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I, Lindsay R James Riegler, hereby submit this original work as part of the requirements for the degree of Doctor of Philosophy in Communication Sciences and Disorders.

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Military On-Line Problem Solving Intervention (MOPS-VI)

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Abstract

The present study reports the phase I findings from an innovative web-based videophone treatment study designed to increase understanding of traumatic brain injury, and elicit problem solving skills for attention and memory impairment following mild TBI in returning veterans. The results support the feasibility of the approach and provide preliminary evidence of efficacy, defined as increased compliance and improvements in memory skills comparable to face-to-face treatment. The intervention utilized telehealth modalities to improve access to care and increase adherence to cognitive therapy. This is a matched pre/post design. The control group participants were veterans initially compliant with face-to-face cognitive therapy. The Military On-Line Problem Solving Videophone Intervention (MOPS-VI) participants were recruited from a group of veterans non-adherent to standard face-to-face cognitive therapy. Each MOPS-VI participant was provided a laptop computer, wireless internet and a videoconference phone for the duration of the intervention.

Following baseline measures of executive dysfunction including: 1) The Test of Memory and Learning 2nd Edition, 2) The Test of Everyday Attention, 3) Behavioral Rating Inventory of Executive Function Adult Version, 4) Center of Epidemiological Depression Scale, and the 5) State/Trait Anxiety Inventory, veterans were trained how to access the on-line modules. Each module consisted of didactic information, veteran interviews providing personal accounts of struggles with executive dysfunction, and self-guided web exercises to help improve executive function skills. Upon completion of each of the six on-line modules, MOPS-VI participants participated in follow-up videophone sessions in an effort to generalize the content learned in the web-based modules.
Results of a two way (pre vs. post assessments) × (standard vs. MOPS-VI) analysis of variance (ANOVA) indicated there was a significant pre-post assessment effect, \( F(1, 10) = 50.38, p < .001 \), indicating that participants’ memory improved after treatment for both MOPS-VI and standard treatment groups. There was no significant difference between face-to-face therapy and MOPS-VI therapy (\( F(1, 10) = 0.39, p = .55 \)) suggesting that MOPS-VI therapy is as effective as standard treatment and therefore is a strong alternative for face-to-face treatment. Although not statistically significant, the MOPS-VI intervention yielded similar results as standard therapy even when the MOPS-VI intervention was fewer months in duration. The results provide preliminary evidence that delivery of TBI telehealth intervention is feasible with this group and, for some patients, increase compliance. Further, the results suggest that the intervention is at least as effective as similarly organized face-to-face therapeutic intervention.
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Chapter 1

Introduction

Statement of the Problem

Traumatic Brain Injury (TBI) is considered the signature injury of soldiers fighting in Iraq and Afghanistan (Department of Defense, September 2009; page 2). Between January 2003 and September 2009, 63,856 service men and women have received a diagnosis of TBI (Department of Defense white paper, 2009; page 2). TBI contributes to cognitive impairment including deficits in planning, problem solving skills, memory, attention, and communication. For some veterans, underlying post-traumatic stress disorder (PTSD) and depressive symptoms also complicate the diagnosis and treatment of TBI and may impede recovery. Although the three diagnoses (TBI, PTSD and Depression) may occur independently in any one patient, the incidence of overlapping diagnoses makes it sensible to combine information about all three in one intervention. The development of a feasible and efficacious treatment model to address these co-morbid symptoms is essential.

Although programs are now in place to screen all returning soldiers for TBI and PTSD, existing data suggest that between 40-60% of military personnel referred for mental health treatment after deployment fail to obtain these services (Hoge, Auchterlonie, and Milliken, 2006). However, identification and follow-up may improve as public awareness increases. The demands of work and family may hinder a veteran’s ability to seek treatment through the Veteran’s Affairs Medical Centers (VAMC) across the United States. Online or videophone based approaches may provide a viable means for reducing barriers to treatment including time, distance, and stigma. Moreover, increasing evidence suggests that online or computer-based treatments can be successful in improving cognitive and behavioral outcomes following TBI (Ho
The Veterans Health Administration (VHA) has supported seminal research to support the utilization and implementation of telehealth services within the VAMC. Telemedicine has been defined as the use of telecommunications technologies to provide medical information and services (Perednia & Allen, 1995). While the majority of telehealth literature supports videoconferencing as an efficacious and patient-liked mode of intervention, no study has evaluated the use of telemedicine to improve compliance with therapy appointments.

The literature does not report barriers for utilizing telehealth modalities to provide cognitive treatment in the veteran population. A review of the PTSD and TBI literature does provide the authors with foreseeable limitations to treatment by this mode (Warden, 2006). A diagnosis of TBI and or PTSD and the sequelae associated with either, independent of other deficits may preclude a veteran from receiving treatment by telehealth. For example, deficits in motivation, planning and organization may hinder a veteran’s ability to receive treatment from a remote site. Despite the limiting factors, research with the veteran population has provided evidence supporting the use of telemedicine to address the consequences of TBI (Nelson & Haley, 2008). For example, Nelson and Haley (2008) developed a prototype treatment for individuals with mild TBI. Their website provided online education with the aim of reducing the frequency and severity of post-concussion symptoms. Eight participants with mild TBI participated in the pilot and rated the prototype as useful and interactive with most indicating that they would use the website for therapeutic purposes if it were available.
Chapter 2

Background

Veterans returning home from war with a diagnosis of Traumatic Brain Injury (TBI) face many challenges in returning to productive and fulfilling civilian lives. For many, the sequelae of TBI including deficits in cognitive skills (typically those involving memory, attention and communication) can prohibit successful reintegration into the home and work environment. Logistical problems may hinder a veteran’s ability to seek treatment across the United States. Unlike the situation in years past, when for the vast majority military service represented a clean break with previous employment; many current veterans have jobs waiting for them post-deployment. In addition, many veterans have existing family responsibilities. This complex set of problems (cognitive impairment, PTSD, logistical barriers) means that veterans are often unable to make or keep their cognitive therapy appointments. For this reason, development of an intervention that improves access to care is essential.

Overview of Traumatic Brain Injury

There are a plethora of definitions available for TBI. For the purposes of this document the following definition was selected for its consistency with other sources. According to the 2009 Traumatic Brain Injury Care in the Department of Defense, TBI is classified as a disruption of brain function resulting from a jolt or blow to the head or a penetrating (object penetrates the skull) head injury (Center for Disease Control and Prevention, American Academy of Neurology). A traumatic brain injury can be further evidenced by the worsening or sudden onset of one or more of the following: (1) Any period of or a decreased level of consciousness, (2) Any loss of memory for events immediately before or after the injury, (3) Any alteration of mental state at the time of injury (confusion, slowed thinking), (4) A focal or neurological
deficit, (5) An intracranial lesion (Brain Injury Association of America, 2009). There is often a presumption of TBI when there is a question of whether loss of consciousness might have occurred. Because of the lack of objective data, i.e. Glasgow Coma Scale, Rancheros Los Amigos Scale, or exact mechanism of injury (blunt vs. blast), veterans often receive a diagnosis of post-concussive syndrome in lieu of TBI (Department of Defense, 2007).

The bulk of research on brain injury comes from studies investigating cognitive outcomes from persons involved in blunt force trauma (motor vehicle accidents, falls, assaults, and sporting accidents). The degree to which the cognitive sequelae associated with blast injuries (improvised explosive devices [IED], rocket propelled grenade [RPG]) resemble those of blunt force trauma remain largely unknown. In general, patients are educated on the assumption that the same general sequelae may be operational.

**TBI in the Veteran Population**

Education about the effects of TBI is an important element of conventional cognitive therapy treatment. However, the population of veterans seeking cognitive therapy for TBI differs considerably from the general population, requiring adaptation of the standard materials. One notable difference between the populations is the mechanism of injury, i.e. blast vs. blunt force trauma. This difference forces discussion of the degree to which sequelae differ in education offered to the veterans during therapy. Another difference stems from the fact that many veterans with a history of TBI also have a history of PTSD. These differences forces discussion of how symptoms of PTSD and TBI are the same or different.

**Military versus Civilian**

The diagnosis and treatment of TBI and the associated post concussion symptoms (headache, dizziness, depression, irritability, fatigue and cognitive complaints) in the absence of
demonstrable structural changes to the brain on conventional clinical imaging is complicated by the overlap with mental health disorders including PTSD, depression and anxiety disorders. According to Lew et al. (2008), post OEF/OIF veterans present differently compared to mild TBI in the civilian settings based on the following: (1) the physically and emotionally traumatic circumstances in which many concussions are sustained; (2) repetitive and cumulative nature of concussions sustained over a tour (or multiple tours) of combat duty; (3) co-morbid mental health conditions; (4) difficulty following typical recommendations for post concussion care (e.g. rest). The mechanism of injury may not affect the mode of cognitive rehabilitation; however population differences must be accounted for.

**Blast Related Traumatic Brain Injury**

Blast injuries have been suggested as the primary cause of military TBI. It has been estimated that 60 percent of blast injuries result in traumatic brain injury (Okie, 2005; Warden. 2006). The pathophysiology behind the lasting effects of brain injury regardless of mechanism remains vastly unknown (Moore, Jeursalen, Nyein, Noels, Jaffee & Radovizky, 2009). On the assumption that pathophysiological effects will be related to the physics of the trauma, blast injuries related to TBI are classified as follows: (1) primary-injury directly related to the propagation of the blast wave through the tissue, (2) secondary-tissue damage resulting from interaction with shrapnel or fragments, (3) tertiary- tissue injury due to environmental factors i.e. structures falling, and (4) quaternary- injury due to electromagnetic pulses or exposure to toxins (Moore et al. 2009). Note that (2) and (3) will have much in common with injury primarily due to blunt force trauma. Possible etiologies of brain injury due to blasts include (1) interaction with the head through the cranium (coup-contrecoup forces) allowing acceleration/rotation of the brain, and or (2) transfer of energy from the blast wave through the blood vessels in the abdomen.
and chest to the central nervous system (Cernak & Noble-Haeusslein, 2010). While (1) is operational in typical blunt force trauma injuries, (2) may cause a different kind of injury to brain structures.

**PTSD and TBI**

Common symptoms of both TBI and PTSD include: confusion, anxiety, irritability and decreased concentration. Recent literature suggests that military men and women who sustained a mild TBI are at greater risk of being diagnosed with PTSD compared to those with more severe brain injuries and longer periods of unconsciousness (Warden, 2006).

It remains important that medical professionals treating OEF/OIF veterans provide education about both TBI and PTSD. Veterans face special challenges while undergoing rehabilitation following TBI including the need to understand and address comorbid conditions. The development of a therapeutic intervention that can be achieved at home or work remains paramount given the high incidence of feelings of isolation, loneliness and anger following combat.

**Need for an alternative method to provide treatment**

Sayer et al. (2009) study evaluated the clinic structure and care processes for veterans with TBI and PTSD across 32 VAMCs as part of a quality improvement project. The objective of the study was to improve services offered to OEF/OIF veterans with TBI and or PTSD. The researchers conducted 40 semi-structured interviews with providers specializing in TBI or PTSD treatment. Sayer et al. (2009) wanted to obtain provider views of challenges posed by providing treatment to this unique population. Provider challenges included lack of patient follow-through with their care plan, difficulty engaging in treatment, and no-show appointments. Based on provider feedback, the research team reported the need for a systematic approach toward patient
and provider education and to expand research in this area in an effort to provide evidence-based intervention. In addition, interviewees suggested determining whether telemedicine options may overcome barriers to appointment adherence (Sayer et al., 2009). This study provides support for the development of a cognitive rehabilitation program that improves appointment adherence, includes an educational component, and is research-based with measurable outcomes.

**Cognition and Rehabilitation**

Cognitive rehabilitation has traditionally been conducted by a speech language pathologist and or occupational therapist through face-to-face treatment in a clinic setting.

*Effectiveness of Conventional Treatment*

Cognition defined by Cicerone et al. (2000) is as follows: "Cognition is defined as the process of knowing. It includes the discrimination between and selection of relevant information, acquisition of information, understanding and retention, and the expression and application of knowledge in the appropriate situations" (Cicerone et al. 2000). Deficits in cognition may present in different domains including but not limited to: decreased effectiveness in the performance of routine activities of daily living (ADL’s), reduction in processing speed, failure to adapt to novel or problematic situations and reduced efficiency. Each domain may impair an individual's ability to return to work or school or to play active roles in a family dynamic.

There are two basic methods for implementing cognitive rehabilitation (Park & Ingles, 2001). The first approach seeks to retrain those cognitive processes that have been impaired by injury through remodeled neural circuits (Robertson & Murre, 1999). Differences remain in the implementation of the therapy since there is limited evidence that therapy remodels neuronal circuitry in the correct way. The second approach focuses on compensatory strategies to enhance
performance on everyday tasks. This approach is based on the idea that the person will learn to compensate for deficits with newly learned strategies using retained cognitive skills and functional reorganization of the brain (Backman & Dixon, 1992; Vanderploeg et al. 2006).

Tsaousides and Gordon (2009) examined the available literature supporting cognitive rehabilitation as an effective and efficacious treatment following TBI. Tsaousides and Gordon (2009) provided an overview of commonly used cognitive rehabilitation interventions. In agreement with Cicerone et al. (2000) methodological review of the literature; both research teams supported the effectiveness of cognitive rehabilitation as measured by patient self-report and improvement in Neuropsychological test scores. Tsaousides and Gordon (2009) reported that the use of technological aides (digital watches, cell phones, pagers and personal digital assistants) should not replace a therapist but enhance the therapeutic experience. A videophone component was added in the present study to simulate a face-to-face therapeutic experience to support the web-based material as Tsaousides and Gordon’s review (2009) suggested the importance of direct therapeutic contact.

Treatment effects for conventional cognitive rehabilitation following brain injury remain variable. Complicating any attempt at comparison between the interventions are the inherent differences within the population. Studies examining treatment effects post intervention are often drill-based and the targeted population is usually individuals with moderate to severe TBI. In addition, the literature highlighting outcomes following treatment for moderate to severe TBI report longer duration of treatment with less progress made. For these reasons, comparisons of treatment effects between studies remain difficult and should be interpreted with caution.
Foundation of MOPS-VI

In designing and implementing a cognitive intervention for veterans of OIF/OEF, researchers must account for the physical and emotional issues associated with combat veterans. Including PTSD/depression and anxiety education along with the identifying proper referrals and providing the necessary contact information remains critical. Providing veterans with the opportunity to receive therapy in the convenience of their home or work environment allows those initially non-compliant with face-to-face therapy an opportunity to receive the service they need and want. The emphasis of Nelson and Haley’s intervention was education. The focus of this intervention is to integrate education about TBI and PTSD with a therapeutic cognitive intervention to promote improvement in memory, attention and concentration.

The MOPS-VI design adhered to the tenets of traditional cognitive therapy but utilized the internet and videoconference phones to increase treatment adherence. MOPS-VI taught participants how to compensate for their deficits through utilizing strategies to improve quality of life (Backman et al., 1992); Vanderploeg et al., 2006). For example, in module 3 "Getting Organized" participants were provided with functional strategies to improve attention and memory i.e. writes things down, take frequent breaks during a task requiring extended time.

