFICE. In addition, SOPs exist which cover a variety of topics that may be relevant to the conduct of your research. See link <http://www.iupui.edu/~respoly/human-sop/human-sop-index.htm>. All documentation related to this study must be neatly typed and must also be maintained in your files for audit purposes for at least three years after closure of the research; however, please note that research studies subject to HIPAA may have different requirements regarding file storage after closure. If you have any questions, please call Research Compliance Administration at 317-274-8289.

Enclosures: Documentation of Review and Approval Advertisement(s)
 Authorization Form(s) Assent(s)
 Informed Consent Statement(s) Other:

Appendix C

Department of Veterans Affairs Study Approval



Department of
Veterans Affairs

Memorandum

Date: August 26, 2008
From: ACOS, Research and Development Committee
Re: Review of Research Study
To: Tamilyn Bakas

Upon receipt of the requested information, your study titled, "The Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury" was given **full approval** by the VA Research and Development Committee on **August 26, 2008**.

PLEASE REMEMBER that **copies** of IRB forms for **Amendments** (after IRB approval) and **Events that Require Prompt Reporting Form** (i.e. **deviations, complaints and serious adverse events**) should be sent to the VA Research Office (VA mail drop code 151). A copy of the IRB **approved Continuing Review** should also be sent to the VA Research Office. Exempt studies will also be required to submit continuing review information upon receipt from the Research office.

If you have any further questions, please contact Robyn Bragg at 988-2526.

Howard Pratt, M.D.
ACOS, Research and Development Committee

Appendix D

Recruitment Letter

A Research Study: The Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury



Conducted over the Telephone by
Virginia S. Daggett, MSN, RN, Doctoral
Student

Dear Veteran,

Caring for veterans with mild traumatic brain injury involves many aspects of a veteran's life. As one of your VA health care providers, I am writing to tell you about a study for veterans who have experienced a mild traumatic brain injury in combat while serving your country in Iraq and Afghanistan.

The purpose of the study is to learn the needs and concerns of new combat veterans with mild traumatic brain injury (mTBI). The study involves a telephone interview scheduled at a time convenient for you. You will be asked a set of questions about your experiences with this injury.

What does the study involve?

- About an hour of your time
- A telephone interview
- Answering questions about your needs and concerns as a new veteran with a mild traumatic brain injury.
- You will receive a \$20 Wal-Mart gift card as a token of appreciation.

In the next few days, a nurse will call you to see if you are interested and eligible to take part in the study. To find out more, you can complete the referral card attached to this letter which is already stamped and addressed to Virginia Daggett, MSN, RN or call (317) 988-3155. **If you know you do not want to take**

part in the study, call Virginia Daggett and let her know and she will not contact you again.

Taking part in this study is completely up to you. Your health care of as a veteran will not be affected at all by your decision.

Sincerely,

REFERRAL CARD

_____ I am interested in learning more about your study.

Veteran's name: _____

Veteran's telephone number: _____

Veteran's street address: _____

City, State, and Zip: _____

Best time of day to call: _____

Name of next of kin: _____

Next of kin's telephone number: _____

Appendix E

Informed Consent Statement

Department of Veterans Affairs		VA Research Consent Form	
Subject Name:		Date:	
Title of Study:	(IRB# and title here) The Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury		
Principal Investigator:	Virginia Daggett	VAMC:	Roudebush VA Indianapolis
<p>STUDY PURPOSE:</p> <p>The purposes of this pilot study are 1) to subjectively explore the needs and concerns of new combat veterans with mild traumatic brain injury (mTBI) during the first year of their follow-up care within the VA healthcare system, and 2) to determine priority areas for intervention development based on their needs and concerns. This study will last over a four week period.</p> <p>You are invited to participate in a research study of combat veterans who have experienced a mild traumatic brain injury during service in Iraq and Afghanistan. The purpose of this study is to find out the needs and concerns of new veterans with mild traumatic brain injury as they return home and into their communities.</p> <p>PROCEDURES FOR THE STUDY:</p> <p>If you agree to participate, you will be one of 10 subjects who will be participating in this research locally. If you agree to be in the study, you will do the following things:</p> <ol style="list-style-type: none"> 1) You will be contacted by telephone by the investigator at a time convenient for you. 2) During this telephone call, which will last about 1 hour, you will be asked questions about your needs and concerns since you have returned home and have been diagnosed with mild traumatic brain injury. 3) The telephone interviews will be audio-taped only for transcription purposes and destroyed at the completion of the study. 4) Any long distance phone fees will be paid by the investigator at no cost to you. 5) You will receive a \$20 Wal-Mart gift card for participating in the study. <p>RISKS:</p> <p>There is a minimal psychological risk that some of the questions may cause negative feelings or frustration related to your needs and concerns related to your traumatic brain injury. You may choose not to answer questions that make you uncomfortable even though all questions of the study are important. Choosing not to answer questions of the study may result in you being withdrawn from the study by the investigator. You may withdraw from the study yourself at any time since participation in the study is completely voluntary. There are no anticipated physical, social, legal, or other potential risks connected with this study.</p>			
Version/or date of (revised) consent form		IRB APPROVED	Subject's Initials _____
VA Form 10-1086 Page 1 of 5 Roudebush VAMC 0408 Replaces Versions 0108, 0606, 0306		Jun 01, 2009	VA ICS May 16, 2008

Department of Veterans Affairs		VA Research Consent Form	
Subject Name:		Date:	
Title of Study:	(IRB# and title here) The Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury		
Principal Investigator:	Virginia Daggett	VAMC:	Roudebush VA Indianapolis
<p>In the event of extreme psychological distress, such as severe depression or suicidal thoughts, you will be encouraged to contact the 24-hour VA national lifeline number for veterans in crisis <u>1-800-273-TALK (8255)</u> and/or you will be encouraged to contact a resource from where you usually receive care. In the event of suicidal thoughts, the investigator may notify a VA health care provider on your behalf so he/she can contact you to determine if treatment is necessary.</p> <p>BENEFITS:</p> <p>One benefit in participating in this study is the knowledge gained from this study may be useful to support other new veterans with mild traumatic brain injury. Another benefit to participating in this study is that you will receive a \$20 Wal-Mart gift card for the telephone interview. A \$20 Wal-Mart gift card will be mailed to you right after the telephone interview that you complete with the investigator.</p> <p>ALTERNATIVE COURSES OF ACTION OR TREATMENT:</p> <p>The only alternative to participating in this study is not to participate. You may decide not to do telephone interviews with the investigator. The care provided to you by the Veterans Administration or any other organization will not be affected in any way by your decision to participate or not participate in this study.</p> <p>STATEMENT OF USE OF RESEARCH RESULTS:</p> <p>The results of this study may be published, but your records or identity will not be revealed unless required by law.</p> <p>CONFIDENTIALITY:</p> <p>Your name as a combat veteran with mild traumatic brain injury will not be used in the study. Your telephone number, address, and other personal information used to contact you for interviews and to issue you a gift card will be stored in a separate place than the interview questionnaires. All information from the study, including the audio-tapes, will be stored in locked file cabinets, and will only be available to authorized personnel. Any computer files related to the study will be protected by a password only given to authorized study personnel. No personal information or names will be used to identify you when we look at the data. Your name or personal information will not be used in the final report, or in any articles or publications from the study. Authorized study personnel will include the investigators and research staff involved in this study. Efforts will be made to keep your personal information confidential. We cannot guarantee absolute confidentiality. Your personal information may</p>			
Version/or date of (revised) consent form VA Form 10-1086Page 2 of 5 Roudebush VAMC 0408 Replaces Versions 0108, 0606, 0306		IRB APPROVED Jun 01, 2009	
		Subject's Initials _____ VA ICS May 16, 2008	