There are a number of cognitive rehabilitation practices typically facilitated by SLP’s for which there is strong evidence of effectiveness (Turkstra and Kennedy, 2008). These include: (1) direct attention training (Sohlberg et al. 2003), (2) utilization of external memory aids, (3) behavior management, (4) learning new skills and (5) awareness of metacognitive skills (Kennedy et al. 2008). The MOPS-VI intervention employed 3 of the 5 practices: behavior management (Controlling Your Behavior, module 5), learning new skills (Staying Positive, module 2) and awareness of metacognitive skills (Getting Organized, module 3).
Attention

The theoretical framework of attention for the MOPS-VI intervention was based on Sohlberg and Mateer's (2001) clinical model. The clinical models discussed in the on-line modules were comprised of five attentional components: (1) focused attention, (2) sustained attention, (3) selective attention, (4) alternating attention, (5) divided attention. Focused attention is the ability to respond to a specific auditory, visual or tactile cue, i.e. head turn in the direction of stimulus. Sustained attention is the ability to maintain a consistent behavioral response during repetitive or continuous activity. Selective attention is the ability to maintain a behavioral or cognitive set in the face of distracting or competing stimuli. Alternating attention refers to the capacity for mental flexibility that enables an individual to shift their focus of attention and move between tasks with different cognitive requirements; self-controlling which information will be selectively processed. Finally, divided attention refers to the ability to respond simultaneously to multiple tasks or multiple task demands (Sohlberg & Mateer, 2001, p. 128). The literature supports direct attention training on a particular task with a hierarchal progression of increasing attentional demands from simple to complex distracters (Sohlberg et al. 2003). However there is little evidence to support the generalization from one task to another (Turkstra & Kennedy, 2008). For this reason, drill based attention training was not utilized in the MOPS-VI intervention. Rather, education about the different types of attention and training in compensatory strategies to improve deficits in everyday life was targeted.

Memory

The memory model used in MOPS-VI provides a simple, easy-to-understand approach and is taught in standard face-to-face cognitive treatment at the Cincinnati VA Medical Center. For these reasons, it was utilized in the MOPS-VI intervention. Deficits in memory have often
been considered the most disabling consequence of brain injury. Memory problems affect a person's ability to learn, retain and utilize new information. The theoretical foundation for the MOPS-VI intervention was based on a generally accepted model of memory formation that incorporates four stages of memory: (1) attention, (2) encoding, (3) storage and (4) retrieval (Baddeley, Wilson & Watts, 1995; Huppert & Piercy, 1982; Posner, Petersen Fox, Raichle, 1988). This model can be found in module 2 "Staying Positive". Attention at its most basic level includes alertness and arousal. Veteran-reported suggestions of how to improve attention in everyday life can be found in module 3 "Getting Organized". Encoding is the form in which information is stored and remembered, e.g. remembering visual material depends upon encoding the graphic representation. The MOPS-VI design included strategies in module 2 to help improve encoding. Storage of memories refers to the transportation of a transient memory to a form or location in the brain for permanent retention or access (Sohlberg & Mateer, 2001). Retrieval is the searching or activation of existing memories.

**TBI and Telemedicine**

Egan, Worrall and Oxenham (2004) investigated whether individuals with cognitive-linguistic impairment as a result of TBI could use the Internet. Seven patients with brain injury and confirmed cognitive impairments were able to learn internet skills with the aid of specialized training materials. Study participants were trained to use the internet using an already trialed protocol designed for persons with aphasia. The intervention attempted to reduce training barriers including: cognitive-linguistic difficulties, sustained attention, sequencing and impaired memory skills. Five of the seven participants had previous internet experience prior to commencement of the study. In order to facilitate motivation during modules, Egan et al. (2004) allowed the tutors guiding the delivery of training to be flexible. Tutors were instructed...
to schedule convenient times and length of therapy sessions to best fit the participants. This model (Egan et al. 2004) matched some of the needs of the MOPS-VI population for flexibility and was felt to enhance compliance.

Despite deficits in information processing, divided attention and difficulty alternating between tasks, the research participants were able to follow the sequential steps outlined in the therapy module with success. Only one participant out of seven was unable to complete the program due to severe memory impairment (Egan et al. 2004). This research suggests that persons with cognitive-linguistic difficulties including impairments in divided attention and memory were able to successfully participate in an internet-based therapy.

**Services Provided via Telemedicine**

Telemedicine has been defined as the use of telecommunications technologies to provide medical information and services (Perednia & Allen, 1995). Health care providers including doctors, nurses, clinicians and administrators have been using telephones and computers to improve quality and ease of access to patient care since the early 1990's (Lehouset al. (2002). The application of telemedicine has been utilized in a number of medical specialties including radiology, dermatology, oncology, cardiology, surgery, psychiatry, psychology and rehabilitation.

The typical telemedicine study is organized as follows: (1) identification of a need that warrants treatment provided remotely, (2) comparison of efficacy between the telehealth treatment and face-to-face treatment (Barak, Klein, Proudfoot, 2009; Lewis, Packman, Onslow, Simpson and Jones, 2008; O'Brain, Packman and Onslow, 2008) and (3) evaluation of participant satisfaction (Tindall, Huebner, Stemple and Kleinert, 2008; Bergquist, Thompson, Gehl and Munoz Pineda). To date, the majority of studies report that the results of intervention
via telepractice are approximately equal to the results of face-to-face intervention for objective measures of progress, while in some cases measures of patient satisfaction show larger gains.

For example, Mashima (Mashima et al. 2003) began using real-time audio-video monitoring equipment to provide voice therapy for veterans in the Pacific Rim (Hawaii, Japan, and Korea) to improve the accessibility to speech-language pathology services. Reduced access to speech therapy services is not a problem unique to the Pacific Rim. Veterans nationwide have work and family obligations that prohibit them from seeking routine intervention for various diagnoses and for this reason improving access to care was an overarching goal of the MOPS-VI intervention.

Mashima et al.’s (2003) objective was to ascertain whether voice therapy could be delivered remotely with effectiveness equal to face-to-face intervention. Treatment was provided under two conditions: (1) voice rehabilitation was provided with the clinician in the same room (face-to-face) or (2) the patient and the clinician were in separate rooms interacting in real time through a hard-wired video camera and monitor. The author's reported there was no difference in treatment outcomes (perceptual judgment of voice quality, acoustical analyses of voice, patient satisfaction and fiber-optic laryngoscopy) between the conventional (face-to-face) group and the remote video teleconference (VTC) group. Two way analysis of variance between groups (conventional versus VTC) and tests of jitter and shimmer scores showed no difference between groups and small estimated effect size (0.29 and 0.12 respectively) (Cohen, 1988). The Mashima et al. (2003) study population mimicked that of the MOPS-VI in that all participants were veterans.

Authors Tindall, Huebner, Stemple and Kleinert (2008) used Televyou TV 500SP videophones to provide Lee Silverman Voice Therapy (LSVT) to 24 individuals ranging in age
from 52 to 84 with idiopathic Parkinson's disease (IPD). The targeted outcome was post-treatment improvement in vocal intensity. The results showed a statistically significant increase in decibel (dB) level for the LSVT videophone treatment group. Participants were also surveyed on their level of satisfaction with the telepractice mode of treatment, including their experience with the videophone equipment. Results showed average to very strong agreement on all questions regarding satisfaction with the model of treatment, including utilizing the videophone equipment.

*Telemedicine within the Veterans Affairs Medical Centers*

According to Godleski, Nieves, Darkins and Lehmann (2008) the Veterans Affairs Administration (VHA) is among the largest integrated healthcare system in the world and the largest within the United States. Telemedicine has begun to play a large part of therapeutic intervention within the Department of Veterans Affairs (VA) (Girard, 2007). VHA began using videoconference phones in 2007 to connect directly into the patient’s home. Reported by Darkins (2006) the Veteran’s Health Administration (VHA) telemedicine programs have reduced hospitalization, length of stay and emergency room visits while improving the quality of life for veterans (Darkins, 2006).

*Computer/Internet-Based Cognitive Rehabilitation*

Schoenberg et al. (2008) compared outcomes between participants with a diagnosis of moderate to severe closed head injuries receiving commercially available computer-based cognitive rehabilitation teletherapy program and patients receiving non-research based face-to-face outpatient speech-language therapy. Outcomes were measured by functional independence (driving, living etc.) and treatment costs. The teletherapy group used a series of computer exercises accessed in the patient’s home over the internet with therapist supervision. The
The teletherapy program was provided by Cognitive Systems Incorporated. The program was intended to enhance cognitive functioning across domains, simple attention, reaction time, visuospatial skills, learning and memory and problem solving. Dependent variables included cost of treatment and self-reported hours of treatment. Functional outcomes of treatment included return to work or school, independent living and independent driving. Results of the study showed both face-to-face and teletherapy groups improved on the three primary outcome measures. Advantages of the computer rehabilitation system were the access to intervention. Additionally, the in-home teletherapy program eliminated transportation to and from an outpatient therapy appointment allowing teletherapy participants to access to therapy more often than would have been likely for the face-to-face group.

The author's reported drawbacks to the teletherapy program including decreased participant motivation. Further, participants with motor or visual impairment had greater difficulty operating the computer system independently (Schoenberg, Dawson, Ruwe, McDonald, Houston and Forducey, 2008). Scheonberg et al.'s (2008) study provides evidence that a home based therapy intervention utilizing technology as a mode to receive therapy is possible. Perhaps most important, results showed that the computer-based teletherapy group provided similar functional outcomes when compared to the face-to-face speech-language therapy.

Bergquist, Thompson, Gehl and Munoz Pineda (2010) developed a four item satisfaction questionnaire using a seven-point Likert scale following an internet based cognitive rehabilitation program. The study satisfaction questionnaire measured the extent to which the study participants agreed/disagreed with a statement concerning the therapist and the therapy received, emotional distress experienced during treatment and willingness to receive internet
based treatment again. The exact questions used in the study were not provided and could not serve as a model from which to emulate. Each of the 14 participants completed 30 sessions of both the active (calendar) or control (diary) treatment. Calendar condition focused on developing calendar skills to address difficulties with memory in everyday life. Diary condition spent an equivalent amount of time interacting with a therapist on-line, and was asked to use their diary to record day-to-day activities and not use as a compensatory tool. Results of the intervention reported no significant difference in memory improvement and increased compensatory strategy use between the calendar and diary conditions; there was no significant difference between conditions in the level of participant reported satisfaction. Although the particular memory treatment (using a calendar) and control treatment (writing in a diary) did not yield different outcomes; the results of the study did suggest that persons with traumatic brain injury and memory impairment are generally satisfied with cognitive rehabilitation provided by a therapist over the internet.

**Background of Pilot Study**

Dr. Shari Wade and colleagues produced an internet-based family intervention for children diagnosed with traumatic brain injury. Wade and colleagues adapted a previously developed face-to-face intervention titled, Family Problem Solving (FPS). FPS focused on coping, cognitive appraisals and family communication. This therapeutic intervention was delivered through self-guided web pages and synchronous videoconferencing one-on-one with a therapist (Wade, Wolfe and Pestian, 2004). Research participants in this study were provided with computers, video web cameras and internet access. Computer training was provided in each participant's home by a trained therapist. Following installment of the computers and training, a structured interview was conducted. Weekly meetings via videoconferencing took place
between the therapist and the participants, and part way through the entire intervention; with the aid of the therapist, each participant reviewed their individual progress and highlighted any remaining concerns. The FPS design included twelve individual sessions, eight of which centered on TBI-specific behavior management skills, problem solving and communication. Pediatric participants ranged in age from 5 to 16 and had to have sustained a moderate to severe TBI more than 15 months prior. Wade and colleagues (2004) reported "families of children with TBI with varied prior computer experience can successfully use a face-to-face treatment adapted for the World-Wide Web to acquire knowledge and skills"(Wade et al. 2004). Of importance, the research participants in Wade et al.'s (2004) study rated the web site as moderately to very easy to use, which is why this protocol has been selected for modification for veterans with complaints of cognitive deficits. Participants perceived the intervention to be helpful and interesting; and both older children and parents described the problem-solving process outlined in the intervention as really useful and applicable to future problems. Overall satisfaction ranked high among the majority of the participants and their families. Although family members of the person with TBI will not be the focus or direct part of the proposed intervention, the selected modules from FPS have been modified to be age and population specific. Education regarding PTSD was not previously included in Wade's (2004, 2006) intervention, thus new content was developed in this area.

Wade, Carey and Wolfe (2006) broadened their research to determine whether this treatment could improve child adjustment post childhood traumatic brain injury. Objectives included examining the relationship between on-line family problem-solving (FPS) therapy and child/social behavioral outcomes compared to an internet resources comparison (IRC) group. Similar to Wade et al. (2004) previous FPS content design, the revised FPS included fourteen
compared to the previous twelve separate sessions, again with eight core sessions focusing on communication, problem solving, and antecedent behavior management skills. Results of the Wade, Carey & Wolfe (2006) study indicated that an on-line cognitive-behavioral approach is beneficial in improving self-management and compliance following TBI in older children (Wolfe et al. 2006). FPS also resulted in significant reductions in behavior problems relative to an internet resource comparison group, particularly among children of lower socioeconomic status. This study also revealed that the on-line approach to intervention is both feasible and acceptable for children ages 5 to 16 with TBI. Of the children who participated in the on-line therapy program, 80 percent rated the web site easy to use. The program was also effective in reducing executive impairment. Because of the success and ease of use of Wade’s well researched program, this intervention is being used as a model for veterans.

Carey, Wade and Wolfe (2008) examined previous use of technology in relation to treatment response to FPS compared to an internet resource intervention (IRI). Prior to intervention, 35% of caregivers reported not using a home computer regularly (Carey et al. 2008). Consistent with the researchers’ hypothesis, participants with less-than-regular computer use in their home prior to initiation of intervention were less likely to show improvements in anxiety and depression (Carey et al. 2008). Importantly, previous technology use was not related to treatment satisfaction, the desire to meet face to face with a therapist, nor the strength of the therapeutic alliance. This suggests that there are some participants that may receive limited benefit from on-line computer based intervention despite higher levels of satisfaction and alliance (Carey et al. 2008).

The Pilot and MOPS-VI studies, although adapted from Wade et al., (2006; 2008), were based on cognitive therapy from a speech therapy standpoint not psychological. The Pilot and
MOPS-VI interventions were intended to address issues that are related to executive function deficits including attention, memory and concentration. Behavioral issues being targeted were related to pragmatics within the scope the practice for licensed Speech-Language Pathologists. Prior studies using this approach have not found increase in emotional crisis; however if identification of further services were warranted the necessary referrals would have been made.

**Results of the Pilot Study**

The first revision of the Wade et al.'s (2006) program was piloted in March of 2009 and included modifications of selected modules that were content specific and of high interest to Veterans. The original on-line home based cognitive therapy module developed by Wade, Carey, and Wolfe (2006) included eight modules. The Pilot Intervention focused on 4 modules that addressed cognitive function affected by frontal impact (i.e. executive impairment) as well as behavior modification.

The initial session titled "Controlling Your Behavior” placed emphasis on the participant monitoring and changing his or her behavior. The second session titled "Getting Organized" focused on organizational strategies to reduce extraneous stress and minimize problems at work, home or school. Specific strategies to improve attention and memory were discussed. The third session, "Staying in Control" outlined ways to control emotions and behavior. Topics discussed included education regarding the identification and management of post-traumatic stress disorder. The content focused on planning for success using a self-monitoring mnemonic, SMART (Stop Monitor Appraise Reflect Try). Module number four, "Staying Positive" highlighted common concerns and problems that veterans may face following a brain injury including strategies to improve attitude, work towards a solution and communicate with others.

The purpose was to collect data on the usability and benefit to a small group of Veterans
who participated in the on-line program. Eight participants with mild TBI received the Pilot Intervention and showed improvement on standardized testing of cognition, and knowledge of TBI. Repeated measures t-test comparing pre/post intervention showed significant improvement on the TOMAL-2nd Edition for all verbal subtests (Word Selective Reminding, Object and Paired Recall) with the exception of Memory for Stories (p<.05) with a large effect size (Cohen's $d$ greater than 0.5). The only non-verbal memory domain to show statistically significant improvement post intervention was Visual Selective Reminding, again with a large effect size (Cohen's $d$ greater than .5). Only one attention subtest showed significant improvement post intervention; the Visual Elevator task; p=.006 with a large effect (Cohen's $d$ greater than .5).

Thus, the results of the pilot study suggest that the study had the largest effect on verbal memory with only scattered improvement on nonverbal memory and attention. However, further testing with a larger group of individuals and a control group is needed to show the effect of videophone intervention study on verbal memory, nonverbal memory and attention.

Results for the repeated measures t-test for pre/post TBI knowledge assessment showed statistically significant improvement with p=.04 and a large effect size (.91). The participants in the pilot study reported in structured interviews that they benefited from the program.

**Design of MOPS-VI Study**

The revisions for MOPS-VI differed from the pilot study with the inclusion of a didactic video clips from veterans discussing how their everyday life has changed since their injury and what strategies work to improve their quality of life. In addition, based on the recommendation of Carey et al. (2008), modifications were implemented in the design of MOPS-VI, including more accessible user interfaces, easier logins, and more engaging technology.
One issue in consideration was the possibility that difficulty using the equipment would constitute more of a barrier for veterans with mild cognitive impairment than for healthy participants in other studies. While the disorders are different, and the cognitive impairment status of participants in the Tindall et al. (2008) study was unknown, the fact that patients with Parkinson's Disease in the Tindall et al. (2008) study seemed to respond well suggested that this particular equipment is relatively straightforward to use. The MOPS-VI authors accordingly chose to use the same equipment as was used in the Tindall et al. (2008) study.

Additional improvements to MOPS-VI included an option to allow a voice over for all static text, different graphics that incorporate military themes and weekly homework assignments to reinforce the information learned. The revised modules included six sessions, the first session was named Getting Started with the purpose being to establish rapport, provide an overview of the intervention and define the expectations for successful completion of the program. The second (2), third (3), fourth (4) and fifth (5) modules included information about attention, memory, problem solving and self-monitoring. A sixth (6) and final session reviewed the information learned in the previous modules.

**Rationale for Research Design**

A restricted time frame prohibited a randomized control group. The control group was meant to emulate a microcosm of the traditional population. Fluctuating numbers of participants from which to recruit hinders optimal structuring of methodology. In addition, logistical restraints given funding mechanism prohibited extended time for recruitment contributing to a small sample size. The researchers evaluated whether or not this intervention improved compliance with cognitive therapy for those who initially did not comply. Comparisons were made to those who complied with traditional face to face cognitive therapy. Although matched
groups are not ideal given the baseline variability between the populations (initially compliant versus not initially compliant), the researchers acknowledge these limitations a priori. The desired purpose of this study was to test the efficacy of cognitive therapy and education using a telemedicine treatment for veterans with mild TBI in the convenience of their home or workplace. MOPS-VI for mild TBI might become the treatment of choice if shown to be as effective as or more effective than standard treatment. There was also a practical advantage to MOPS-VI; many individuals requiring therapeutic intervention are unable to take time off from work and time out of family functions to receive treatment in a hospital or clinic.
Chapter 3

Methods

Procedures

Potential subjects for this Phase I study reviewed and signed the informed consent approved by the Institutional Review Board before beginning the study. The overall study (henceforth called the MOPS-VI Comparison study) was a matched subject pre/post design comparing test data collected from 6 veterans who participated in a specialized MOPS-V intervention for TBI (pre and post treatment) vs. test data from 6 veterans who participated in standard treatment for TBI (pre and post treatment). The treatment intervention was not intended to meet the patients’ need for psychotherapy. Behavioral issues targeted were related to pragmatics or social communication and were within the scope and practice for licensed Speech-Language Pathologists. For both MOPS-VI and control groups, intervention followed a conventional approach in that it had dual foci: (1) education about TBI and PTSD with the aim of improving knowledge about the conditions, and (2) therapeutic cognitive intervention focused on memory, attention and concentration. It is conventionally assumed that improved understanding of TBI and PTSD will improve executive function skills. The conventional treatment model involves face-to-face interaction between the clinician and the patient; this was the approach followed for the standard treatment control group. The MOPS-VI portion of the study was designed to deliver the conventional treatment content online.
Figure 1. MOPS-VI Design Flow Chart
Power Calculations and Statistical Analyses

Sample Size: A repeated measures t-test comparing pre/post pilot data showed significant improvement on the TOMAL-2nd Edition for all verbal subtests (Word Selective Reminding, Object and Paired Recall) ($p<.05$) with a large effect size (Cohen's $d$ greater than $0.5$). The pilot study was conducted with 8 participants. Based on the pilot study, a power analysis for sample size was conducted a priori to determine how many participants would be necessary for treatment groups in the MOPS-VI study. The analysis was conducted using G*Power, a statistical software package designed to perform high-precision power analyses for the most common statistical tests in behavioral research (Faul, Erdfelder, Lang, & Buchner, 2007). Results suggested an $n=12$ per group (MOPS-VI treatment group and standard treatment control group) would achieve adequate power ($\geq 0.50$) for this study. The research team acknowledged a priori the potential for insufficient power with an $n=12$.

Participants

The MOPS-VI group was obtained from the three (3) Cincinnati VA TBI clinics. Participants included patients who were referred for speech therapy and either (1) never came to the initial speech therapy session for a baseline interview, (2) came for an initial speech therapy session and did not return for follow up or, (3) came for less than 2 sessions and did not continue in treatment. Initial contact was made by letter offering participation in the MOPS-VI program. A postage paid card was sent with the letter containing a response box for the participant to indicate if they were or were not interested in participating in the MOPS-VI study. A follow-up phone call was made by a member of the research team to potential participants who had not yet responded.
**Inclusion Criteria MOPS-VI**

1. Age twenty to forty-three at the time of treatment
2. Complaints of memory, attention and or concentration deficits on a subjective self-report section of the neurobehavioral symptom inventory (NSI), defined as self-selecting scores in the range of 2-4 (indicating moderate to severe impairment per participant report) on items 15 m, n, o, and p on the NSI (see Appendix A).
3. English as the primary language spoken in the home.

**Inclusion Criteria for the Standard Treatment Control Group obtained through retrospective chart review**

This group included all OEF/OIF veterans whose medical records indicated the following:

2. Age twenty to forty-three at the time of treatment
3. Complaints of memory, attention and or concentration deficits on a subjective self-report section of the neurobehavioral symptom inventory (NSI), defined as endorsement of scores of 2-4 (indicating moderate to severe impairment per participant report) on items 15 m, n, o, and p on the NSI (see Appendix A)
4. English as the primary language spoken in the home
Criteria for Selection of Matched Subjects from the chart review

   a. Participants were matched according to their scores on the Composite Memory Index (+/- 10) at the start of therapy. The Composite Memory Index consists of eight core subtests: (1) memory for stories, (2) facial memory, (3) word selective reminding, (4) abstract visual memory, (5) object recall, (6) visual sequential memory, (7) paired recall and (8) memory for location.
   b. Participants were also matched in pairs on age (+/- 3 years), marital status (married/partnered), and years of education (+/- 2 years)

Exclusion Criteria for Both Groups

1. Active treatment for substance abuse including but not limited to drugs and alcohol.
   (Persons receiving treatment in the smoking cessation clinic were not excluded.)
2. Participation in the pilot study.
3. History of neurologic diseases preceding the head trauma.
4. Psychiatric history prior to the head injury.

MOPS-VI Participants

Nine participants were recruited from Cincinnati Veterans Affairs Medical Center Speech Traumatic Brain Injury Clinics. We were not able to recruit the full set of 12 due to funding restrictions. Of the 9 original participants, six (6) completed the intervention. Two (2) participated in pre-intervention testing but did not complete the treatment, and one signed the informed consent and was unable to reached for testing/treatment.
Results from these six (6) participants were thus the main focus of the study. The six (6) MOPS-VI participants ranged in age from 23 to 38 years with a mean of 30.17 years. The PPVT was administered pre-intervention to obtain verbal intelligence scores in the absence of pre-injury IQ. PPVT scores indicated verbal IQ was intact with a mean standard score of 108. Pre-intervention PPVT standard scores ranged from 90 to 122. There were no significant differences between the groups on any of these variables indicating that the matching procedure was successful. The MOPS-VI group were recruited from a database of veterans initially non-adherent with speech therapy for cognitive rehabilitation. The control group, age 24 to 41 with a mean of 30.67, was obtained from veterans previously seen and discharged from traditional face-to-face speech therapy for cognitive rehabilitation. Treatment and control groups were matched on age within +/- 3 years, gender and commitment status (partnered, divorced or single). Table 1 shows group demographic data.

*Table 1. Descriptive Statistics for MOPS-VI and Control Group*

<table>
<thead>
<tr>
<th></th>
<th>Treatment Group (n=6)</th>
<th>Control Group (n=6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Age in Years</td>
<td>30.17</td>
<td>5.27</td>
</tr>
<tr>
<td>Months in Treatment</td>
<td>3.83</td>
<td>0.98</td>
</tr>
<tr>
<td>Years of Education</td>
<td>14</td>
<td>1.67</td>
</tr>
</tbody>
</table>

Of the six MOPS-VI participants, two were actively engaged in Post Traumatic Stress Disorder (PTSD) treatment. Three had previous PTSD intervention. All six were combat veterans. Four MOPS-VI participants were employed full-time, one was employed part-time and one was
unemployed. All six veterans in the MOPS-VI group had children. Two participants had one child under the age of 2 and two veterans had two children each under the age of 4. The remaining two veterans had multiple children; one had five children ranging from 3 to 12 years of age and the other had four children ranging in age from 8 to 15. Five of the six (6) control group veterans had been in combat, and four (4) had received PTSD treatment.

**Outcome Measures**

MOPS-VI participants came to the Cincinnati Veteran’s Medical Center (CVAMC) Speech-Language Pathology Department for preliminary testing. The test battery included (1) the Peabody Picture Vocabulary Test (PPVT: Dunn & Dunn, 1997) as a measure of Verbal IQ, (2) a questionnaire designed to document pre-intervention knowledge concerning TBI, (2) the State Trait Anxiety Inventory (STAI: Spielberg, 2010) a self-report of anxiety, (3) the Center of Epidemiologic Studies Depression Scale (CES-D: Radloff, 1977), (4) the Behavior Rating Inventory of Executive Function–Adult Version (BRIEF-A: Roth, Isquith and Gioia, 2005), (5) the Test of Everyday Attention (TEA: Robertson, Ward, Ridgeway and Nimmo-Smith, 1994) and (6) the Test of Memory and Learning-2nd Edition (TOMAL-2nd Edition: Reynolds & Voress, 2007). In addition, the participants were interviewed to determine highest level of education, number of combat tours, and marital status. All of the proposed measures are widely used and have acceptable reliability and validity. An overview of the assessment tests is included in Appendix D.

At follow-up, all of the baseline measures were re-administered. Additionally, ease of access and module use was discussed following the first Video Conferencing interaction. Following completion of all modules, participants were asked to come back to CVAMC Speech-Language Pathology department for follow up assessments.
MOPS-VI Intervention

This intervention was intended to be in lieu of traditional on-site face-to-face therapy. During pre-intervention assessments, participants were issued a video conference phone and instructed how to use it. Prior to initiation of the intervention, the participant was required to develop his own username and password to log into the intervention. The participant was then asked to demonstrate the ability to log onto the server and access the treatment modules.

Sessions

This intervention focused on training metacognitive strategies rather than improving executive dysfunction through drill practices. The content and graphics of six (6) selected sessions of the 16-session TOPS (Wade et al. 2004) program were modified to be age- and issue-appropriate for the veteran population. The intervention content and framework were modified to address executive functioning and related skills such as attention, memory, and concentration from a speech therapy standpoint. The MOPS-V intervention consisted of six (6) sessions, each lasting approximately 60 minutes.

The homepage featured a log-in requiring a standard username and password. By clicking on a “Start Sessions” button, participants could access the self-guided content from current and previous sessions. The six (6) sessions provided problem solving, communication, and social skills training. The content was designed to target executive function and social skills that are essential for successful adult functioning. Specific modules included information on language pragmatics, nonverbal communication, compensatory memory strategies, PTSD, anger management and social problem-solving. Each self-guided online web session included individuals with TBI talking about how their injuries affected them; didactic content regarding the skill (i.e., problem-solving), video clips modeling the skill, and exercises that provided the
participant with opportunities for practice. The video clips were veteran interviews that described problem situations that required problem solving and executive function skills such as self-regulation and memory strategies.

*Table 2. MOPS-VI Module Content*

<table>
<thead>
<tr>
<th>Session Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Getting Started</td>
</tr>
<tr>
<td>2</td>
<td>Staying Positive</td>
</tr>
<tr>
<td>3</td>
<td>Getting Organized</td>
</tr>
<tr>
<td>4</td>
<td>Staying in Control</td>
</tr>
<tr>
<td>5</td>
<td>Controlling Your Behavior</td>
</tr>
<tr>
<td>6</td>
<td>Planning for the Future</td>
</tr>
</tbody>
</table>

The initial session titled "Getting Started" describes the purpose for the intervention and provides the participant with general information about TBI. Module number two (2) "Staying Positive" highlighted common concerns and problems that veterans may face following a brain injury and provided strategies to improve attitude, work towards a solution and communicate with others. The third (3) session titled "Getting Organized" focused on organizational strategies to reduce extraneous stress and minimize problems at work, home or school. Specific strategies to improve attention and memory were discussed. The fourth (4) session, "Staying in Control" outlined ways to control emotions and behavior. Topics discussed included education regarding the identification and management of post-traumatic stress disorder. The content focused on planning for success using a self-monitoring mnemonic, SMART (Stop Monitor Appraise Reflect Try). Session five (5) "Controlling your Behavior", placed emphasis on the participant
monitoring and changing his or her behavior. The final session (6) provides a review of content learned.

Figure 2. Screen shot of Session 2, Staying Positive
Following all sessions, participations were required to answer a mini-quiz to assure comprehension and retention of information. Please see treatment manuals for further detail regarding the intervention in Appendix C.

MOPS-VI participants were issued a TeleVyou 500SP videophone for use during simulated face-to-face therapy and were required to sign a waiver agreeing to return the videophone upon completion of the study. A Skype like alternative would have been the preferred method of simulated face-to-face therapy; however VA regulations prohibited the use of Skype or anything similar. The authors acknowledged the videophones as an inferior technology to what was commercially available at the time. Figure 1 shows the equipment used in the treatment group. The TeleVyou 500SP utilizes POTS (plain old telephone service) and has been VA- approved for encryption purposes. All treatment group participants were trained on how to plug the standard telephone wire into the videophone in addition to making simulated videophone calls while in the presence of the PI to ensure sufficient participation usability. All
videophone contact with treatment participants was therapist-generated at a pre-determined time. The use of telephone technology has the advantage of familiarity within the veteran population.

Figure 4. Picture of videoconference phone used in MOPS-VI

Following independent completion of the on-line modules subjects had a pre-determined appointment set with the treating therapist. The face-to-face video conferencing sessions reinforced the content learned in the previously completed module. The treating clinician followed a treatment manual during each follow-up session to ensure fidelity. Examples of content reinforced included generalization of internal vs. external memory strategies and how the veteran may utilize these in his everyday life. The treatment manual specified the content for each session including time allocated at the beginning for the participant to ask questions and rapport building. Reference Appendix C for complete details.

Standard Treatment Group

The MOPS-VI treatment involved standardized on-line provision of information contained in modules thus ensuring greater standardization of when and where elements were introduced than is typical in conventional face-to-face treatment. For the purposes of this intervention, a standard treatment manual was developed that represents standard clinical face-to-face practice in the TBI Speech Pathology Clinic. The manual was reviewed by the remaining
2 Cincinnati VA SLP's who conduct cognitive therapy with veterans with TBI to ensure that all elements of standard therapy protocol were included. The treatment manual can be found in Appendix B. Treatment was slightly more individualized than described in the actual sessions but followed the general outline of the manual. Weekly or bi-weekly speech therapy sessions typically included the following therapeutic topics: (1) knowledge about TBI, (2) knowledge about post-traumatic stress disorder as it pertains to TBI, (3) memory changes following TBI and strategies to improve memory including information about types of encoding, (4) attention difficulties following TBI and training in methods to improve attention skills, (5) pragmatic skills and the ability to self-monitor, (6) communication skills and strategies to improve, (7) strategies for improving concentration and methods for success in the work/school environment.