Department of Veterans Affairs		VA Research Consent Form	
Subject Name:		Date:	
Title of Study:	(IRB# and title here) The Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury		
Principal Investigator:	Virginia Daggett	VAMC:	Roudebush VA Indianapolis
<p>be disclosed if required by law. Organizations that may inspect and/or copy your research records for quality assurance and data analysis include groups such as the investigator and his/her research associates, the study sponsor, and the IUPUI/Clarian Institutional Review Board or its designees, the Office of Human Research Protection (OHRP) and the VA Research and Development Committee's designees.</p> <p>RESEARCH SUBJECT COSTS:</p> <p>In the unlikely event of physical or psychological injury resulting from your participation in this research, necessary medical treatment will be provided to you and billed under your VA medical benefits or other health care insurance benefits. Eligibility for medical care at a VA Medical Center is based upon the usual VA eligibility policy and is not guaranteed by participation in a research study. Some veterans are required to pay co-payments for medical care and services provided by the VA. These co-payment requirements will continue to apply to medical care and services provided by VA. There is no program in place for other monetary compensation for such injuries. All long-distance telephone fees, postage, and written materials mailed to you for the study will be paid for by the investigator.</p> <p>COMPENSATION:</p> <p>You will receive a \$20 Wal-Mart gift card for participating in this study. The VA medical facilities shall provide necessary medical treatment to a research subject injured as a result of participation in a research project approved by a VA Research and Development Committee and conducted under the supervision of one or more VA employees. This does not apply to: (1) treatment for injuries due to noncompliance by a subject with study procedures; or (2) research conducted for VA under a contract with an individual or a non-VA institution.</p>			
Version/or date of (revised) consent form VA Form 10-1086 Page 3 of 5 Roudebush VAMC 0408 Replaces Versions 0108, 0606, 0306		IRB APPROVED Jun 01, 2009	
		Subject's Initials _____ VA ICS May 16, 2008	

Department of Veterans Affairs		VA Research Consent Form	
Subject Name:		Date:	
Title of Study:	(IRB# and title here) The Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury		
Principal Investigator:	Virginia Daggett	VAMC:	Roudebush VA Indianapolis
RESEARCH SUBJECT'S RIGHTS:			
<p>Participation in this study is entirely voluntary. You may refuse to participate. Refusal to participate will involve no penalty or loss of rights to which individuals are entitled. You may withdraw from this study at any time without penalty or loss of VA or other benefits. You will receive a signed copy of this consent form.</p> <p>In case there are medical problems or questions, concerns or complaints, Virginia Daggett can be called at 317/988-3155 or Dr. Tamilyn Bakas at 317/274-4695 during the day (8:00 AM – 5:00 PM). If you can not reach the investigators during these business hours, please call the IUPUI/Clarian Research Compliance Administration Office at 317/278-3458 or 800/696-2949. If you experience emotional distress, you may contact the VA national lifeline number for veterans in crisis <u>1-800-273-TALK (8255)</u> and/or be encouraged to contact a resource where you are usually receive care. Please direct questions about the consent process and the rights of research subjects to the VA Customer Service Office at (317) 988-2602. For questions about your rights as a research participant or complaints about a research study, contact the IUPUI/Clarian Research Compliance Administration office at 317/278-3458 or 800/696-2949. If you have any concerns about the research study or want to check the validity, discuss problems, questions or obtain information or offer input, please call the Research Office at 317-988-3032. If any medical problems occur in connection with this study, the VA will provide emergency care.</p> <p>The study has been explained to me and all of my questions have been answered. The risks or discomforts and possible benefits of the study have been described. Other choices of available treatment have been explained. I acknowledge receipt of a copy of this informed consent statement.</p>			
_____ Subject's (or Legally Authorized Representative's) Signature		_____ Printed Name of Subject or LAR	_____ Date
_____ Signature of Witness to above signature		_____ Printed Name of Witness	_____ Date
_____ Signature of Person Obtaining Consent		_____ Printed Name of Person Obtaining Consent	_____ Date
Version/or date of (revised) consent form VA Form 10-1086 Page 4 of 5 Roudebush VAMC 0408 Replaces Versions 0108, 0606, 0306		IRB APPROVED Jun 01, 2009	Subject's Initials _____ VA ICS May 16, 2008

Department of Veterans Affairs		VA Research Consent Form			
Subject Name:		Date:			
Title of Study:	(IRB# and title here) The Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury				
Principal Investigator:	Virginia Daggett	VAMC:	Roudebush VA Indianapolis		
<p>NOTE TO VETERAN: PLEASE INITIAL EACH PAGE OF THE INFORMED CONSENT AT THE BOTTOM OF WHERE IT SAYS, "SUBJECT'S INITIALS."</p>					
<table border="1" style="margin-left: auto;"> <tr> <td>IRB Approval Date: Jun 01, 2009</td> </tr> <tr> <td>Continuing Review Date: Jun 01, 2010</td> </tr> </table>				IRB Approval Date: Jun 01, 2009	Continuing Review Date: Jun 01, 2010
IRB Approval Date: Jun 01, 2009					
Continuing Review Date: Jun 01, 2010					
Version/or date of (revised) consent form VA Form 10-1086Page 5 of 5 Roudebush VAMC 0408 Replaces Versions 0108, 0606, 0306		Subject's Initials _____ VA ICS May 16, 2008			

Appendix F

Suicide Protocol

The Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury

Suicide Protocol

5-16-08

Suicide guide triggered by veterans expressing thoughts about being better off dead or of hurting themselves in some way.

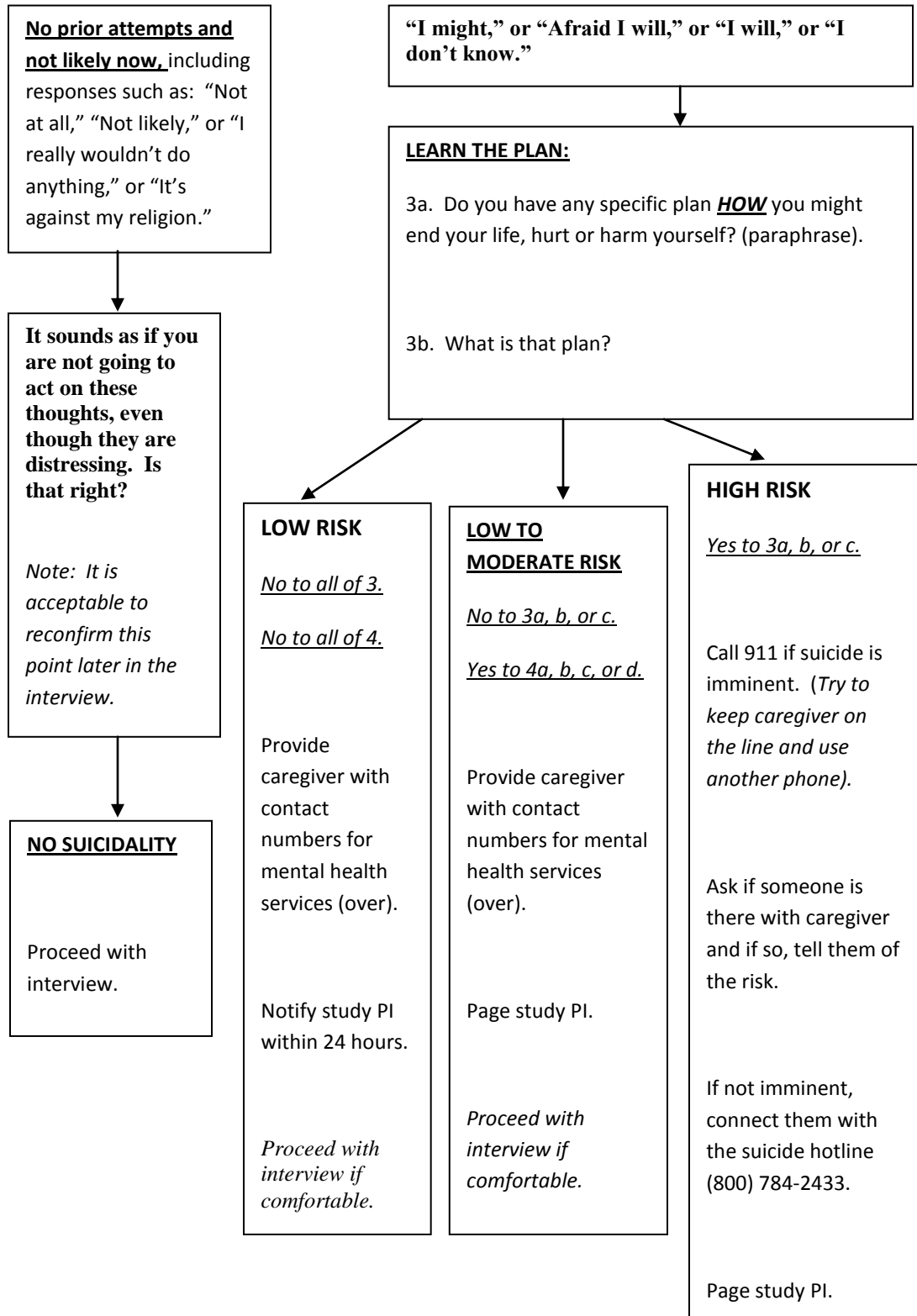
1. You mentioned you... (paraphrase their suicidal trigger: "had thoughts about being better off dead," "ending your life," "hurting yourself")... could you tell me more about that? (open ended, regardless of response, proceed to question 2.)