**Timeline**

The anticipated timeline for the intervention group was no more 8 weeks. There were 6 modules total and each module took approximately sixty minutes to complete. Participants were asked to view one module per week for 6 weeks with follow-up by the PI weekly via videoconference phone and a reminder follow-up call to complete the modules if indicated. The remaining 2 weeks were for post intervention assessments and additional time needed for possible unaccounted life event, i.e. death, vacation. Time to complete the intervention varied between participants (between 3 and 5 months with an average of 3.8 months).
Chapter 4

Results

Specific Aims

An overarching aim of this study was to determine if computer-based therapy support in the form of the Military On-Line Problem Solving Videophone Intervention (MOPS-VI) is as effective as face to face therapy. As part of this aim, a set of computer-based therapy modules representative of best clinical practices were developed, videophones for the military were obtained, and a combined therapy program implemented.

Aim 1: To test the effects of MOPS-VI on patient compliance and satisfaction.

Compliance

Participants in the current study were selected from a group of veterans initially non-compliant with cognitive rehabilitative services. Non-compliance was defined by the following criteria: 1) failure to schedule a follow-up appointment after referral for cognitive rehabilitation therapy; or, 2) failure to attend more than two therapy sessions. It was hypothesized that this therapeutic approach would increase compliance because of decreased travel time and increased scheduling convenience.

One-hundred recruitment letters were sent out to the non-adherent veterans, 16 sent the response card back indicating interest. Nine signed the informed consent; six completed the MOPS-VI intervention.

Among the veterans identified as non-compliant with speech therapy for cognitive rehabilitation services using these criteria, nine signed the informed consent; eight participated in pre-intervention testing; and six completed the intervention (67%). Participant 1 signed the informed consent and was unable to be contacted for baseline testing. Participant 4 was
diagnosed with cancer shortly after signing the informed consent and required consistent follow-up care at the main hospital. After careful discussion, this participant chose to begin face-to-face speech therapy for cognitive rehabilitation in conjunction with his other medical appointments. Participant 7 was unexpectedly deployed from the Army National Guard shortly after completing base-line testing and was unable to complete the intervention.

Of the six participants who completed the intervention, one participant re-scheduled his initial videophone session two times because he had not yet completed the self-guided module preceding the session and required two sessions for post-intervention testing. An additional participant called to re-schedule his third videophone session because of traffic. All other participants kept their originally scheduled appointments. Compliance data was unable to be gathered on control group participants due to the study design.

Satisfaction

Satisfaction was measured post treatment utilizing questionnaires and open ended questions. The veterans reported high satisfaction with the ease of access to the intervention and the idea behind receiving treatment at their convenience. Three distinct themes emerged from the qualitative data.

THEME 1: Access/Convenience

Post-intervention interview questions provided insight into the barriers faced by MOPS-VI participants and the reason for initial non-compliance for face-to-face treatment. Treatment barriers reported by videophone group participants included full-time employment, family commitments and distance from the medical center, especially given increasing gas prices. All six participants had one or more children and all reported working full-time. Two participants accessed the intervention at work, one of these two participants remained at work for the follow-
up videoconference call, often scheduling the call as soon as his shift ended or during his lunch break. Two participants scheduled their videoconference calls routinely at 7:00 am prior to the commencement of their tour of duties. One participant preferred Friday evenings at 5 pm because that is when he and his wife were both off work and his wife could watch their infant while he participated in treatment.

All six veterans reported satisfaction with the improvement in access to treatment. One veteran provided useful insight into how MOPS-VI compared to other experiences he has had with doctors or counselors about brain injury. One participant said the technology was "great because I didn't have to drive downtown".

Participant 6 reported:

I had to drive all the way to Cincinnati to wait an hour to see a doctor for fifteen minutes. With this (MOPS-VI) I could take as much time as I needed and then have time with the clinician (PI Riegler). I thought it was a much better use of my time, and it didn't cost me anything out of pocket except for the two trips (pre/post testing).

He further responded by saying:

This experience allowed you (the veteran) to work at your own pace and get it done. To get treatment at the VA you can't have a job. The VA does not want you to work and then when you can't make the appointments you get black balled. I get that it's critical to fill the slots but I can't remember when they (appointments) were and then I wouldn't be in town because I travel for work. My wife would call and say 'Did you know you have a VA appointment? You're (the VA) is making appointments I don't have a clue about.
THEME 2: Technology

Four participants made reference to the antiquated technology namely slow internet and videophone connectivity. Time delays were sometimes present when using the videoconference phones. Participants 6 and 8 were the only veterans who did not report dissatisfaction with the videoconference phones, computers or internet speed. Participant 8 discussed his affinity to the technology because it was simple and easy to use.

The remaining four participants discussed their frustration with the poor internet speed contributing to increased time in downloading the interviews and web-based materials. In addition, a time delay was often present during the synchronous videophone portion of treatment which frustrated a few of the participants. Poor video image quality decreased the intimacy of treatment for one of the participants; he often reported his image of the clinician as 'grainy'.

Theme 3: Content

All six veterans expressed general satisfaction with the project content. However, three discussed disliking the embedded interviews within MOPS-VI describing them as child-like or 'cheesy'. When asked what would make the intervention better, two veterans suggested updating the graphics and the color scheme to a neutral palate. Participant 5 was very satisfied with the content, showing the intervention to 58 military personnel in his Army National Guard unit. This veteran reported he particularly liked the educational content on PTSD and strategies to organize home and work environment.

Technical Difficulties

Technology itself can produce barriers during treatment. Throughout the intervention the PI kept detailed notes during each session. Following completion of treatment, the notes were reviewed. Some of the technical difficulties are outlined here. Multiple attempts were
sometimes required to connect. While the phone portion of the videophone call was often intact, obtaining the connection to visualize the remote participant was sometimes a problem. During the initial call for Participant 6, another call came through terminating the call requiring the therapist to reinitiate the call. Although not a true technical difficulty, one participant had to be reminded on a number of occasions to remove the cap that protected the camera so that he could be seen. For one treatment participant, the therapist was never able to see him during the videophone sessions; however he was able to visualize the therapist. All participants had to be reminded to fill out the session review questions following each module.

**Aim 2:** To test the effects of MOPS-VI relative to standard on a specific set of cognitive skills pre- and post-intervention.

The elements of cognition tested were those in the Core Subtests of the TOMAL-2nd and included: auditory processing and consolidation of verbal information; retrieval of information, visual recognition with verbal recall, associative learning, visual discrimination, visual processing and spatial memory. These subtests are considered to be acceptable measures of cognitive efficiency for memory. As noted in Chapter 3, these cognitive skills were not targeted through drill as part of the intervention but were predicted to improve as an indirect effect of the intervention which uses education and training on the use of problem solving and executive function strategies to improve metacognitive skills.

**Hypothesis 1:** Veterans who receive MOPS-VI will show greater improvement on TOMAL-2nd Edition measures of cognition in comparison to standard control group treatment provided by an SLP.

Treatment and control participants were matched on age and education level in years to control for variability noted in section IV. MOPS-VI pre-TOMAL 2nd Edition mean composite
memory scores ranged from 75 to 99 (m=86.67, SD =8.07). Post-TOMAL 2nd Edition mean scores for the MOPS-VI group ranged from 83 to 103 (m= 95.17, SD = 7.68). Standard control group treatment pre-intervention mean composite scores were slightly lower to begin with and ranged from 68 to 89 (m=80.83, SD=6.97), and post-intervention scores ranged from 77 to 107 (m=95.33, SD=10.31). Standardized test-retest reliability for composite memory index score for persons ranging in age from 19 to 59 averaged m=98 (SD=16) on the first trial, m=113 (SD=15) on the second trial with the testing interval ranging from 1 to 3 weeks (Reynolds & Voress, 2007). The mean composite index scores for both MOPS-VI and control group participants were below that of the standardized group. A difference of more than eleven (11) points for the MOPS-VI pre and eighteen (18) points post. Control group scores ranged from a difference of seventeen (17) points pre to eighteen (18) points post. Larger variability in test scores pre/post for the standardized group must be noted evidence by a larger standard deviation.

Results of a two way (pre vs. post assessments) × (standard vs. MOPS-VI) analysis of variance (ANOVA) indicated there was a significant pre-post assessment effect, F (1, 10) =50.38, p<.001, indicating that participants’ memory improved after treatment for both MOPS-VI and standard treatment groups. There was no significant interaction between treatment groups and pre-post assessment, F(1,10)=3.43, p=.09. The trend for an interaction between group and time is driven by the control group which had lower scores prior to treatment but ended up equivalent to the MOPS-VI group. Direct comparison of both therapy groups supported this finding. There was no significant difference between face-to-face therapy and MOPS-VI therapy (F (1, 10) =0.39, p=.55) suggesting that MOPS-VI therapy is as effective as standard treatment and therefore is a strong alternative for face-to-face treatment.
In addition, the partial eta squared results indicate the partial contribution of each of the factors. The change in TOMAL-2 scores from the pre to post-treatment contributed 0.83, which indicates a relatively strong effect of treatment on composite test scores regardless of whether the treatment was standard or MOPS-VI. Although both therapy groups experienced a positive change in TOMAL-2 test scores, the MOPS-VI group spent approximately six months less time in treatment (n=3.87) compared to the control group (traditional face to face treatment, n=9.33).

Figure 5. MOPS-VI vs. Control groups according to Pre/Post TOMAL-2 scores

Note. Pre-TOMAL 2nd= Pre-Intervention Test of Memory and Learning 2nd Edition Composite Memory Index Score, Post-TOMAL= Post-Intervention Test of Memory and Learning 2nd Edition Composite Memory Index Score. An increase in test scores indicates improvement.
Table 3. Analysis of Variance of Pre-Treatment and Post-Treatment Scores (composite TOMAL2nd) for two Groups (MOPS-VI and Standard Treatment)

<table>
<thead>
<tr>
<th></th>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>Partial Eta Squared</th>
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</thead>
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<tr>
<td>Test of Between-Subjects Effects</td>
<td>Treatment Groups</td>
<td>48.17</td>
<td>1</td>
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<td>0.39</td>
<td>0.55</td>
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<td></td>
<td>Error</td>
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<td>10</td>
<td>123.68</td>
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<tr>
<td>Test of Within-Subjects Effects</td>
<td>Pre vs. Post</td>
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<td>793.5</td>
<td>50.38</td>
<td>&lt;.000</td>
<td>0.83</td>
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<tr>
<td></td>
<td>Pre vs. Post Treatment Groups</td>
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<td>54</td>
<td>3.43</td>
<td>0.09</td>
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<td></td>
<td>Error</td>
<td>157.50</td>
<td>10</td>
<td>15.75</td>
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</table>

Aim 3: To test the relationship between months spent in therapy and cognitive improvement in MOPS-VI vs. standard treatment group.

Hypothesis 2: Veterans with the greatest number of months spent in therapy will have significant improvement in cognitive test scores (pre/post TOMAL-2nd) compared to those with fewer hours and number of sessions spent in therapy.

Time in treatment (months) was included in the analysis of covariance (ANCOVA) for examining changes in memory as indicated by a standard test. There was a significant difference in participants’ pre vs. post memory scores (i.e., the time effect), F (1, 9) =10.30, p=.01, suggesting that memory scores improved after treatment for all participants. The effect of time in treatment was not significant, F (1, 9) =0.02, p=.89 indicating that veterans in the standard treatment, who spent more time in treatment than individuals in the MOPS-VI, showed similar results. There was no interaction between treatment group and pre-post assessments F (1, 9) =2.73, p=.13. There was no interaction between time in treatment and pre-post assessments, F (1, 9) =0.28, p=.61. After controlling for the differences in time in treatment, there was no difference in memory scores between the MOPS-VI and regular treatment groups, F(1,9)=0.11,
p=.75, suggesting that the MOPS-VI therapy yields similar results as standard therapy even when the MOPS-VI is operational for a shorter duration.

**Table 4.** Two-way Analysis of Variance of Pre-Treatment and Post-Treatment Scores (composite TOMAL2nd) for two Groups (MOPS-VI and Standard Treatment)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test of Between-Subjects Effects</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Treatment Groups</td>
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<td>15.13</td>
<td>0.11</td>
<td>0.75</td>
<td>0.01</td>
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<td>2.58</td>
<td>0.02</td>
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<td>0.00</td>
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<tr>
<td>Error</td>
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<td>9</td>
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<tr>
<td><strong>Test of Within-Subjects Effects</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre vs. Post</td>
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<td>174.80</td>
<td>10.30</td>
<td>0.01</td>
<td>0.53</td>
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<td>Pre vs. Post *Treatment Groups</td>
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<tr>
<td>Pre vs. Post *Time in Treatment</td>
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<td>4.74</td>
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<td>Error</td>
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<td>9</td>
<td>16.97</td>
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</table>

**Aim 4:** To test pre and post scores on assessments of depression and anxiety for MOPS-VI

*Hypothesis 3:* Veterans who receive MOPS-VI will report a decrease in depression and anxiety post intervention as measured by STAI and CES-D.

The CES-D scale is a patient-report scale designed to measure depressive symptoms and behaviors within the last week in the general population. *Figure 6.* MOPS-VI pre intervention scores averaged (m = 21.17) indicative of mild depression (Zich et al. 1990, Ensel 1986). Post-treatment scores remained in the mild depression range but there was a slight, and non-significant, decrease in participant report of depressive symptoms (m= 20.17). Treatment participants rated their depressive symptoms on average 1.67 points lower post-intervention compared to pre-intervention.

STAI measures two different types of anxiety, the temporary condition of “state anxiety” (STAI1) and the more general and long-standing quality of “trait anxiety” (STAI2). Although
not statistically significant, post-intervention testing revealed a decrease in both state anxiety (m=3.5) and trait anxiety (m=2.8) scores providing support to the hypotheses that veterans who received MOPS-VI will report a decrease anxiety post intervention as measured by the State Trait Anxiety Inventory (STAI). Three participants dropped at least 3 points in their State (STAI Y-1) anxiety post-intervention; and 4 participants showed a decrease in Trait anxiety post-treatment by 4 points or more. See Figure 6. Compared to the normative sample of military recruits for state anxiety (m=44.05) the MOPS-VI participants reported a lower mean score of (m=38.17) both pre (m=34.67) post-intervention. Normative trait anxiety for military recruits (m=33.86) was lower than that reported in the MOPS-VI group both before (m= 44.5) and after (m= 41.67) treatment. Normative data based on age for this intervention crossed two age categories (ages 19-39 and 40-49) making comparisons more difficult. When comparing the normative sample based on age ranging from 19 to 39 (m=36.54) for state and (m=35.55) for trait to the MOPS-VI participants, results showed higher levels of anxiety overall in the MOPS-VI group.

![Figure 6. Pre/Post CES-D and STAI Scores](image)

Note. STAI-1=State Anxiety Inventory, STAI-2=Trait Anxiety Inventory, CES-D= Center for Epidemiological Studies Depression Scale. A reduction in test scores indicates improvement in the above assessments.

*Figure 6. Pre/Post CES-D and STAI Scores*
Aim 5: To test improvements in measures of executive function from pre to post intervention for MOPS-VI.

Hypothesis 4: Veterans who receive MOPS-VI will have significant improvements from pre to post intervention on the Behavior Rating Inventory of Executive Function-Adult Version BRIEF-A, TEA and TOMAL-2nd Edition, STAI, CES-D and PPVT.

BRIEF-A pre/post composite index scores provided useful insight into MOPS-VI participants self-report of executive dysfunction. Mean T scores indicate clinical significance across composite indices T > 65 (behavioral regulation, metacognition and global executive) (Roth et. al 2005). For this assessment, higher scores indicate greater degrees of executive dysfunction. On average, MOPS-VI participants reported executive dysfunction two standard deviations above the normative sample based on age.

Table 5. Paired Samples Statistics BRIEF-A

<table>
<thead>
<tr>
<th>Pair</th>
<th>Pre BRIEF-A (BRI)</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
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<tbody>
<tr>
<td></td>
<td>Mean T</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pair 1</td>
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<td>11.95</td>
<td>4.88</td>
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<tr>
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<td>66.83</td>
<td>6</td>
<td>12.53</td>
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</tr>
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<td>Pair 2</td>
<td>73.50</td>
<td>6</td>
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<tr>
<td>POST</td>
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<td>6</td>
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<td>POST</td>
<td>71.33</td>
<td>6</td>
<td>13.87</td>
<td>5.66</td>
</tr>
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</table>

Note: BRI= Behavioral Rating Index represents the adults ability to maintain appropriate regulatory control and emotional response; MI=Metacognition Index represents the adults ability to systematically solve problems utilizing planning/organization while sustaining task completion efforts in active working memory; GEC=Global Executive Composite is a summary score that incorporates all clinical scales of the BRIEF-A.

TEA results were consistent with test-retest reliability based on age. Seven (7) of the eight (8) subtests were administered. MOPS-VI participants displayed average improvement on three (3) of the seven (7) subtests (map search, visual elevator, telephone search while counting), a decline in two (2) subtests (elevator counting with distraction, elevator counting with reversal) and no change on two (2) (telephone search and elevator counting).
There was no statistically significant improvement across executive function measures for the MOPS-VI group. Although there was no statistically significant improvement in pre/post outcome measures for the remaining assessments, *Figure 7* highlights the positive effects of the intervention as evidence by improved scores across all measures.
Note: BRI= Behavioral Rating Index represents the adults ability to maintain appropriate regulatory control and emotional response; MI=Metacognition Index represents the adults ability to systematically solve problems utilizing planning/organization while sustaining task completion efforts in active working memory; GEC=Global Executive Composite is a summary score that incorporates all clinical scales of the BRIEF-A. STAI-1=State Anxiety Inventory, STAI-2=Trait Anxiety Inventory, CES-D= Center for Epidemiological Studies
Participant Data

The following graphs depict each MOPS-VI participant's pre/post outcome measures. The +/- indicate the direction of improvement. For example, for the CES-D, a decrease in score (-) indicates a reduction in veteran report of depressive symptoms, thus an overall improvement in wellbeing. For the TBI knowledge, an increase in score reveals improved knowledge as it pertained to TBI. Participants are grouped based on their post intervention scores. Some participants clearly demonstrated an improvement in scores from pre to post intervention. Among those who had mixed results, some showed improvement, some decline, and some showed no change.

**Demonstrated Improvement (Improvement in 7 out of 8 subtests)**

The direction of the predicted improvement for a particular test (e.g. increased understanding of TBI, or fewer reports of depression) is indicated as (+) or (-).

![Graph showing pre/post comparisons for MOPS-VI across all measures](image)

Note. TBI=TBI Knowledge Questionnaire, STAI-1=State Anxiety Inventory, STAI-2=Trait Anxiety Inventory, CES-D= Center for Epidemiological Studies Depression Scale, BRI=Behavioral Rating Inventory (BRIEF-A), MI=Metacognition Index (BRIEF-A), GEC=Global Executive Composite (BRIEF-A)

**Figure 7. Pre/Post Comparisons for MOPS-VI across all measures**

**Figure 8. Treatment Participant 8**

Participant 8 demonstrated an improvement post-intervention for all subtests with the exception of a 2 point decrease in the TBI knowledge questionnaire.
The direction of the predicted improvement for a particular test (e.g. increased understanding of TBI, or fewer reports of depression) is indicated as (+) or (-).

Figure 9. Treatment Participant 5

Participant five demonstrated an improvement across measures with the exception of an increase in his self-report of metacognitive dysfunction.

The direction of the predicted improvement for a particular test (e.g. increased understanding of TBI, or fewer reports of depression) is indicated as (+) or (-).

Figure 10. Treatment Participant 9
Participant 9 showed a 3 point increase post treatment for state anxiety. Generalized improvement noted otherwise.

**Demonstrated mixed performance (Improvement in 5 out of 8 subtests)**

The direction of the predicted improvement for a particular test (e.g. increased understanding of TBI, or fewer reports of depression) is indicated as (+) or (-).

![Bar graph showing pre and post treatment data for various measures](image)

Note. TBI=TBI Knowledge Questionnaire, STAI-1=State Anxiety Inventory, STAI-2=Trait Anxiety Inventory, CES-D= Center for Epidemiological Studies Depression Scale, BRI=Behavioral Rating Inventory (BRIEF-A), MI=Metacognition Index (BRIEF-A), GEC=Global Executive Composite (BRIEF-A)

**Figure 11.** Treatment Participant 2 Data

Participant 2 showed improvement across all measures with the exception of a one point decrease post intervention for the TBI knowledge and a four point increase in BRIEF-A scores post treatment.
The direction of the predicted improvement for a particular test (e.g. increased understanding of TBI, or fewer reports of depression) is indicated as (+) or (-).

![Graph showing improvement in TBI Knowledge Questionnaire, State Anxiety Inventory, Trait Anxiety Inventory, Center for Epidemiological Studies Depression Scale, Behavioral Rating Inventory (BRIEF-A), Metacognition Index (BRIEF-A), and Global Executive Composite (BRIEF-A).]

**Figure 12. Treatment Participant 6 Data**

Participant 6 had the same number of correct responses post treatment on his TBI knowledge. In addition, a two point increase was observed on his measure of depression and a slight increase in his self-report of anxiety. There was marked improvement on the BRIEF-A MI (22 point decrease from pre to post).
Demonstrated a worsening in performance on test scores post treatment (Decrease in 7 out of 8 scores)

The direction of the predicted improvement for a particular test (e.g. increased understanding of TBI, or fewer reports of depression) is indicated as (+) or (-).

![Graph showing pre and post scores](image)

Note. TBI=TBI Knowledge Questionnaire, STAI-1=State Anxiety Inventory, STAI-2=Trait Anxiety Inventory, CES-D= Center for Epidemiological Studies Depression Scale, BRI=Behavioral Rating Inventory (BRIEF-A), MI=Metacognition Index (BRIEF-A), GEC=Global Executive Composite (BRIEF-A)

**Figure 13.** Treatment Participant 3

Participant 3 was the only participant to show a worsening post treatment in all measures of depression, anxiety and executive dysfunction. This participant demonstrated a one point increase on TBI knowledge and an 11 point increase in composite memory index score. The increase in memory and knowledge score demonstrates that persons with active mental health issues can participate in cognitive rehabilitation services and show improvement.

**Secondary Analyses**

It was hypothesized that Veterans who were closer to age 40, with the least number of combat tours with longer time since their final tour, higher educational level, higher verbal IQ and who were married will have higher post intervention outcomes compared to veterans who were closer to age 20, with greater number of combat tours, lower educational level and who were separated, divorced or single. The smaller sample size did not allow for a regression
analysis as planned. Even if there was a significant correlation between age and treatment outcome, detection would not be likely given the small sample size.
Chapter 5

Discussion

The present study reports Phase I of a larger innovative web-based videophone treatment intervention designed to increase understanding of traumatic brain injury and elicit problem solving skills for attention and memory impairment following mild TBI in returning veterans. The MOPS-VI intervention did result in an improved composite memory score on the TOMAL when pre and post intervention scores were compared. In contrast to the original hypothesis (that MOPS-VI might be more effective than traditional therapy), the MOPS-VI intervention and standard therapy produced similar results. However, the MOPS-VI intervention may be potentially more advantageous than standard therapy given that similar results were obtained in a shorter time period. In short, MOPS-VI improved access to care. Overall, these Phase I results support the feasibility of the approach and provide evidence of efficacy, defined as increased compliance and improvements in memory skills comparable to face-to-face treatment.

Compliance

Lack of adherence to treatment is a serious issue for veterans. Before this study commenced, statistics compiled by the Cincinnati VA Speech Pathology department showed that approximately 17% of veterans from October 1, 2009 to April 30, 2010 failed to show up for their initial session in the standard face-to-face therapy process. This means that only 83% even began the treatment process. Further, the data showed that after two face-to-face sessions, an additional 19% dropped out. Thus, only 64% of veterans eventually completed their treatment under the standard face-to-face model. Because the MOPS-V intervention was designed to improve the rate of adherence (and thereby access to care), MOPS-VI participants were recruited from the 36% of veteran's non-adherent to standard face-to-face treatment.
Overall, MOPS-VI participants were adherent to the telehealth model used in this intervention. One patient in particular stood out because although he fits the definition of a non-compliant patient, he required eight (8) scheduled appointments to complete the six (6) scheduled modules. This veteran was the only veteran requiring multiple telephone reminders to complete the modules. On two different occasions, the veteran was present for the videophone portion of the treatment but had not completed the modules prior requiring the PI to re-schedule his appointment. In addition, he required two sessions for post-intervention testing. Perhaps not coincidentally, this veteran had five (5) children under the age of twelve.

One of the most important findings of the study was the increased rate of compliance with treatment in the MOPS-VI group compared to the data available for traditional standard face-to-face treatment. As indicated above, 64% of the patients using face-to-face therapy completed treatment, and the MOPS-VI participants were recruited from the 36% of veterans who dropped out. These numbers suggest that of 100 randomly chosen patients, 64 would complete treatment if offered standard face-to-face therapy, and 36 would drop out. Of the MOPS-VI participants recruited for this study, 9 were consented, and 6 completed the treatment, for a rate of two-thirds, or 66% percent compliance to videophone treatment. If we assume that this videophone compliance rate will generalize to a larger population, in a random sample of 100 patients, 36 would abandon face-to-face therapy but 27 (two-thirds, or 66%) of them would complete treatment if offered MOPS-VI. This suggests that a combination of face-to-face standard therapy and MOPS-VI can achieve a 94% compliance rate, with no diminution in the quality of results. This would be a major advance in the effort to maximize these veterans’ ability to transition to normal lives.
Patients in VA Hospitals are typically assigned to face-to-face therapy at their geographically closest VA Hospital. This is a particular problem for those veterans who live at greater distances from the locus of treatment. One possible explanation for why some patients are not compliant with the standard therapy, yet show compliance when offered the MOPS-VI intervention, is that these are the patients who live the furthest from the Cincinnati VA Hospital Medical Center. Figure 14 provides evidence that those initially compliant with standard face-to-face treatment (standard control group participants) lived in closer geographical approximation to the medical center when compared to the MOPS-VI participants.

Note: Red = control group; Blue = Research

Figure 14. Map of Videophone versus Control Group
Generally, the improved compliance results of the MOPS-VI intervention suggest that persons with mild traumatic brain injury and memory impairment find it more satisfactory than face-to-face standard care, at least given the patients’ life circumstances. In the Phase I MOPS-VI study, data on patient satisfaction was collected for the treatment patient group but not for the control group. As noted above, the survey showed that patients expressed a high level of satisfaction with the theme of on-line cognitive rehabilitation and follow-up videophone conferencing. Although the studies are not analogous, because satisfaction data was collected only on the treatment group, these results are similar to those of Bergquist et al. (2010), who reported no significant difference between conditions (control and treatment) in the level of participant reported satisfaction concerning the therapist and the therapy received.

Qualitative review of the results yielded 3 distinct themes: (1) participant satisfaction with improved access to care at the veteran’s convenience, (2) satisfaction with the treatment modality but dissatisfied with the antiquated technology, (3) satisfaction with content but dissatisfaction with interviews and graphics. The theme of positive response to flexibility and access are consistent with results from Egan et al.'s (2004) study. His group aimed to reduce training barriers for brain injured patients with cognitive-linguistic deficits. Egan et al. (2004) allowed the clinicians delivering the training to be flexible. Clinicians were instructed to schedule convenient times and to tailor the length of therapy sessions to best fit the participants. Similarly, the MOPS-VI program design adhered to the same guidelines outlined in Eagan et al.'s (2004) study by providing flexibility to increase motivation and compliance to the intervention.

Sixty-seven (67) percent of MOPS-VI participants reported dissatisfaction with the videoconference phones. The same videoconference phones were used three (3) years
previously in the Tindall et al. (2008) LSVT study. Unlike participants in the Tindal et al. study, who reported average to very strong agreement on all items measuring satisfaction with the mode of treatment including the videophones, MOPS-VI participants were generally dissatisfied with the videophones. Their major reasons for dissatisfaction included poor connection, time delays and pixilated images. Reasons for differing levels of satisfaction are presumably due to the advances made in technology from 2008 to 2011. Videophones were the cutting edge method of technology in 2008. For participants in the MOPS-VI intervention, familiarity with technological advances such as Skype was the norm. As noted above, government information security regulations precluded the use of public-access, Skype-like methods to conduct treatment. Discrepancies between what the participants were familiar with (Skype) and what was VA-approved for treatment (videophones) could have contributed to overall participant dissatisfaction with the videoconference phones.

**Outcome Scores**

**Cognitive Testing**

As noted in the Results section above, three (3) out of six (6) MOPS-VI participants demonstrated an overall improvement in cognitive skill test scores post-intervention. Three of these participants improved in seven (7) of the eight (8) subtests. Two of the six MOPS-VI participants improved on five (5) of the eight (8) subtests. Participant 3 was the only veteran to show a decrease in test performance from pre- to post treatment on measures of depression, anxiety and executive dysfunction. This decrease was larger than measurement error for all the tests, and thus is suggestive of an increase in impairment. A review of the notes taken by the PI during the videophone sessions suggested increasing marital conflict throughout the MOPS-V intervention. An increase in depression, anxiety and executive dysfunction was presumably due
to the increasing conflicts at home. This participant demonstrated an increase in composite memory scores indicating that he was able to independently implement the strategies learned in the intervention. It should be noted that this is the same participant described above as showing a level of compliance relative to the other participants that is particularly problematic for treatment. It is possible that the MOPS-VI treatment was not optimal for this particular patient. However, since he was recruited out of the group of patients who did not sustain compliance with face-to-face therapy, it is worth noting that a home-based intervention utilizing telehealth was more successful in improving his compliance with treatment. Additionally, he did show improved memory scores.

Post-intervention scores on the TEA were poorer than anticipated. Pre/post TEA comparisons between the pilot and MOPS-VI participants were not possible due to testing error in the pilot study. MOPS-VI participants demonstrated improvement on three (3) of the seven (7) subtests. Attentional domains targeted in the subtests where progress was made include: sustained, selective and alternating attention. Auditory-verbal working memory was targeted in the two (2) subtests where a decrease from pre to post-intervention was observed. MOPS-VI focused on educating the participant about the attentional domains and providing strategies for improvement.

Results of the MOPS-VI intervention are consistent with the findings of Cicerone et al. (2000) who reported that cognitive therapies directed at multiple domains of impairment can significantly improve neuropsychological performance in particular skill areas (e.g. attention, memory, problem solving). Both the standard treatment group and the MOPS-VI participants’ composite memory scores improved post-treatment. There was no significant difference in composite memory scores on the TOMAL-2nd Edition between the standard treatment control
group and MOPS-VI participants, suggesting that MOPS-VI intervention is as effective as standard treatment and therefore is a strong alternative for face-to-face treatment.