2. How likely is it that you might do something? (to hurt yourself? End your life?) _____

3. Have you ever tried to hurt or harm yourself in the past? (learn when, what, how, hospitalized, enter any details here and on back of form).

NO TO BOTH QUESTIONS 2 & 3

YES OR UNCLEAR TO QUESTIONS 2 OR 3



If script triggered by phone call:

1. If plan is specific and imminent, have a colleague call 911. Important in this case to also determine if the veteran is alone. If not, do ask to talk to the person that is with the veteran and make them aware of the risk.
2. If risk is unclear, ask if veteran would like to talk with a crisis counselor immediately and transfer to the VA Suicide Prevention Lifeline 1-800-273-TALK (8255) or any other resource from where they usually receive care.
3. If not high risk, provide the veteran with the telephone number for VA Suicide Prevention Hotline 1-800-273-TALK (8255) or any other resource from where they usually receive care.
4. Determine that continuing with interview is OK with veteran and switch back to the previous questionnaire.
5. Contact the PI to determine whether contact with a health professional on a veteran's's behalf is necessary.

Study Number: _____

Date and Time: _____

PI Contacted: _____

911, Suicide Hotline, or Health Professional Contacted: _____

Appendix G

Mild Traumatic Brain Injury Veterans' Interview Schedule

Study ID _____

**Mild Traumatic Brain Injury Veterans'
Interview Schedule**

Veteran Characteristics – Demographics Form

This set of questions will provide us with important information about you. Please answer the following questions.

1. What is your age? _____

2. What is your gender?
_____ Male
_____ Female

3. What is your ethnicity and race?
_____ Hispanic or Latino
_____ Not Hispanic or Latino
_____ American Indian or Alaska Native
_____ Asian
_____ Black or African American
_____ Native Hawaiian or other Pacific Islander
_____ White
_____ Unknown or Other: Please specify _____

4. What is your current marital status?
_____ Single
_____ Married
_____ Separated
_____ Divorced
_____ Widowed
_____ Other: Please specify _____

5. How many years of education have you had including grade school, middle school, high school (12 years), technical or business school, or college?
_____ Years

6. Are you currently receiving a VA pension connected to your traumatic brain injury?
- _____ Yes
_____ No
7. How many times were you deployed to Iraq and/or Afghanistan?
- _____ times
8. Where are you currently living?
- _____ House
_____ Apartment
_____ Assisted living facility
_____ Other: _____
9. Considering your household income from all sources (today), would you say that you are:
- _____ Comfortable
_____ Just have enough to make ends meet
_____ Do NOT have enough to make ends meet
10. What is your current employment status?
- _____ Employed full-time
_____ Employed part-time
_____ Homemaker
_____ Retired
_____ Unemployed
_____ Other: Please specify _____
11. Did you have to quit a job or take early retirement because of your traumatic brain injury?
- _____ Yes
_____ No
12. Do you have any of the following health problems? Check all that apply.
- _____ Other combat injuries. Specify type of injury _____
_____ Heart disease
_____ Myocardial infarction (heart attack)
_____ Heart failure
_____ Cerebrovascular Accident (stroke)
_____ Hemiplegia from CVA or other reason
_____ Peripheral vascular disease (poor circulation legs)
_____ Hypertension (high blood pressure)

- _____ Diabetes (high blood sugar)
- _____ Cancer (Leukemia, Lymphoma, skin, breast, prostate, other)
_____ Specify type of cancer
- _____ Arthritis (osteoarthritis, rheumatoid arthritis)
- _____ Chronic obstructive pulmonary disease (emphysema or lung disease)
- _____ Renal disease (kidney disease)
- _____ Kidney Dialysis
- _____ Ulcer disease (gastric reflux, gastric ulcer)
- _____ Chronic hepatitis or cirrhosis (liver disease)
- _____ Asthma
- _____ Headaches
- _____ Chronic pain
- _____ Alzheimer's disease or other form of dementia
- _____ Other: _____

13. How would you describe your symptoms related to your traumatic brain injury?

Mild Traumatic Brain Injury Combat Veteran's Needs and Concerns Interview

1. Describe a normal day in providing care for yourself.
2. What have been your greatest concerns or problems since you have been diagnosed with a mild traumatic brain injury sustained in combat?
3. What has helped you cope with these concerns or problems?
4. What advice would you give a fellow comrade once he or she has been diagnosed with a mild traumatic brain injury?
5. If the Department of Veterans Affairs were to develop a program for veterans with mild traumatic brain injury, what would be most helpful?

Mini-Mental State Examination Screener - 6 item

Instructions:

1. Say to the veteran the words "apple," "table," and "penny."
2. Have them repeat the words and tell them to remember the words.
3. Go through the first 3 questions.
4. Have the veteran recall the three words.

1. What day of the week is it?
2. What month is it?
3. What year is it?
4. Recall "apple."
5. Recall "table."
6. Recall "penny."

Score 1 point for each correct response.

If Score is **3 or below**, veteran is **ineligible**.

If Score is **4 or above**, veteran is **eligible**.

SCORE _____

Callahan, C.M., Unverzagt, F.W., Hui, S.L., Perkins, A.J., Hendrie, H.C. (2002). Six-item screener to identify cognitive impairment among potential subjects for clinical research. *Medical Care*, 40(9), 771-781.

Appendix H

mTBI Veterans' Needs and Concerns Checklist

Note: This checklist will be utilized as an initial nursing assessment, face-to-face training and orientation to the Web-based technology.

mTBI Veterans' Needs and Concerns Checklist

Cognitive Impairments (deficits in)

1. Memory: At this time, I need help...

(Check all that apply)

- remembering my appointments with health care team members (e.g., TBI care manager [social worker, nurse], rehabilitation physicians in the Polytrauma unit, speech-language pathologist, physical therapist, occupational therapist, recreational therapist, psychologist, psychiatrist, neuropsychologist).
- remembering my appointments with Veterans' Services (e.g., Veterans' Disability Benefit Office, Veterans' Service Office; Compensation and Pension Examiner).
- remembering what I am suppose to do (e.g., household chores, paying bills, follow-up with co-workers, steps in tasks).
- remembering my passwords (logins to computers at home or work or online accounts/services).
- recalling information (childhood memories, how my brain injury happened, "right" words to say what "I mean", names of family members, friends, and acquaintances I knew before my brain injury).
- remembering where I place things (e.g., cash, keys, cell phone, work tools).

2. Concentration (attention): At this time, I need help...

(Check all that apply)

- focusing on tasks (e.g., home therapy exercises, household chores, work tasks, school assignments, reading)
 - listening without being distracted (e. g., in a conversation with family, friends, co-workers, health care providers; watching a movie or listening to music; participating in fun activities like playing board games or sport activities)
-

3. Executive functioning: At this time, I need help...

(Check all that apply)

- recognizing and exchanging money (bills, coins).
- understanding what other people are asking or saying (e. g., conversation with family, friends, employer or co-workers, health care providers; written materials or applications).
- planning regular activities (e. g., family, friends, exercise, leisure activities or “hobbies”, social events, volunteer activities, church, organizations such as Veteran-oriented).
- solving problems (e. g., do not know how to begin solving a problem or the steps to solve a problem; do not access to support to help solve problems).
- making good decisions (e. g., making decisions that I do not regret or may not be best for my family or friends, making decisions too quickly and not having enough facts first, making major decisions when stressed, fatigued, or ill).

Symptoms

4. Physical-Headaches: At this time, I need help...

(Check all that apply)

- managing my headache symptoms and my headache medications (e.g., do not take medication that was prescribed or take medications after headache are moderate to severe; headache medications cause side effects).
- functioning with my headaches (e.g., managing responsibilities at work, home, school, with family; completing tasks at work, household chores, school assignments; maintaining positive relationships with family members, friends, coworkers, peers).