Self-Rating Instruments

On average, the MOPS-VI participants rated themselves before intervention as having executive dysfunction at two standard deviations greater the normative mean. This self-estimate did not change after intervention. Self-Rating scores improved overall on the post-intervention Behavioral Regulation Index (BRI) and on the Metacognition Index (MI), with everyone except Participant 3 reporting some improvement. Metacognition Index scores improved more post-intervention than the BRI perhaps because the MOPS-VI intervention targeted metacognitive skills to a greater extent than emotion regulation.

Depression/Anxiety

While the decrease in participant report of depressive symptoms was not statistically significant, the results do suggest that the intervention yielded a reduction in depressive symptoms for the majority of participants. However, without a control group the decrease in depressive symptoms could be regression to the mean. As stated above, MOPS-VI may have targeted training in metacognitive strategies to a greater extent than it did on strategies to improve emotional regulation.

Therapist Perspective

Having the chance to visualize a participant in his home/work environment afforded the therapist an opportunity to assist the veteran in generalizing strategies learned in treatment. Two of the six participants had their children with them during the intervention on two separate occasions. Without a home cognitive rehabilitation program, these two veterans would not have been able to receive treatment given child care barriers. On the four occasions where children
were present during treatment, the veterans provided the children with toys or in one instance his car keys to keep the children occupied while the participant continued treatment with the therapist. As a therapist, observing an individual in their home environment provides an intimate perspective into their life not only as a patient, but as a parent. The level of participant comfort observed by the therapist would be impossible to emulate in a clinic setting. It could be argued that progress in treatment was heightened because of the rapport established between the patient and the clinician in a rapid time frame.

**Pilot Study vs. MOPS-VI**

Measures of knowledge about TBI and measures of working memory increased significantly from baseline to follow-up for pilot study participants. Effects were greatest on verbal memory with only scattered improvement on nonverbal memory. In contrast, MOPS-VI participants did not show a significant improvement in TBI knowledge post-intervention; however modifications were made to the questionnaire between the interventions based on the updated content. Analyses for the pilot examined the eight (8) core subtests within the TOMAL 2nd Edition. Analyses for the MOPS-VI group examined the overall composite index score which is derived from the core subtests. While direct comparisons are not possible, it is worth mentioning that both studies yielded a statistically significant improvement in memory scores (core and composite) post-intervention providing support that on-line computer based cognitive rehabilitation is an effective modality to provide education and compensatory strategies to assist with memory dysfunction.

**Traditional Treatment vs. MOPS-VI** In contrast to Schoenberg et al. (2008) study where the tele-therapy group spent significantly more time in therapy compared to the face-to-face group, MOPS-VI participants spent less time in treatment (n=3.87 months) and yielded similar
outcomes to those in face-to-face treatment (n=9.33 months). It is worth mentioning that the standard treatment control group scored an average of 5.84 points lower on the composite memory index pre-intervention (n= 80.83) compared to the MOPS-VI group (n=86.67). This might suggest that individuals who were more compliant with face-to-face treatment (and thus not eligible for the MOPS-VI) came to therapy sessions because they were more aware of memory problems and were thus more motivated for treatment in general.

As discussed in Chapter 2, patients with brain injury show wide variability in their response to conventional cognitive rehabilitation treatment. Perhaps because of this variability, the bulk of the telehealth literature concentrates on participant satisfaction and feasibility rather than treatment effects per se. Direct comparisons between MOPS-VI and similar programs are not possible. In addition, comparisons between MOPS-VI and the literature on traditional face-to-face cognitive rehabilitation remain implausible given the significant variability between the populations.

*Interest in continued treatment*

Two of the nine (9) participants originally recruited for the intervention reported an interest in beginning face-to-face treatment at the end of the study. One of the two (2) veterans was diagnosed with cancer after pre-intervention testing and chose to be seen face-to-face in conjunction with his other medical appointments. This veteran did not participate in the MOPS-VI study. The second participant completed the MOPS-VI and reported he was interested in continuing treatment at the VAMC. This participant was contacted to schedule his follow-up appointment. Since he was to be re-deployed to Afghanistan at the beginning of the year he decided to post-pone further treatment until his return from deployment.
Limitations

These are preliminary findings and care must be taken in generalizing from these results, for several reasons. First, the sample size was limited by restrictions on technology and the timing of funding. Further, the sample used in this study is not necessarily representative of the broader population of veterans with mild TBI. Because all participants had a diagnosis of a mild TBI, findings may not generalize to a more severely injured sample. The high ratio of outcome measures/analyses to participants increased the possibility that some of findings may have been attributable to chance alone. Thus, while the results are suggestive, it will be necessary to test the MOPS-V intervention materials with a larger group of patients.

The assessments selected for the MOPS-VI intervention were chosen based on the American Veteran's Association Speech Language Pathology (AVASLP) recommendations for tracking response to therapy in cognitive rehabilitation therapy. Although most of the participants showed significant improvement on the cognitive outcomes, it remains unclear if the assessment measures employed in this study effectively captured the extent and nature of participant gain. It is possible that a more sensitive set of measures would have shown a more nuanced picture of response to therapy. In particular, the most commonly used assessments were developed to distinguish populations with and without overt brain pathology. They are not sensitive to the contemporary cognitive neuroscience perspective of brain/behavioral systems (Cicerone et al., 2006).

Conclusions

The MOPS-VI intervention supports the conclusion that telehealth is an appropriate mechanism for providing cognitive rehabilitative services from the perspective of a speech-language pathologist. Participant satisfaction combined with improved outcome measures make
MOPS-VI an effective alternative method of service delivery. Speech-Language Pathologists interested in improving access to care may consider examining telehealth as an alternative for individuals with work/family and time constraints who would not normally be adherent to standard face-to-face treatment.

As discussed in Chapter 2, the literature does not report obstacles for using technology to provide cognitive treatment in the veteran population. MOPS-VI authors discussed foreseeable barriers to treatment using telehealth modalities based on Wardens' (2006) report of symptoms common to both TBI and PTSD (confusion, anxiety, irritability and decreased concentration). Despite the possibility of reduced motivation, impaired planning and organization, known to be common in the TBI population; MOPS-VI participants were able to successfully participate in a cognitive skills intervention using on-line modules and videophones.

Lessons Learned

Understanding the limitations to conducting funded research was a lessons learned. Navigating the stipulations imposed on federal funds appropriated by Congress proved to be the biggest challenge. Utilizing the appropriate resources combined with creative ingenuity allowed the research team to allocate the funds lawfully. With federal funding came a restricted time frame which prohibited extended time for recruitment of a sufficient sample size.

If the VA is to continue advocating for innovative treatment interventions a change must be made. While most policy and procedural regulations are well intended, unless a systems re-design is implemented, utilizing technology for the purposes of providing treatment will become obsolete. The barriers remaining are significant and without senior management advocating for change, the future for technological advancement is dismal.
Discovering that an idea is only as good as those willing to fight for it was the best lesson learned. The idea for this intervention was developed based on a need identified in treatment. The research team recognized the need, applied for funding and funding was awarded but the bureaucratic legalities limited the feasibility of the study. This intervention took four (4) years of conference calls and lobbying national VA personnel before it was approved. Countless hours were spent meeting with various service chiefs and front office staff before the study could be run. This study would have not been possible without the dedication of a few VA employees willing to sacrifice their time for the good of the veterans. Understanding the need for change and having the patience to see change made is a lesson forever learned.

**Future Directions**

This study represents an important next step in developing effective online interventions for veterans with TBI. Large, randomized clinical trials will be necessary to more definitely establish the efficacy of this intervention. Studies that compare the on-line intervention to alternative treatments (e.g., attentional control) will be important in determining the unique effects of the intervention on veteran's improved level of functioning. Future studies should also include longer term follow-up to establish maintenance of gains. Nonetheless, the results provide important preliminary evidence of the potential feasibility and efficacy of on-line cognitive rehabilitation for veterans with TBI.
References


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Faul, Erdfelder, Lang, & Buchner, 2007 G*Power


Appendix A

Neurobehavioral Symptom Inventory (NSI)

None 0 - Rarely if ever present; not a problem at all
Mild 1 - Occasionally present, but it does not disrupt activities; I can usually continue what I'm doing; doesn't really concern me.
Moderate 2 - Often present, occasionally disrupts my activities; I can usually continue what I'm doing with some effort; I am somewhat concerned.
Severe 3 - Frequently present and disrupt activities; I can only do things that is fairly simple or takes little effort; I feel like I need help.
Very Severe 4 - Almost always present and I have been unable to perform at work, school, or home due to this problem; I probably cannot function without help

15 Neurobehavioral Symptoms
15a Feeling Dizzy:
15b Loss of Balance:
15c Poor coordination, clumsy:
15d Headaches:
15e Nausea:
15f Vision Problems, blurring, trouble seeing:
15g Sensitivity to light:
15h Hearing Difficulty:
15i Sensitivity to noise:
15j Numbness or tingling on parts of my body:
15k Change in taste or smell:
15l Loss of appetite or increased appetite:
15m Poor concentration, cannot pay attention:
15n Forgetfulness, cannot remember things:
15o Difficulty making decisions:
15p Slowed thinking, difficulty getting organized, cannot finish things:
15q Fatigue, loss of energy, getting tired easily:
15r Difficulty falling or staying asleep:
15s Feeling anxious or tense:
15t Feeling depressed or sad:
15u Irritability, easily annoyed:
15v Poor frustration tolerance, feeling easily overwhelmed by things:
SESSION 1: INITIAL EVALUATION-FACE TO FACE

Overview:

- Getting to know the participant/establishing rapport
- Understanding reasoning for referral
- Describing services provided
- Case history

Materials Needed:

- Computer

Objectives:

1. Get to know the participant
   - Learn about the participant’s interests
   - Discuss reasoning for ‘Speech Therapy’ referral
     1. No the person does not have a ‘speech problem’
   - Describe services provided
     1. Attention
     2. Memory
     3. Concentration
     4. Organization
   - Communicate respect for the participant and their thoughts and opinions about what should happen, explain that you will work with the participant
   - Obtain case history
Getting to know the participant/Establishing rapport:

The initial session lays the foundation for all subsequent sessions in terms of the traditional therapy process. It is essential that the participant is engaged during this initial meeting and that he/she perceives the intervention as something that will be beneficial. An important aspect of engaging the participant is communicating a sense of respect for them. Part of the way that the therapist conveys respect for the participant is to address them as Mrs. /Miss and Mr. until the participant makes it clear that they would prefer to use first names. The therapist should also communicate respect for the participant by comporting him/herself as a professional by dressing and acting like a professional.

During this period of getting to know the participant, the therapist should also ask about their interests, how the participant has changed since the injury, challenges facing the injured child (e.g., education, emotional, behavioral, or physical) and what they would like to get out of the intervention. The therapist should be sensitive to resistance or skepticism on any of the participant and try to address these feelings in laying out the content of the intervention. For example, if the participant says that “nothing will help me”, the therapist should reflect back these feelings (e.g., “Sounds like you feel like things are pretty hopeless”), and then explore with the participant what they have to lose by trying the program. The therapist can then talk about goals that the participant might want to work on.

Reasoning for Referral

It remains crucial to explain in detail reasoning for speech therapy referral. Often time’s persons are unclear at time of appointment why they are seeing a speech language pathologist for their self reported cognitive deficits. The therapist must explain protocol at the CVAMC is for the SLP to implement cognitive therapy.

Services Provided

Although some participants have been given a description of the types of services provided by speech pathology, it remains in the participant’s best interest to re-educate. Services provided include the following: attention training, auditory processing training, attention, concentration and memory therapy, issuing of prosthetic items to aid in the treatment and improvement in quality of life. Reminding veterans that participation in any treatment is strictly on a volunteer basis and exact type of intervention will vary from person to person based on reported deficits, past medical history, occupation, schooling and personal preference.

Case History

The standard template answered is as follows:

Patient History Speech, Language & Cognition- Traumatic Brain Injury

Subjective:

Military History:
Branch of the military:
MOS:
Rank at discharge:
Deployment History:

Injury History:

History of medical intervention following injury:

History of rehabilitation following injury:
a. Speech pathology services:

b. PT/OT services:

c. Psychology/Neuropsychology/PTSD:

Educational history:

Handedness:

Employment:

Hobbies or Activities:
Do you do the things you used to do for enjoyment with friends and family?

What kind of support network do you have (e.g., friends, family etc.)?

Are you involved in any community organizations (e.g., voc rehab, support groups etc.)?

Living situation:

Residual physical problems:

Have you had your hearing tested recently? If so, when/where?

Specific speech/language problems that currently impact daily activities:

Expression:
a. How good is your ability to express yourself now as compared to before your accident (word-finding etc.)?

Comprehension:
a. Do you often have to ask people to repeat what they have said because you didn't quite understand the first time?

Reading:

Writing:

Specific cognitive issues that currently impact daily activities:

Alertness/fatigue:
Memory:
How has your memory changed since your accident?

Do you have trouble remembering daily procedures or tasks (e.g., feed the cat)?

Attention:
Do you have any trouble concentrating or maintaining focus?

Do you get easily distracted?

Has your ability to multi-task changed since your injury?

Problem-Solving:
Have you noticed any changes in your ability to problem solve?

How good is your ability to handle your money now as compared to before your accident?

Visuospatial skills:
Have you noticed any difficulty with depth perception/visual deficits that you did not have problems with prior to the accident/blast?

Behavior/emotional problems:
Have you noticed any significant changes with your emotions (i.e. more or less emotional) since your injury?

Self-control/impulsivity:
Have you noticed that you now say inappropriate comments that you would not have said in the past?

Do you find you can't control your spending as much as you used to?

Organization/planning:
How do you keep track of appointments, errands, medications etc.?

Current issues which are most concerning to patient:
Speech Therapy Goal: Pt will undergo continuous assessment of cognitive abilities in order to establish baseline scores and track potential changes.

Assessment: All information was obtained from this pt through informal interview. The above information is judged to be accurate by this clinician.

Rehabilitation needs following discharge from this clinic:

Estimated time frame of treatment:

[ ] Patient and/or family members participated in and were educated on the development and implementation of the rehabilitation plan  
[ ] Patient and/or family members were not able to participate in education and implementation of the rehabilitation plan because:
SESSION 2: STANDARDIZED TESTING-FACE TO FACE

Overview:

Begin assessments based on the person's self-report of deficits.

Materials:

- Test of Memory and Learning (TOMAL-2nd Edition)
- Test of Everyday Attention (TEA)
- Behavioral Rating Inventory of Executive Function for Adults (BRIEF-A)

Objective:

1. Establish baseline cognitive scores prior to therapy across all domains of executive function:
   a. Memory
   b. Learning
   c. Attention
   d. Concentration
SESSION 3: INTERPRETATION OF SCORES/INTRODUCTION TO MEMORY

Overview:

Provide participants with scores of assessments
Ensure participants understand meanings of scores and how their deficits may present in everyday life
Steps to the memory process
Encoding Strategies
Types of Memory

Materials:

Testing Results/Scoring forms
Steps to the memory process handout(Encoding strategies
Types of Memory packet

Objectives:

1. Persons will understand test scores and how their results generalize to deficits reported in everyday life
   a. Generation of plan of care with veteran input, i.e. goals of therapy
2. Introduce the memory process
3. Introduce encoding strategies
4. Introduce the different types of memory
   a. Immediate/working
   b. Short-term/recent
   c. Long-term/remote
   d. Prospective
   e. Verbal/semantic/auditory
f. Visual/spatial

g. Motor

h. Procedural
Results of Standardized Scores/Generalize to Everyday Life

Results of scores will differ from person to person, it will be the therapist’s responsibility to relate deficits noted in the assessments into everyday life. Provide both a verbal and a visual cue of the participant’s scores across all tests including showing the person his/her actual scoring booklet. Identify what ‘exceptional, above average, average, below average and deficient’ scores are and where the participant’s scores fall. The therapist should give an example of how poor scores within a particular domain correspond to self reported deficits. For example:

As you can see here, you scored in the below average range for “Memory for Stories”. This was the subtest that required you to listen to a story about ‘Marianne who lived on a ranch in western Nebraska and Christopher who just hated algebra class’ and recall everything you heard by memory. This subtest was looking at your ability to listen to a lot of information at once and your ability to recall, we call this verbal memory. Given you below average score, it is not surprising that you are having difficulty taking verbal directions from your supervisor. Possible ways to improve performance at work include asking your supervisor to write tasks down, allow you extra time, ask you to repeat the directions back to him/her before leaving.