5. Physical-Fatigue/Insomnia: At this time, I need help...

(Check all that apply)

- managing my tiredness (e.g., finding energy to work, to do household chores, to play with kids, to have an sex or be intimate with significant other, or to participate in fun activities with family and friends).
- managing my sleep difficulties (e. g., difficulty falling or staying asleep, awake from bad dreams, headaches or chronic pain).

6. Physical-Tinnitus: At this time, I need help...

(Check if applies)

- managing ringing in my ears, or high-pitched sounds (e. g. distracts from tasks, conversations, studying, reading; interferes with relaxing activities or ability to fall asleep).

7. Emotions and behaviors - Anger: At this time, I need help...

(Check all that apply)

- managing my anger (e. g. overreacting in situations, frustrated with physical disabilities and the inability to perform as did before brain injury or other combat injuries; impatient with family members, friends, coworkers; take anger out on others).

8. Emotions and behaviors - Fear (uncertainty): At this time, I need help...

(Check all that apply)

- coping with uncertainty of long-term effects (e.g., memory problems from my brain injury and ability to function normally; abilities to return to school, reading and test-taking; developing early dementia like Alzheimer's Disease; when will see improvements from therapy or treatments).

9. Emotions and behaviors - Depression (sadness): At this time, I need help...

(Check all that apply)

- coping with grief (e. g., loss of memory due to brain injury and or loss of an arm or leg; loss of a comrade in combat; loss of dreams such as lifetime military service; loss of structure in daily activities).
- managing my depression (e. g., lack of interest in activities, lack of energy, feelings of being alone, feelings of unhappiness with self or life, hopelessness, thoughts of hurting self).

Functional Status

10. Instrumental activities of daily living - Finances: At this time, I need help...

(Check all that apply)

- obtaining financial help (e. g., not aware that need to file for VA disability benefits, do not know where to go to file for VA benefits or who can help; need information about state financial benefits for disabilities or other resources; disability benefits are not enough to live on; need help paying bills).

11. Instrumental activities of daily living - Work/school: At this time, I need help...

(Check all that apply)

- finding employment (e. g., limited work experience-went right into military after high school; limited type of skills-most work has been as a soldier or in the military; limited jobs available in community; poor economy; limited education).
- improving skills and qualifications to be successful (e.g., finding vocational services, returning to school for a higher level of education with a brain injury).

12. Instrumental activities of daily living - Leisure activities: At this time, I need help ...

(Check if applies)

- increasing my leisure and social activities (e.g., experience fatigue all the time or tired because of the inability to sleep; no interest in hobbies, sports; cannot physically or mentally participate in preinjury activities like football, playing chess or board games; do not hang out with friends that use to before deployment).

13. Interpersonal interactions – Communication, Relationships, Support: At this time, I need help ...

(Check all that apply)

- sharing my experiences with others (e.g., no one would understand combat experiences or what “ordered to do” in combat; can only share with my comrades from my unit or other veterans at Veteran organizations; no one understands how brain injury has affected me emotionally or physically).

- reconnecting with family members and friends (e.g., inability to accurately communicate or understand others due to brain injury; inability to immediately resume relationships with family members and/or friends; difficulty balancing relationships, family and friends with military comrades).
- obtaining and accepting support when return from deployment (e.g., obtaining support from family members and friends, obtaining support from service organizations American Legion, VFW; accepting support from family members and friends or community services).
- from disability staff who are responsive and knowledgeable processes and benefits (e.g. lack of staff at VA Disability Benefit Office; lack of continuity in contact-talk to someone different each time; staff who have been adequately trained; staff who are responsive when call and return calls).
- with access to VA services (e.g., diverse services with flexible hours; logistics of VA facilities, distance, gas costs, time off work).

Characteristics of the Environment

14. Community reintegration - Return to combat unit, Adaptation to society, Expectation of others: At this time, I need help...
(Check all that apply)

- adapting to my home life and my community (e.g., do not feel that I belong do not “fit in” since I returned; have feelings that want to go back into the military unit; no structure in daily activities; accepting what has happened).
- finding the “right” community resources to assist me (e.g., school, social activities, veteran organizations).
- being recognized and feeling valued for serving my country in my community (e.g., do not feel of appreciated; feel family, friends, and community are indifferent to military service and personal sacrifices; feel everyone has move forward at home while deployed).
- coping expectations (e. g., not able to meet family members’ and others’ expectations after deployment, brain injury and other combat injuries; difficulty balancing expectations for self; expect too much of self too soon).

Appendix I

Characteristics of TBI Expert's Survey

Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury and the Development of the Veterans Compensate, Adapt, Reintegrate Intervention

Characteristics of TBI Experts

1. Age (Please fill in) _____
2. Gender (Please check appropriate box) Male Female
3. Please name your professional discipline: _____
4. How many years of education have you had, including grades 1-12, undergraduate, graduate? Total _____ years.
5. Highest Level of education (Please check appropriate box):
Associate Degree

Bachelor's Degree

Master's Degree

Doctoral Degree

Other (Please name): _____
6. Type of degree (Please name): _____
7. Please list your credentials: _____
8. Number of years of practice (Please fill in): _____
9. Number of years providing TBI care (Please fill in): _____
10. Number of years conducting research or practicing as a health care provider in the Department of Veterans Affairs (Please fill in): _____

Appendix J

Example Expert Content Rating Forms

Expert Rating Form for Algorithm # 1 Memory

Please circle the level of agreement or disagreement with each of the following statements:

1. Algorithm # 1 addresses the need/concerns related to memory. *(Corresponds with the mTBI Veteran Needs and Concerns Checklist items related to memory).*

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Unable to evaluate
1	2	3	4	5	6

2. The strategies addressing the need or concern embedded in algorithm # 1 are accurate.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Unable to evaluate
1	2	3	4	5	6

3. It would be feasible for mTBI veterans to understand and use the strategies in algorithm # 1.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Unable to evaluate
1	2	3	4	5	6

4. The content in the strategies would be acceptable for mTBI veterans.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Unable to evaluate
1	2	3	4	5	6

5. What features of algorithm # 1 do you like most?
6. What features of algorithm #1 do you like least?
7. What recommendations do you have that would improve algorithm # 1?
8. Please feel free to return the algorithms with any edits written on them.

Overall Expert Rating Form for VETSCARE Intervention

Your feedback is essential about how the VETSCARE intervention will be accomplished. Please review the following:

- mTBI Veteran Needs and Concerns Checklist-see checklist at front of binder.
- Algorithms- see Table of Contents and Sample Screen Shots.
- Content of the strategies in each algorithm

Please circle your agreement or disagreement with each of the following statements:

1. The mTBI Veteran Needs and Concerns Checklist **addresses the most relevant needs and concerns** that mTBI combat veterans would have within the first year of follow-up post diagnosis.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Unable to evaluate
1	2	3	4	5	6

2. What items should be removed from the mTBI Veteran Needs and Concerns Checklist?
3. What items or areas of concern should be added to the mTBI Veteran Needs and Concerns Checklist?
4. Please review the general format of the algorithms. It would be feasible for an mTBI veteran to follow the general format of the algorithms in a web-based program.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Unable to evaluate
1	2	3	4	5	6

5. Please review the general language in the strategies in the algorithms. It would be feasible for an mTBI veteran to read and understand language in the content of the strategies that are embedded in the algorithms.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Unable to evaluate
1	2	3	4	5	6

6. It would be feasible for mTBI to perform weekly self-management skills using the VETSCARE program?

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Unable to evaluate
1	2	3	4	5	6

7. The VETSCARE intervention would be acceptable for mTBI veterans for their community reintegration processes and ongoing support.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Unable to evaluate
1	2	3	4	5	6

8. Which algorithms do you think would be **most helpful**? (Please check all that you think would be helpful)

- # 1 Memory
- # 2 Concentration (attention)
- # 3 Executive functioning
- # 4 Headaches
- # 5 Fatigue/Insomnia
- # 6 Tinnitus
- # 7 Anger
- # 8 Fear (uncertainty)
- # 9 Depression (sadness)
- # 10 Finances
- # 11 Work/school
- # 12 Leisure activities
- # 13 Communication, Relationships, Support
- #14 Return to Combat Unit, Adaptation to society, Expectations of others

9. Which algorithms do you think would be **least helpful**? (Please check all that you think would not be helpful)

- # 1 Memory
- # 2 Concentration (attention)
- # 3 Executive functioning
- # 4 Headaches
- # 5 Fatigue/Insomnia
- # 6 Tinnitus
- # 7 Anger
- # 8 Fear (uncertainty)
- # 9 Depression (sadness)
- # 10 Finances
- # 11 Work/school
- # 12 Leisure activities
- # 13 Communication, Relationships, Support
- #14 Return to Combat Unit, Adaptation to society, Expectations of others

10. What other algorithms or topics do you think would be helpful that are **not currently included?**
11. What recommendations do you have that would make the VETSCARE intervention better?
12. Overall, do you think the VETSCARE intervention would be helpful to mTBI veterans? Why nor why not?
13. Would you recommend the VETSCARE intervention to mTBI veterans? Why or why not?