Steps to the Memory Process

The steps to the memory process are to be highlighted with examples of each step generated by both the treating therapist and the participant.

1) Attention and Selection: picking out what information you want to attend to
   a. Example: An example of this is when your husband/wife/girlfriend/boyfriend comes home from work and he/she is complaining about a co-worker. Attention and selection is your ability to listen to the 15 minute conversation and pick out what is truly important.

2) Encoding: how you learn information
   a. Visual
   b. Kinesthetic
   c. Verbal

3) Storage: Committing the information to memory

4) Retrieval: the ability to recall information that you have stored

Encoding Strategies

Encoding is a fancy word for how you best learn or commit the information to memory. Following each type of encoding strategy, the therapist is to provide an example of each and then cue the participant to generate his/her own example.

1) Rehearsal/Repetition
   a. How you learned your multiplication times tables/alphabet/spelling words

2) Visualization
   a. Forming a mental picture

3) Association
   a. Relating information together in a way that makes sense to you based on previous life experiences

4) Linking
   a. Finding a commonality, i.e. same color, same letter

5) Mnemonics
   a. Rhymes (Hickory Dickory Dock)
   b. Acronyms (HOMES)

6) Write it down

Types of Memory
There are different types of memory with a lot of different often confusing names. Memory can be divided into two categories: the time period involved (immediate, short-term, long-term and future) and the type of information to be remembered (verbal, spatial, motor). All examples of memory should be discussed, following each category the therapist is to provide a generalizable example and cue the participant to come up with his/her own to help facilitate better encoding.

**Category I: Memory described by time period involved**

1) **Immediate/Working**
   a. Initial stage of memory, information is initially taken in through the senses
      i. Sight
      ii. Hearing
      iii. Taste
      iv. Smell
   b. Information goes into memory where it is held for a very short time, seconds
   c. It can be viewed as a scratchpad upon which we temporarily store information prior to processing or discarding it
   d. Therapist provide an example relevant to the participant
   e. Therapist cue participant to provide an example

2) **Short-term/Recent**
   a. Information stored just long enough to be used/minutes/hours/days
   b. Therapist provide an example relevant to the participant
   c. Therapist cue participant to provide example

3) **Long-term/Remote**
   a. Memory for episodes or things that have happened in the past
   b. Episodic/Autobiographical Memory
   c. Therapist provide example relevant to the participant
   d. Therapist cue participant to provide example

**Category II: Memory described by type of information to be remembered**

1) **Prospective**
   a. Remembering things for the future
   b. Involves certain amount of planning
   c. Organization/Planning memory
   d. Therapist to provide example relevant to participant
   e. Therapist cue participant to provide an example

2) **Verbal/Semantic/Auditory**
   a. Remembering events using words, i.e. story
   b. Therapist provide an example relevant to the participant
   c. Therapist cue participant to provide example

3) **Visual/Spatial**
   a. Remembering pictures/images
   b. Therapist provide an example relevant to participant
   c. Therapist cue participant to provide example

4) **Motor**
   a. Remembering a motor skill, i.e. riding a bike, assembling/cleaning a gun
   b. Therapist provide an example relevant to the participant
   c. Therapist cue participant to provide example

5) **Procedural**
   a. Remembering a procedure, i.e. switching on a computer
   b. This type of memory often seems to bypass conscious control
   c. Therapist provide an example relevant to the participant
   d. Therapist cue participant to provide example
Appendix C

Video Conference Outline

Goal Setting as a Principle

The core of the intervention is instruction and practice in executive function deficits, namely problem-solving, attention and memory. However, throughout the intervention, we refer to goal setting rather than problem solving to shift the emphasis away from problems to goal attainment. The reasons for emphasizing goals are twofold: 1) participants may be less defensive identifying unmet goals rather than talking about problems; and 2) the goal setting framework provides a useful model for helping the veteran to work on executive function processes.

The Clinical Implications of Videoconferencing

Meeting with veterans via videoconferencing is qualitatively different than meeting with veterans in person and calls upon somewhat different clinical skills. Because veterans are in their own home, they have a wider range of behavior choices than in the therapist’s office. For example, they can answer the door or phone, leave to get food or drink, or walk out because they are upset or don’t like the topic. It is useful for the therapist to anticipate these possibilities in advance with veteran and establish ground rules for the videoconferences (e.g., get snacks and drinks before hand). The therapist should also anticipate and address potential disruptions in his or her own environment by forwarding calls etc.

Although videoconferencing provides some information regarding the participants reactions to the therapist’s statements and to one another, it does not provide the same level of feedback that one gets by being in the same room with the participant. As a first step, the therapist should ensure that the participant is within camera range at the beginning of the session and have him/her move their seats if they are not. Check in frequently with the participant to determine if they understand what is being said and if they have comments or questions.

Eye contact and empathic listening are somewhat more difficult to accomplish via videoconferencing. Because the therapist is seeing the participant on the computer screen, while the camera recording the therapist is located elsewhere (above or to the side of the screen), it is virtually impossible to look at the participant and maintain direct eye contact. For the purposes of rapport, it is probably helpful to alternate between looking at the participant on the screen and looking into the camera. It is also helpful for the therapist to let the participant know why he or she is looking away (e.g., the therapist is opening up the website). Recording videoconference sessions can provide the therapist with feedback regarding how he or she looks to the participant.

Some disruptions during videoconferences are almost inevitable. Despite planning and previously discussed ground rules, occasionally someone will come to the door or a participant member/co-worker/friend not participating in the sessions will come home. It is important for the therapist to acknowledge these disruptions while maintaining the flow of the session as much as possible. Sometimes a disruption may necessitate rescheduling the session. Although this is not usually necessary, it is critical to be flexible and responsive to environmental contingencies while videoconferencing.
For any therapist doing videoconferencing for the first time, it will be a novel and discomfiting experience. It is important to maintain a sense of humor and shared exploration with the participant. By remaining faithful to the tenets of the intervention, namely having a positive attitude and problem-solving around difficulties, the therapist can model real-life application of the intervention materials while addressing technical and logistic difficulties that arise. It is also important that the therapist own/acknowledge his or her own frustration with the technical difficulties while modeling how to work through them in a thoughtful and planned way.

Dealing with Technical Problems

Often, unforeseen technical problems will arise during the course of a videoconference. Participants are generally very forgiving of technical difficulties and are willing to work through them with the therapist. However, to preserve the participant’s patience as well as your own sanity, troubleshooting should be limited to 10-15 minutes. At that point, if the problem is unresolved, the therapist has the option of rescheduling the session or implementing a strategy to work around the problem. For example, if the sound isn’t working, but video is, it may be possible to use a speakerphone or cordless phones for the audio. Similarly, if the audio and video are not working but net meeting is available, the therapist may choose to continue the call via phone and share the web pages via net meeting. In general, the goal should be to maintain the flow of the session and the therapeutic process rather than worrying that all the videoconferences are implemented in exactly the same way.

The Importance of Monitoring and Record Keeping

Although accurate record keeping and monitoring of clinical progress is always good clinical practice, it is particularly critical in the context of a research project to determine if the treatment program is effective. Following each session, you, the therapist, will need to complete a form identifying the topics covered in the session and the amount of time devoted to each topic. You will also complete forms regarding the engagement and cooperation of the participant. This form is also to be used for monitoring problem-solving practice and completion of “homework”. These forms will be used to provide more detailed information about the amount and type of treatment the participant actually received as well as their level of engagement.
SESSION 1: GETTING STARTED

Overview:

Getting to know participant/establishing rapport (15 minutes)
Overview of the intervention and problem-solving framework (10 minutes)
Identifying and rating goals the participant wants to work on (15 minutes)
Wrap-up and scheduling (5 minutes)

Materials Needed:

Interview Schedule on participant structure
Schedule for videoconferences

Objectives:

2. Get to know the participant
   • Learn about the participant’s interests
   • Learn how the injury has affected the participant
     1. educational challenges
     2. behavioral challenges
     3. emotional challenges
     4. physical challenges
   • Learn about the participant’s feelings about the intervention
   • Communicate respect for the participant and their thoughts and opinions about what
     should happen, explain that you will work with the participant
3. Show the participant how to logon to the website and allow them to practice logging on
4. Review the webpage outlining the structure and content of the intervention
   • Describe the intervention process
   • Communicate that everyone is involved in the process
5. Discuss problems the participant wants to address
6. Review plan for future sessions and schedule VC2
Getting to know the participant/Establishing rapport: (15 minutes)

The initial session lays the foundation for all subsequent sessions in terms of the didactic content and the process. It is essential that the participant is engaged during this initial meeting and that he/she perceives the intervention as something that will be beneficial. An important aspect of engaging the participant is communicating a sense of respect for them. Part of the way that the therapist conveys respect for the participant is to address them as Mrs./Miss and Mr. until the participant makes it clear that they would prefer to use first names. The therapist should also communicate respect for the participant by comporting him/herself as a professional by dressing and acting like a professional. The therapist should consider him or herself as a guest in the participant’s home and act with according deference.

During this period of getting to know the participant, the therapist should also ask about their interests, how the participant has changed since the injury, challenges facing the injured participant (e.g., education, emotional, behavioral, or physical) and what they would like to get out of the intervention. The therapist should be sensitive to resistance or skepticism on any of the participant and try to address these feelings in laying out the content of the intervention. For example, if the participant says that “nothing will help me”, the therapist should reflect back these feelings (e.g., “Sounds like you feel like things are pretty hopeless”), and then explore with the participant what they have to lose by trying the program. The therapist can then talk about goals that the participant might want to work on.

Overview of the intervention: (10 minutes)

Although the participant has been given a description of the intervention before agreeing to participate, this is an important opportunity to review the number and content of the sessions and give the participant an opportunity to ask questions about how things will work. The therapist should give a description of the intervention and the rationale as follows:

As you know, you have been asked to participate in this program because you have had a head injury. We know that an injury like this can cause problems and stress and that this stress can make it harder to achieve personal and participant goals. This program will help you to understand some of the common effects of brain injury. It will also teach you, as a participant, strategies for dealing with the effects of brain injury or other problems you might be experiencing, and to work with others to accomplish your goals.

For the next month, we will have a video conference call following your participation in the on-line modules. We will meet every week for the next 6 weeks. Before each meeting, you will complete exercises and activities on the computer on your own. You can always call me between meetings if you need to. Do you have any questions?

During the course of our meetings, we will work together to help you achieve your goals. If participant cannot find the sheet, give them a new one.) As you know, we are going to be using our website to help you learn about brain injury and achieve your personal goals. First, I’d like to review with you how to get onto the website. (Ask participant if he/she knows how to get onto internet explorer. If so, let them open up internet explorer. If not, the therapist should show the participant how to click on internet explorer and open it.) To get to our website, you need to open internet explorer by double clicking on it. A homepage is the page that you see when you open internet explorer. If for
If you ever have trouble logging on, call me. (Have the participant log on, with your assistance, if necessary.) All of the sessions are listed over here. You will work on one new session each time, but you can also go back and look at the information in the sessions that you completed before. For today, only session 1 is listed, because that is the first session. (Have them click on session 1). There are three parts to this session, Getting started, the checklist, and the comfort rating. Let’s click on Getting Started. (Therapist should show the participant the different buttons including the Start button, next button, and the progress bar at the bottom.) Each session will have things for you to read and do and video clips for you to watch. (Advance to the first video clip and show the participant how it plays.) Sometimes the videos may take a few seconds to load and they may be a little choppy. Let us know if you have trouble watching them. (Continue working through the introductory materials with the participant until you get to “Our goals for you”.) You will be able to listen to words on each page by clicking on the green play button. (Demonstrate for the participant how to play, pause, and stop the audio). Let’s go through the rest of the session together, so you have a sense of how things work. (When you get to the schedule of session spend some time reviewing this with the participant),

Identifying goals that the participant wants to work: (10 minutes)

When we talk about goals, we visualize how we would like things to be and think about what things need to change to make them the way we’d like them to be. Sometimes goals are connected to unsolved problems-situations that make you feel tense or upset or that cause conflicts with other participant members. The unrealized goal may involve you directly, such as finding a better job, or it may be something involving another participant member you’d like to see changed, for example your daughter getting better grades in school. Sometimes, the goal might be obvious. Other times, it might take more thinking and discussion to come up with a goal that is specific and responds to the problem.

When we talk about goals, I want us to focus on things that can be changed. For example, you may find yourself feeling upset every time that you think about the injury and become worried that something could happen again. How can you talk about this worry as a goal that you can achieve?

Give the participant an opportunity to discuss this and see if they can reframe this situation into a workable goal. If the participant has difficulty, provide support by asking leading questions. For example, you can ask participant what additional information might be helpful to come up with a goal. You can also ask participant to think about what aspects of this situation can be changed. The participant can also be asked to visualize what they would like things to be like. Praise the participant for their effort and let them know that they are going to become expert problem-solvers.
It is critical that the participant have a sense that he/she can successfully achieve their goals (self-efficacy). For the most part, this objective will be addressed indirectly by emphasizing and praising successful problem-solving efforts. However, if a participant self doubts or negativism impedes problem-solving efforts then it will need to be confronted more directly through a discussion of the role of expectations and self-fulfilling prophecies. However, this discussion is likely to come up in subsequent sessions.

Entering participant goals into the computer: (15 minutes)

Next, the participant will have the opportunity to enter between 1 and 3 goals he/she wants to address into the computer. As the participant begins to generate problems or goals, the therapist should remind them to focus on goals that he/she wants to pursue in the next month and that the goal should pertain to the individual. If participant seems to have difficulty identify goals, the therapist can provide examples such as “To get better grades in school”, “To do more fun activities as a participant”, “to become more social” etc. For each goal or problem identified the participant will be asked to rate the severity and frequency. If it is a positive goal such as “spend more time together as a participant” the severity and frequency can be rated “not applicable”. This discussion can also provide an opportunity to point out overgeneralizations that are characterized by the use of the words “never” or “always”.

Wrap up and planning for session 2: (5 minutes)

The therapist should ask the participants (> 8) to complete the session review questions. The therapist should also show the participant the Session 2 materials on the website that will need to be completed by the participant prior to videoconference 2. The therapist will schedule videoconference 2 with the participant for 1 week and review with the participant the process of initiating the video conference: 1) participant will turn on computer; 2) the therapist will call via phone to make sure that the participant is ready, and 3) the therapist will initiate the video conference call. The therapist should be reassuring about the videoconferencing aspect, since it may seem intimidating. This also sets a clear expectation that the therapist will initiate the session (e.g., again since the participant is in the comfort of their own home they may think nothing of trying to contact the therapist through the video equipment before the therapist is ready. It is worth remembering that participants with no computer experience or advanced education have been able to use the videoconferencing software.

The therapist should also talk with the participant to establish ground rules for videoconferences. Because the sessions will take place in the participant’s home/work, it may be useful for the therapist and participant to establish some boundaries. It may be helpful to remind participants to plan to get drinks and snacks, go to the restroom before the session begins. The therapist should also help the participant come up with a seating arrangement so that most if not all participants are in view.