Appendix K

Exemplar Narrative Quotes within Each Theme

Table A3

Exemplar Narrative Quotes

Themes and Conceptual Definitions	Representative Quotes for Needs and Concerns
<i>Cognitive Impairments</i>	
<p>Memory—Murray & Clark (2006) define memory as “the cognitive function responsible for storing, retaining and retrieving processed information” (p. 417).</p> <p><i>Algorithm: Memory 3.87</i></p>	<p>“The other day I gave somebody a ten dollar bill and something cost five dollars and they gave me back change and I thought I handed them a five. I forgot what I gave them within like five seconds.” 001, p. 8. 4(LM); 3(BH); 4(JB)</p> <p>“Is it going to get worse? Is it, you know, here I am almost 40 and, you know, the average person seems like they start losing their memory what 50, 60?...Am I going to...lose my memory before...like the average person?...not Alzheimer’s but like Alzheimer’s....I have been doing this a year and there are some days I cannot remember. Like today, I have already wrote today’s date probably three times and I had to ask you what today’s date was.” 001, p. 13–14. 4(LM); 3(BH); 4(JB)</p> <p>“You know you are supposed to do something and you cannot. It is just like somebody in passing tells you something. Hey, be here at one o’clock or whatever and it is 1:15 and you look up at the clock and you are going. It is 1:15, and you start thinking real hard and it takes two or three minutes to think where you were. Like, I know I was supposed to do something, but you cannot remember.” 001, p. 19. 4(LM); 3(BH); 4(JB)</p> <p><u>“My memory is not...my memory is not that sharp anymore...I mean, I can’t remember things hardly at all...I mean, I just can’t remember things that I have done. I’ve lost big chunks of...I lose...I lose stuff...I’ve lost big chunks of time. I don’t remember things that happen...somebody can tell me that I did this or that and I’ll have no memory of it...I can sit here and have an entire conversation and forget it.”</u> 003, p. 7–8. 5(LM); 3(BH); 4(JB)</p> <p>“Forgetfulness. I forget stuff all the time. I am really bad now... I’ll leave the room to go get something, and I’ll come back because I have no idea what I left for...my wife will ask me to do something, like go to the store, and I’ll go upstairs and get dressed, and I’ll come back downstairs, and just continue what I was doing...maybe that’s just being absent-minded. But I don’t</p>

	<p>know.” 005, p. 11. 4(LM); 3(BH); 4(JB)</p> <p>“I leave my deodorant out now. So I used to put it away. If I don’t see it, I forget to put it on.” 005, p. 12. 3(LM); 3(BH); 4(JB)</p> <p>“I have short-term and long-term memory loss. I have trouble remembering people, places, things...anything before the explosion...dates...childhood memories in general....I’d run into people after I got out and I didn’t know who they were and I was friends with them at school, but I didn’t know them anymore. When I talked about my past, I didn’t remember events...didn’t remember childhood memories. And then short-term, I have trouble remembering times, dates, appointments.” 006, p. 6. 5(LM); 4(BH); 4(JB)</p> <p>“Everything before has been kind of erased...remembering people...at first, they think I am messing with them or they don’t understand why I don’t remember them.” 006, p. 7. 4(LM);3(BH);4(JB)</p> <p>“I have trouble sometimes remember...appointments and materials and stuff like that, but...my guys are sworn to refresh my memory.” 006, p.10. 3(LM); 3(BH);4(JB)</p> <p>“Just where I put things, keys, cell phone....Passwords, that’s my biggest problem, especially with the new job I’ve got. There’s a lot of passwords I got to remember.” 007, p. 6. 3(LM); 3(BH); 4(JB)</p>
<p>Concentration—The concept of attention includes a wide range of cognitive skills, such as immediate span of attention; focused, sustained, and divided attention, and the speed in which one processes information (Sohlberg & Mateer, 2001).</p> <p><i>Algorithm: Concentration</i> 3.79</p>	<p>“Before I could keep my interest in something for a little bit. Now, sometimes, I cannot even watch a two hour movie without, ‘This is boring. I am going to do something else.’...And it is one of those shows...you see advertised and your are like ‘I really want to watch that...about 10 minutes into it, you are like ‘okay’.” 001, p. 15–16. 3(LM); 3(BH); 2-3 (JB)</p>

<p>Executive Functioning—include cognitive functions of initiation, planning, and management of complex behaviors that particularly place demands on attention and working memory (Sohlberg & Mateer, 2001).</p> <p><i>Algorithm: Executive functioning 3.25</i></p>	
<p>Physical Symptoms</p>	
<p>Headaches—post-deployment (mild to severe)</p> <p><i>Algorithm: Headaches 3.59</i></p>	<p><u>“Depending on...they kind of go. They kind of like, you see I have never had...I don’t know what a migraine is, but I was told they’re a little more severe than a migraine like I can’t get out of a bed, can’t focus, can’t open your eyes, sunlight hurts. I take some pretty strong dose of medicine...headache medicine for them. I really can’t function. Then eventually, they go away and be back in the saddle.”</u> 006, p. 8. 4(LM); 3(BH); 4(JB)</p> <p>“Today was a really bad day for me....I went to work for a couple hours, and then had to go to the VA hospital for some things, and then I just came straight home because my head hurt...they gave me some medication, and I take that....And then if it’s just a mild headache, I just take regular aspirin. Like, today, I seen white lines in my eyes...the light was just really bugging me today. I felt nausea...I came home, and just kind of went downstairs in the basement in the dark...that helps, being in the dark.” 007, p. 8–9. 4(LM); 3 (BH); 4(JB)</p>
<p>Sleep - Insomnia/fatigue—trouble sleeping and being tired</p> <p><i>Algorithm: Fatigue/Insomnia 3.68</i></p>	<p>“So when I take the Doxepin like I’m pretty much just passed out within at least an hour to two hours and then the whole entire next day. I am fighting sleep all day long. Like all I want to do sleep all day long.” 004, p. 13–14. 4(LM); 3(BH); 4(JB)</p> <p><u>“I just started, so I’m trying to give them everything I’ve got, you know. I’m trying to keep up...but if I have to work past my normal time, I will or they said I could come in early....When I come home at the end of the day, I usually take an hour’s nap...you know then I’m okay, and then I go to bed between 9 and 10. And I’m usually up by 1:30, 2:00 every day because I can’t sleep.”</u> 007, p. 7–8. 3(LM); 3(BH); 4(JB)</p>
<p>Tinnitus (Hearing/Tinnitus/Balance)—ringing in the ears</p>	<p><u>“I had a hearing test. They said my hearing is fine, but like is someone is trying to talk to me and there’s like a TV on in the background or something...or like other people are talking in the background”</u> 004, p. 8. 3(LM); 3(BH); 4(JB)</p>

<p><i>Algorithm: Physical/Tinnitus</i> 4.17</p>	<p>“My greatest problem or concern obviously is really losing my hearing again for life...for good. Once I came conscious, I remember lying there not being able to hear and it was pretty hard thing to swallow” 006, p. 11. 3(LM); 3(BH); 4(JB)</p>
<p><i>Emotional and Behavioral Symptoms</i></p>	
<p>Anger (Post Traumatic Stress Disorder?)</p> <p><i>Algorithm: Anger</i> 3.95</p>	<p>“I didn’t notice the dilemma. A friend did. I’m more harsh, as they call it. I’m more blunt. I don’t, you know, usually I blow it off and stuff like that...like ‘well or whatever.” 002, p. 16. 4(LM); 3(BH); 4(JB)</p> <p>“It usually comes out in anger...so that’s why, you know, said they’re going to try and talk to a PTSD counselor.” 002, p. 16. 4(LM); 3(BH); 4(JB)</p>
<p>Fear (uncertainty)—not knowing what future holds with disabilities or recovery or abilities to function normally.</p> <p><i>Algorithm: Fear (Uncertainty)</i> 3.73</p>	<p>“Is it going to get worse? Is it, you know, here I am almost 40 and, you know, the average person seems like they start losing their memory what 50, 60?...Am I going to...lose my memory before...like the average person?...not Alzheimer’s but like Alzheimer’s....I have been doing this a year and there are some days I cannot remember. Like today, I have already wrote today’s date probably three times and I had to ask you what today’s date was.” 001, p. 13–14. 3(LM); 3(BH); 4(JB)</p> <p>“If I go back to school, am I going to be able to, you know, to make it. Am I going to be able to be with my memory...what I remember of being in school was a lot of tests...I don’t know if I could do it or not.” 006, p. 12. 4(LM); 3(BH); 4(JB)</p> <p>“My greatest problem or concern obviously is really losing my hearing again for life...for good. Once I came conscious, I remember lying there not being able to hear and it was pretty hard thing to swallow.” 006, p. 11. 3(LM); 3(BH); 4(JB)</p> <p>“<u>Not knowing exactly what’s all involved into it. You know, what are the long-term effects going to be....later on down the road, you know, health problems...If that’s going to affect anything. As I age, yeah..after I get into the fear area of life and stuff after. Is it going to lead to Alzheimer’s or it’s just going to...always going to have to have, you know, medical assistance and stuff like that.</u>” 002, p. 9. 5(LM); 4(BH); 4(JB)</p>

<p>Depression (sadness)—feelings of hopelessness, helplessness, grief, lost dreams...</p> <p><i>Algorithm: Depression 4.04</i></p>	<p><u>“Wound up settling working at a trailer factory, I settled....It was really disappointing feeling...like I was a failure.”</u> 005, p. 17. 4(LM);3(BH);4(JB)</p>
<p><i>Instrumental Activities of Daily Living</i></p>	
<p>Employment/School</p> <p><i>Algorithm: Work/School 3.63</i></p>	<p><u>“I think the hardest thing for me is just getting back...the hardest thing for me is the job thing...the whole...holding down a job now is much harder than it used to be and it’s not just my brain injury stopping me from doing...having gainful employment. I’ve got more than one problem, so I don’t know what to attribute to the brain injury.”</u> 003, p. 17. 5(LM); 3(BH); 4(JB)</p> <p>“The Army was awarded this company...a contract to build a lot of these weapon systems and I talked to them about two and half months of trying to get a job with them and they didn’t...they just didn’t...see me fitting in their company to do anything. They never offered me a job for anything.” 004, p. 23. 3(LM); 3(BH); 3(JB)</p> <p>“I was going to get...a little more than a year’s experience doing helicopter hydraulics so that way when I came back, I’d have an alright shot of maybe trying to get a job with...helicopter maintenance...but they have taken me off that deployment, so now I can’t do that...Because of all this medical stuff going on, I’m probably never going to apply for flight school now...taken my whole entire dream of eventually becoming a helicopter pilot completely away...I have been hearing it’s like 75, 80 thousand dollars to try and be trained as a helicopter pilot as a civilian.” 004, p. 29. 4(LM); 3(BH); 4(JB)</p> <p>“If I go to school, am I going to be able to, you know, to make it. Am I going to be with my memory and everything like that....I mean, what I remember of being in school was a lot of tests, a lot of stuff, you know, stuff like that. I don’t know if I could do it or not.” 006, p. 12. 3(LM); 3(BH);4(JB)</p> <p>“They retired me because I can no longer carry out my duties as a United States Marine....They are screwing me because I was planning on being a 20-year Marine...so they medically retired me out and early. They gave me an option either take retirement or sit behind a desk and I didn’t join the</p>

	<p>Marines to be some desk clerk. I can do that at home. So I took the retirement and walked, went home and went to work.” 006, p. 13-14. 4(LM); 3(BH); 4(JB)</p>
<p>Finances—obtaining financial resources, e. g., VA pension, managing money, bank accounts, paying bills</p> <p><i>Algorithm: Finances 3.50</i></p>	<p>“It’s getting real hard driving back and forth all the time from all these doctors’ appointments for the VA now. It’s really taken a chunk out of my wallet.” 002, p. 10. 4(LM); 3(BH);4(JB)</p> <p><u>“I’m scraping by. Let’s see, I really don’t have enough to make ends meet, but I do somehow....I don’t have enough make...ends...I’m unemployed...not because of my brain injury but because of my other injury.”</u> 003, p. 3. 5 (LM); 3(BH);4(JB)</p> <p>“I think the rating system that they have is really messed up and it takes a super long time...the amounts that they give you aren’t nearly enough....” 003, p. 17. 3(LM); 3(BH);4(JB)</p> <p>“The first year I was back, when I was really still really messed up...I was only getting like \$300 a month. I was not able to work.” 003, p. 19. 4(LM); 3(BH);4(JB)</p> <p>“While we were in Iraq, one of the most frustrating things to see is to see all these civilians over there that, you know, we an infantry and cavalry were having to provide security for these private security....And they’re over there making like two hundred grand plus and I’m making 35 thousand dollars...extremely frustrating...the whole money issue.... You can’t ask for a pay raise.” 004, p. 21. 3(LM); 4(BH);4(JB)</p>
<p>Leisure Activities—hobbies, sport participant or spectator, volunteer activities</p> <p><i>Algorithm: Leisure activities 4.05</i></p>	<p><u>“I used to love to work out, and for some reason, I don’t...I don’t know...I have plenty of time to.”</u> 005, p. 15. 4(LM); 3(BH);4(JB)</p>

Interpersonal Interactions	
<p>Communication—sharing deployment experiences and experiences with TBI. Ability to correctly explain thoughts/respond to others</p> <p><i>Algorithm: Interpersonal Interactions: Communication, Relationships, Support 4.10</i></p>	<p>“A couple of buddies that I was in Iraq with. Well, actually, quite a few guys that I was in Iraq with have been diagnosed with TBI, but I really don’t talk to anybody.” 004, p. 19. 3(LM); 3(BH);4(JB)</p> <p>“I do not think none of them have...well, none of them really talk. We do not talk about our injuries among ourselves.” 001, p. 17. 4(LM); 3(BH);4(JB)</p> <p><u>“That’s the biggest thing. I’m going to tell you right now. Veterans do not open up to people that do not relate to them because they don’t feel that they know what they know, they’ve been through.”</u> 006, p. 30. 5(LM); 4(BH); 4(JB)</p>
<p>Relationships—reconnecting with family/friends; relationships with health care providers</p> <p><i>Algorithm: Interpersonal Interactions: Communication, Relationships, Support 4.10</i></p>	<p><u>“I really...a lot of friends I had before I left, I really don’t...we don’t do anything anymore. We used to go out and maybe it’s attributed to...you know, I got older. But, I don’t know, I don’t go out and hang out with my friends anymore. I don’t know. It doesn’t bother me either. Is that weird?”</u> 005, p. 10. 5(LM); 3(BH); 4(JB)</p> <p><u>“I get irritable real quick. That’s my biggest problem between my wife and I right now is that I don’t have no patience with her or the kids.”</u> 007, p. 6. 5(LM);3(BH);4(JB)</p> <p><u>“It’s my lack of patience with the family...especially my youngest...it just seems like we have drifted apart because of patience.”</u> 007, p. 10. 4(LM);3(BH);4(JB)</p>
<p>Support: Community/Family</p> <p><i>Algorithm: Interpersonal Interactions: Communication, Relationships, Support 4.10</i></p>	<p>“But there was never anyone there. Like every time I would call they were in Washington DC training op, where I would leave a message, and they’d never call me back so I would leave another one. But you know, I’m being told this entire time that there are only a few people...because they weren’t prepared for the amount of people that were going to come back injured. And when all these people started coming back, they were just overwhelmed.” 003, p. 20. 4(LM); 3(BH);4(JB)</p> <p><u>“All they told me when I got out was to go to a service organization, and they’ll help you....They’ll square you away...just what they tell everyone. But the numbers of people that are going to service organizations are...you know...it’s more than they’ve had in years, so where they may had one or</u></p>

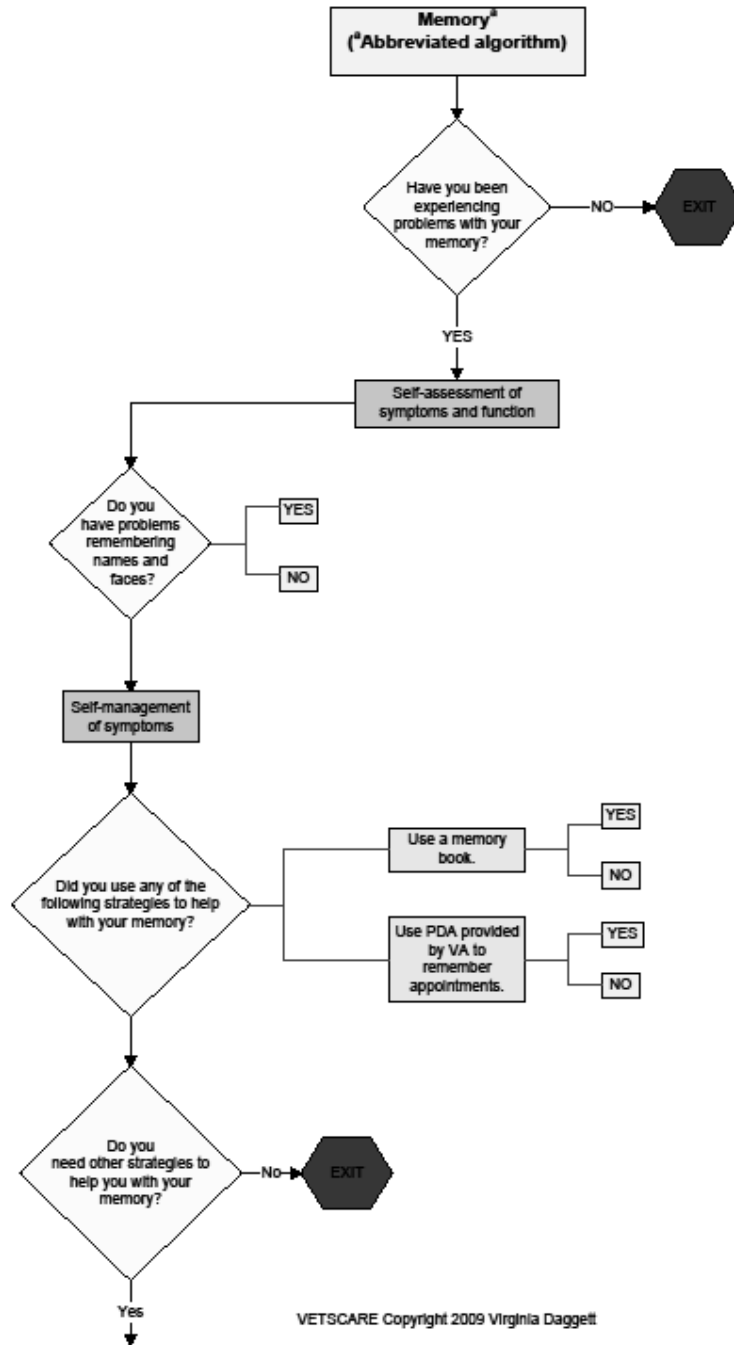
	<p><u>two people a day as a benefit counselor for, you know, the few people came in, now, it's, you know, hundreds of people are coming back, and they've only got two or three counselors. So they're swamped.</u>"</p> <p>003, p. 21. 4(LM); 3(BH);4(JB)</p> <p>"I got back here in April of this year, and it took till September for me to finally...get in because I wasn't officially out of the Army until 31 of August. And for some reason, they didn't bring me until after that date...I called many times, nobody ever got back with me. It was really frustrating."</p> <p>007, p. 7. 4(LM); 3(BH);4(JB)</p>
<p>Community Reintegration</p>	
<p>Return to combat unit—feel need to be with combat comrades, return to Iraq/Afghanistan</p> <p><i>Algorithm: Return to Combat, Adaptation to Society, Expectation of Others 4.17</i></p>	<p><u>"But I just...I just really could not function, and then you know, I just wanted back in the Army, and I didn't want to be out here. And that's the kind of thing that I went through."</u></p> <p>003, p. 22. 2(LM); 2(BH); 4(JB)</p>
<p>Adaptation to society—the ability to adjust back into regular lifestyle in own community</p> <p><i>Algorithm: Return to Combat, Adaptation to Society, Expectation of Others 4.17</i></p>	<p><u>"The transition could be better....When you are recruited in the service...you get calls nonstop. You have to go and meet with them once a week. You have to go to all these little events. You have to do this. You've got to do that...getting you prepped to go to Boot Camp. Coming home, there is no one. There's nobody. There's no transition or recruiters when you come out to guide you and make sure everything is in line. It's all on you. Well, if you don't know where to look, how the hell are you going to get it?...You see this stuff on the news...you know, ex-service...goes crazy, kills family, or goes to the mall and kills 50 people...He's mentally f---- up in the head and he didn't get...he slipped...their theory is that he slipped through the cracks of the system...he didn't slip through nothing."</u></p> <p>006, p. 22–23. 5(LM); 4(BH);4(JB)</p> <p>"I told them if there was somebody required to send the EAS, which is getting out paperwork to them...they live here...this is where they're coming....They need to contact them. I'd say within at least a week, as soon as they get home, and set up an appointment to come out and sit down with them and visit with them and give them an option. Either I'll come to you and meet with you or you can come into my office and we'll get this all squared away for you."</p> <p>006, p. 24. 4(LM); 3(BH);4(JB)</p>

<p>Expectation of others</p> <p><i>Algorithm: Return to Combat, Adaptation to Society, Expectation of Others 4.17</i></p>	<p><u>“When you come home, you get tossed back into your setting...and your family expects you...everyone expects you to be who you were.”</u> 005, p. 18. 5 (LM); 4(BH);4(JB)</p>
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Note. Underlined portion of exemplar quotes denotes representative quotes for each emerging theme in Phase I.

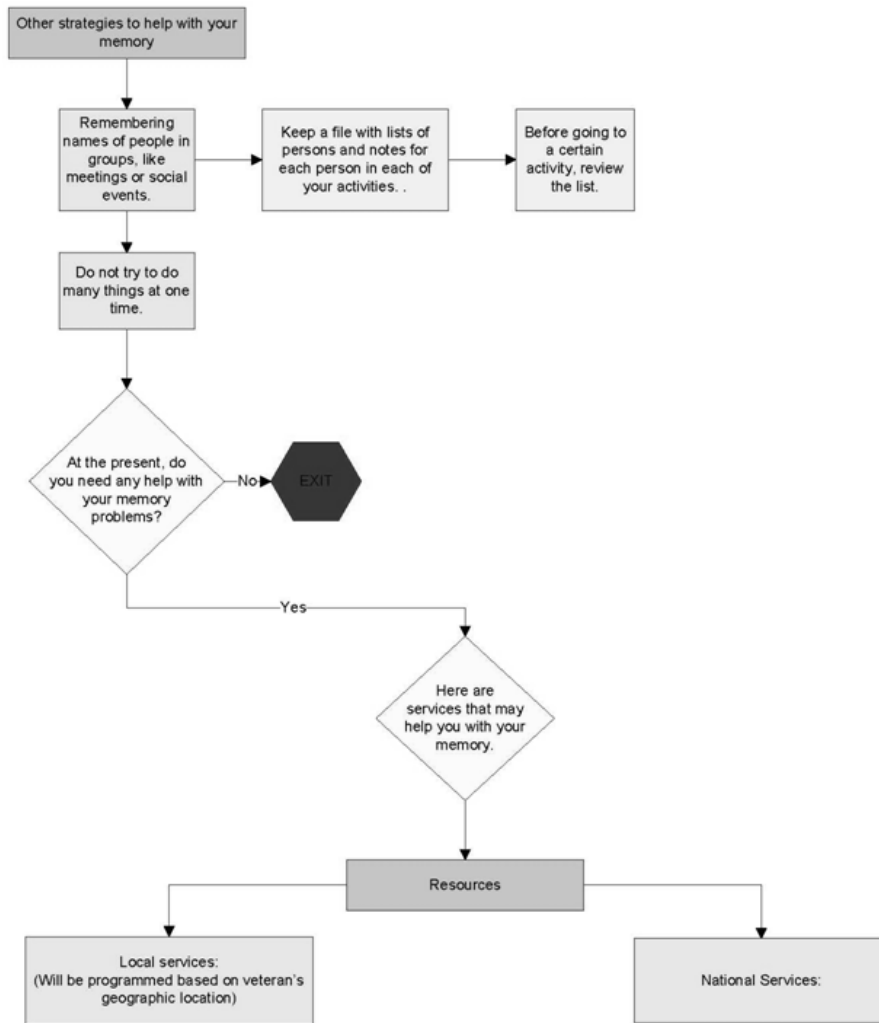
Appendix L

Memory Algorithm, Abbreviated Version



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1



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CURRICULUM VITAE

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EDUCATION:

UNDERGRADUATE:	Practical Nursing: Decatur Vocational School	L.P.N.	1978
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GRADUATE:	Nursing Administration: Bradley University	M.S.N.	2001
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ACADEMIC APPOINTMENTS:

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PROFESSIONAL APPOINTMENTS:

Co-Implementation Research Coordinator, VA/HSRD Stroke QUERI
Department of Veterans Affairs, Richard L. Roudebush VA Medical
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Associate Chief Nurse, Community-based Outpatient Clinics
Department of Veterans Affairs, Illiana Health Care System
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Nurse Care Manager, Telehealth/Care Coordination, Department of
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Nurse Care Manager/RN, Neurosurgery, Ann Stroink, MD
Bloomington, IL 2003–2004

Nurse Manager/RN, A Woman's Place/Susan G. Komen Breast
Centers, OSF Saint Francis Medical Center, Peoria, IL 2001–2003

Practice Administrator/RN, Family Practice, Occupational Health &
Urgent Care, Methodist MedPointe, Morton, IL 1998–2001

Practice Coordinator/RN, Internal Medicine/Pediatrics, OSF Medical
Group, East Peoria, IL 1997–1998

RN, ICU Step-down Unit, BroMenn Regional Medical Center,
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LPN, Obstetrics/Gynecology, Roy Tsuda, MD, Decatur, IL 1989–1995

LPN, Family Practice, W.L. Terrell, MD, Maroa, IL 1978–1989

CONSULTANCY:

Peer reviewer, *Clinician-Patient Communication: TBI, Polytrauma, PTSD, and Spinal Cord Injury (SCI) Web-based course*. VA Primary Care physician at Ralph H. Johnson VA Medical Center and Associate Professor of Medicine, Medical University of South Carolina, Charleston, SC, December 2009.

LICENSURE:

Registered Nurse's Licensure, Illinois, active status

CERTIFICATION:

American Heart Association, CPR Certification-Health Care Provider

PROFESSIONAL ORGANIZATIONS:

American Association of Neuroscience Nursing

Brain Injury Association of Indiana

Central Indiana Chapter American Association of Neuroscience Nurses

Midwest Nursing Research Society (MNRS)

Nursing Organization of Veteran Affairs (NOVA)

Sigma Theta Tau Alpha

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PROFESSIONAL SERVICE:

Invited abstract peer reviewer for State-of-the-Art Stroke Nursing Symposium 2010, International Stroke Conference

Invited reviewer for *Rehabilitation Process and Outcome*, December 2009

Invited reviewer for *Japan Journal of Nursing Science* September 2009

Patient Care Services Task Force Stroke Care in VHA, March 2009–present

American Cancer Society, West Central Region Regional Leadership Board Health Initiatives Council, 2006–2007

Morton Chamber of Commerce, Ambassador, Morton, IL, 2001

Sigma Theta Tau XiPi

Secretary, 1998–2000

Research Committee, 1996–1997

United Way Campaign Planning Committee, 2001

HONORS & AWARDS:

1997	Mennonite College of Nursing: Cum Laude
1995–1997	BroMenn Regional Medical Center, Full Tuition Scholarship
1996	Academic Honors and Community Service, Sigma Theta Tau International Honor Society Induction

GRANTS & FELLOWSHIPS:

Spring 2010	<i>Graduate Affairs Fellowship Scholarship</i> . (\$4,000). Indiana University–Purdue University Indianapolis
2008–2009	<i>Research Incentive Fellowship</i> . (\$10,000). Indiana University School of Nursing PhD Fellowship
2007–2008	<i>Research Incentive Fellowship</i> . (\$15, 000). Indiana University School of Nursing PhD Fellowship
2007	<i>Research Training Predoctoral Fellowship, PHS T32 NR07066</i> . (\$5,193). NIH Institutional Research Training Grant, Indiana University School of Nursing

TEACHING ASSIGNMENTS:**Bradley University**

Jan. 2002–Dec. 2006	Nursing Care of Children
Fall 2006	Medical/Surgical Adult
Spring 2006	Nursing Process: Complex Health Solutions
Fall 2005	Nursing Care of Children
Fall 2005	Medical/Surgical Adult
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Spring 2002	Women’s Health

PRESENTATIONS:

1. *Development of a Conceptual Model that Addresses Needs and Concerns of Veterans with Mild Cognitive Impairment.* (2010, April). Midwest Nursing Research Society 2010 Annual Research Conference, Kansas City, MO. Co-presented with T. Bakas.
2. *Healthcare Engineering Methods Can Improve Inpatient Stroke Care Quality.* (2010, February). International Stroke Conference, San Antonio, TX. Co-presented with L. S. Williams, H. Woodward-Hagg, A. Herm, D. Bravata, L. Plue, T. Damush.
3. *Implementation of a Nursing Admission Dysphagia Screening Tool for Veterans with Acute Ischemic Stroke.* (2009, February). State-of-the-Art Stroke Nursing Symposium 2009, International Stroke Conference, San Diego, CA. Co-presented with D. M. Bravata, H. Woodward-Hagg, T. Damush, L. Plue, S. Russell, G. Allen, L. S. Williams, J. Harezlak, N. Chumbler.
4. *System Redesign of the Dysphagia Screening Tool at Richard L. Roudebush VA Medical Center.* (2008, December). National QUERI Meeting, Phoenix, AZ. Co-presented with D. M. Bravata, H. Woodward-Hagg, T. Damush, L. Plue, S. Russell, G. Allen, L. S. Williams, N. Chumbler.
5. *Assessing the Implementation of a Dysphagia Screen for Veterans: Piloting a CIEBP Systems Redesign.* (2008, May). CyberMeeting, Health Services Research & Development, National VA.
6. *Nurses' Perceptions of the Ethical Climate in Their Organizations.* (2006, March). 30th Annual Midwest Nursing Research Society Conference, Milwaukee, WI.
7. *Co-management of Our Veterans.* (2004, November). VISN 11 Care Management Conference, Kalamazoo, MI. Co-presented with K. Thomas.

PUBLICATIONS:

1. Daggett, V., Bakas, T., & Habermann (2009). A review of health-related quality of life in adult traumatic brain injury survivors in the context of combat veterans. *Journal of Neuroscience Nursing*, 41(2), 59-71.
2. Daggett, V. S. (2009). Understanding challenges, organizational approaches and skills to effectively manage dysphagia in elderly patients. *American Nurse Today*. In press.

3. Bravata, D. M., Daggett, V. S., Woodward-Hagg, H., Damush, T., Plue, L., Russell, S., Allen, G., Williams, L. S., Harezlak, J., & Chumbler, N. R. (2008). Assessment of the implementation of nursing admission dysphagia screening tool for veterans with acute ischemic stroke. *Journal of Rehabilitation Research and Development*. In press.

RESEARCH:

1. Daggett, V. S., & Bakas, T. *Needs and Concerns of Combat Veterans with Mild Traumatic Brain Injury and the Development of the Veterans Compensate, Adapt, Reintegrate Intervention*. Ongoing.
2. Daggett, V. S. (1997, May). *Clinical Nurses' Perceptions of the Ethical Climate in Their Organizations*. Bradley University, Peoria, IL.