Post Session Therapist Tasks: (15 minutes)

1) Complete checklist of session tasks completed and rating of participant interest/cooperation.
2) Release session 2 immediately for the participant to complete and on the scheduled appointment date prior to your video conference release VC3
VIDEOCONFERENCE 2: STAYING POSITIVE AND MANAGING STRESS AND HOW IT PERTAINS TO YOUR MEMORY

Overview:

Review Session 1 materials and End of Session Checklists (20 minutes)
Confronting negative problem orientation role play (15 minutes)
Talk about personal strategies for relaxation and stress management (10 minutes)
Introduction of Steps to Memory Process (5 minutes)
Types of Memory (10 minutes)
Introduction of monitoring problem behaviors (5 minutes)
Wrap-up and scheduling (5 minutes)

Objectives:

1. Explain Positive and Negative Problem Orientations
2. Emphasize the importance of having a positive problem orientation or attitude.
3. Review the participants positive rephrasing of negative statements.
4. Practice challenging negative problem orientations through role play.
5. Review positive self statements.
6. Review stress and brain injury
7. Talk/brainstorm about staying positive under stress.
8. Introduce the idea of monitoring problem behaviors.
9. Review steps of the memory process
10. Identify types of memory and how they affect problem solving
11. Assign web session 4 and schedule videoconference 4.
Positive Problem Orientation (15 minutes)

How effective an individual is at problem solving depends, in large part, on the attitude with which he or she approaches the problem. Someone who blames him or herself or who pretends that problems don’t exist is unlikely to be an effective problem-solver. The therapist should review the differences between a Positive vs. Negative problem orientation with the participant emphasizing why it is important to have a positive problem orientation. Participants should be encouraged to talk about how he/she feels when they have problems. It is important to point out that everyone has occasions when they feel overwhelmed or when they want to avoid their problems. This is also an opportunity to discuss differences among individuals in how they approach problems.

The therapist should also review participants efforts to “rewrite” the negative statements on the website. This provides the therapist with an opportunity to praise the participant and explore how they might change negative statements in their day-to-day life. This approach of cognitive reframing is simple to explain but difficult to implement in real life, particularly for individuals with a more pessimistic or Dysthymic personality. It can be useful to compare the process to “changing channels on the TV when you don’t like the show” or rebooting the computer when it’s not working properly.

Role playing replacing negative self-statements with positive statements (15 minutes)

Given the difficulties implementing cognitive reframing in real life, this exercise provides the opportunity for participants to practice in a fun and non-threatening way. It is helpful to create “extreme” characters and scenarios so that it is fairly easy for participants to challenge the negative orientation. Once participants understand the process, they may want to take a stab at “playing” a negative character.

Example: I’m going to pretend that I just applied for school using my Post 911 GI Bill. Listen to what I’m saying to myself and then I want you to challenge this and come up with some positive things that I can say to myself instead.

“I’m so stupid. There is no way in hell I am going to get into college. I can't pass math. The teacher probably thinks I’m stupid. There’s no point in even trying. I hate my brain.”

Ask participants to identify the negative and extreme statements and how they may impact motivation. Example: name calling (stupid), over-generalizing (teacher), catastropizing (no way I’ll pass), distorted perceptions (teacher probably thinks I’m retarded), and defeatist attitude. How does this person feel about him/herself? How likely is he to ask for help if he believes the teacher thinks he is retarded?

Steps to the Memory Process (5 minutes)

The steps to the memory process are to be highlighted with examples of each step generated by both the treating therapist and the participant.

5) Attention and Selection: picking out what information you want to attend to
   a. Example: An example of this is when your husband/wife/girlfriend/boyfriend comes home from work and he/she is complaining about a co-worker. Attention
and selection is your ability to listen to the 15 minute conversation and pick out what is truly important.

6) Encoding: how you learn information
   a. Visual
   b. Kinesthetic
   c. Verbal
7) Storage: Committing the information to memory
8) Retrieval: the ability to recall information that you have stored

Encoding Strategies

Encoding is a fancy word for how you best learn or commit the information to memory. Following each type of encoding strategy, the therapist is to provide an example of each and then cue the participant to generate his/her own example.

7) Rehearsal/Repetition
   a. How you learned your multiplication times tables/alphabet/spelling words

8) Visualization
   a. Forming a mental picture

9) Association
   a. Relating information together in a way that makes sense to you based on previous life experiences

10) Linking
    a. Finding a commonality, i.e. same color, same letter

11) Mnemonics
    a. Rhymes (Hickory Dickory Dock)
    b. Acronyms (HOMES)

12) Write it down

Types of Memory (10 Minutes)

There are different types of memory with a lot of different often confusing names. Memory can be divided into two categories: the time period involved (immediate, short-term, long-term and future) and the type of information to be remembered (verbal, spatial, motor). All examples of memory should be discussed, following each category the therapist is to provide a generalizable example and cue the participant to come up with his/her own to help facilitate better encoding.

Category I: Memory described by time period involved

4) Immediate/Working
   a. Initial stage of memory, information is initially taken in through the senses
      i. Sight
      ii. Hearing
      iii. Taste
      iv. Smell
   b. Information goes into memory where it is held for a very short time, seconds
   c. It can be viewed as a scratchpad upon which we temporarily store information prior to processing or discarding it
   d. Therapist provide an example relevant to the participant
   e. Therapist cue participant to provide an example

5) Short-term/Recent
   a. Information stored just long enough to be used/minutes/hours/days
   b. Therapist provide an example relevant to the participant
   c. Therapist cue participant to provide example

6) Long-term/Remote
   a. Memory for episodes or things that have happened in the past
   b. Episodic/Autobiographical Memory
   c. Therapist provide example relevant to the participant
d. Therapist cue participant to provide example

Category II: Memory described by type of information to be remembered

6) Prospective
   a. Remembering things for the future
   b. Involves certain amount of planning
   c. Organization/Planning memory
   d. Therapist to provide example relevant to participant
   e. Therapist cue participant to provide an example

7) Verbal/Semantic/Auditory
   a. Remembering events using words, i.e. story
   b. Therapist provide an example relevant to the participant
   c. Therapist cue participant to provide example

8) Visual/Spatial
   a. Remembering pictures/images
   b. Therapist provide an example relevant to participant
   c. Therapist cue participant to provide example

9) Motor
   a. Remembering a motor skill, i.e. riding a bike, assembling/cleaning a gun
   b. Therapist provide an example relevant to the participant
   c. Therapist cue participant to provide example

10) Procedural
    a. Remembering a procedure, i.e. switching on a computer
    b. This type of memory often seems to bypass conscious control
    c. Therapist provide an example relevant to the participant
    d. Therapist cue participant to provide example

Positive Self Statements and Stress Management (5 minutes)

The therapist should review the positive self statements that the participants entered into the computer. Remember to praise their efforts. The therapist should then explore with participants how they can use these statements when they are feeling down or experiencing stress. Many individuals find it helpful to post positive statements on their mirror or bedroom door to help them to start the day in a positive mood.

The therapist should also talk with the participant about how different persons handle stress. Talk about his/her responses to the website as well as other things they might like to do relax or decompress. It is important for the participant to identify strategies that can be done anytime and anyplace (i.e., have a cup of tea rather than go to the movies).

Monitoring Behavior Problems (5 minutes)

The therapist should introduce the idea of monitoring problem behaviors. Ask the participant to access the online form to monitor problem behaviors on their computer. Given the focus on positive problem orientation, the therapist can use the example of monitoring and challenging negative self-statements as a problem that a participant might choose to monitor. In general, persons are reluctant to invest the time and energy necessary to monitor problems consistently. However, the therapist can emphasize that often just careful monitoring can serve to improve the problem. For example, when someone writes down everything that he or she eats, they often start eating less.
Wrap-up and scheduling: (5 minutes)

The therapist should encourage participants to challenge negative thoughts and replace them with positive self-statements between sessions. When appropriate the therapist can suggest monitoring of negative statements for the participant. The therapist should schedule a time for VC 3 within 1 week. The therapist should also briefly outline the objectives of session 2. It may be helpful for the therapist to indicate that session 3 is a longer session because it introduces all of the steps of problem solving and gives the participant practice using them. If the participant appears to need additional support in completing the self-guided on-line portion, the therapist may offer to call them during the week between sessions to see how things are going.

Post Session Therapist Tasks: (15 minutes)

1) Complete checklist of session tasks completed and rating of participant interest/cooperation.
2) Log any technical problems.
3) Release session 3 immediately and VC 3 prior to scheduled appointment.
VIDEOCONFERENCE 3: ADDRESSING COGNITIVE PROBLEMS ASSOCIATED WITH TBI THROUGH EDUCATION AND PROBLEM-SOLVING

Overview:
- Review the effects of TBI on attention, memory, and cognition. (10 minutes)
- Review strategies for addressing TBI-related cognitive problems the participant may be experiencing. (10 minutes)
- Problem Solving Practice (15 minutes)
- Homework and wrap-up (5 minutes)

Objectives:
1. Review how the participant did implementing their positive self statements from last session.
2. Review cognitive changes following TBI with particular emphasis on changes in memory, planning, and organizational skills.
3. Review strategies for handling attention and memory problems and facilitating task completion.
4. Assess the need for academic intervention (e.g., evaluation, work/school accommodations) and make appropriate referrals.
5. Work through the problem solving process using a goal identified by the participant.
6. Ask the participant to complete online Session 4 prior to the next videoconference.
Understanding changes in thinking and behavior following TBI: (10 minutes)

Rationale for Didactic Portion of the Session

This didactic portion is intended only as an introduction to some of the cognitive changes that occur following TBI. Participants for whom cognitive difficulties are an issue will have further opportunities to discuss and address these problems during the problem solving portions of the core sessions and in the individualized sessions. It is useful for the injured participant to be involved in the discussion of cognitive sequela. The material must be presented in simple and concrete terms. Although the effects of TBI on cognition will have been raised with most participants at some point during the participant’s hospitalization, the therapist should assume that the participant has received no prior education. In introducing this discussion, the therapist should ask the participant about problems with thinking or learning that they feel the participant is having as a result of the TBI. The therapist can also use prior information (i.e., problems identified on the NSI/Medical chart etc) to tie the discussion to the difficulties faced by a specific participant. Problems noted by the participant during this session or on previous questionnaires should be taken as an indication of cognitive problems. If the participant becomes distressed or anxious during this discussion, the therapist should remind them that the purpose of this program is to help them handle these problems more effectively. (See sample script below.)

Have you noticed any changes in your thinking or memory or listening since the injury? For example, you can’t seem to pay attention as long as before, or he gets lost in what he’s doing? Maybe you just don’t seem to be as with it as he was before. Have you noticed that some things are harder for you than before? (Give the participant a chance to discuss any changes they may have noticed. Most participants will acknowledge some initial problems with memory and attention, even if they’ve subsequently resolved themselves. Today we’re going to focus on what you can do about these changes. (Alternatively, the therapist can refer back to a cognitive or attention problem listed in the problem list during the prior session.)

Some participants will insist that the participant is fine and is not currently experiencing problems or perhaps never did. These statements should be accepted at face-value. A portion of the participants in the study will be doing well and experiencing few cognitive difficulties. However, if you as therapist have evidence to the contrary you may gently raise that with the participant at the appropriate time (which may not be now). Thus, for participants who are doing well, the discussion of changes below can be eliminated and the discussion of study/organizational strategies can be presented as things that can be helpful for anyone, even if they haven’t had a brain injury.

The brain is the part of our body that controls thinking, feeling, and behavior. When the brain is injured (hurt) because of an illness or accident, there may be changes in how the participant thinks and learns and how he/she feels and acts. First, I’d like to talk about some of the changes in thinking. Doctors (psychologists) often use the word cognition when they talk about changes in thinking and learning. Executive abilities or executive functioning is a really important aspect of thinking that can be affected by a brain injury. Executive functions refer to the broader skills that allow each of us to think about what we want to do, to organize our thoughts and behavior, and to plan and prioritize so that we can accomplish our goal. Executive abilities also are what allow us to reflect on our own behavior and decide whether we did things right or not.
Another way to think about this is the coach in your brain who makes sure you get the job done. We normally don’t have to think about these self-coaching skills. For example, if your goal is to get to work by 9:00, you know that you have to get up, get washed and dressed, eat breakfast, and be in the car by 8:30. However, if you have problems with executive abilities, you might get sidetracked by a magazine on your coffee table and forget that you need to keep getting ready for work. When you arrive late for work, you may fail to recognize that showing up late will cause problems with your boss. These organizational difficulties can be particularly frustrating because testing may show that the participant has the same specific skills as before, yet he/she is failing all his/her classes.

Understanding the changes in thinking that can happen following brain injury is important for a number of reasons. First, changes in mental power and executive skills can be blamed on a lack of motivation when it is really a problem with the brain. For example, a lack of mental energy can look like low motivation to a boss who sees the participant dozing off/zoning out at work. Not being able to do what one was previously able to do without difficulty can lead to anger and depression in the injured participant. We will talk more about these behavior changes next time. Finally, being able to identify and understand changes in thinking that are caused by brain injury can help us to come up with ways to help the person function better. For example, if your participant has problems getting organized, you can work with him/her to provide the structure to help them get organized using prompts and reminders. We will talk more about this in a few minutes when we talk about how to deal with the changes in thinking caused by TBI.

Keeping a record of when your participant has problems with (his/her) memory, attention, or organizational skills can be very useful for coming up with ideas about how to help him/her. You can keep track of situations in which (name of participant) has a problem. You might want to write down the time of day in order to see if cognitive problems are worse when (name of participant) is tired. It is also helpful to write down what else is going on then. Is there a lot of noise and confusion in the house? Are there other distractions? It is really important to pay attention to what the rest of the participant does when (name of participant) is having a problem. This section of the website gives you a format for keeping track of problems. There are spaces for the time of day, a description of the situation, and what you and other participants did. (Therapist should share the problem monitoring portion of the website with the participant and explain how to use it. The therapist should point out that these records are a helpful way to tell if a problem solution is making things better or worse.)

Strategies for responding to cognitive problems following TBI: (10 minutes)

During this part of the session, the therapist reviews basic strategies for managing problems with attention, memory and organizational skills. If the participant has previously mentioned problems with attention, memory, or learning, this discussion should be tied directly to the problems that the parent has mentioned. So for example, the discussion below can be initiated by mentioning the participant’s problem and how the strategies that will be discussed relate to the participant’s problem.

It is important that participants understand that these strategies will not change the brain damage itself. Instead, they will help the participant to “work around” or compensate for the brain damage. Participants may have questions about further cognitive recovery and whether he/she will return to “normal”. The therapist should acknowledge that one of the greatest frustrations for participants
following TBI is the lack of definitive answers from “experts” regarding the prospects for the future. The strategies that will be discussed are intended to make things easier now and to reduce the participant’s frustration and stress. It is possible that they will no longer be needed as the participant’s brain continues to recover. Some participants may perceive strategies to work around the participant’s cognitive deficits as crutches that will impede the progress of recovery. For these participants, the therapist needs to underscore the fact that supports are part of the process of recovery and will facilitate, not impede, recovery. Other participants may be less interested in addressing cognitive problems (at least in the home) because they are not as distressing as behavioral problems. In this case, the therapist should emphasize the connection between cognitive problems and behavioral problems. (See sample script below.)

**Linking Cognitive Difficulties to Behavioral Problems**

Many of the behavior problems that occur following TBI arise from the participant’s confusion and frustration. The participant no longer understands what other people expect from him/her and becomes frustrated and angry. It’s important to think about how to make things as clear and easy as possible. This doesn’t mean that (name of injured participant) should be allowed to get out of things because they’re too hard for him/her. However, it does require some planning so that what you expect is clear and doable. The website listed some things that you can do to help make things less confusing (name of participant), like breaking tasks down into small, concrete steps and giving reminders along the way about what to do next. What strategies do you think would work best in your participant? (At this point the therapist can initiate a discussion with the injured participant about ways he/she would like to be reminded.) It’s really important to be positive and give (name of participant) a lot of praise and encouragement along the way. Even if something is not quite right, it is important to acknowledge and praise the effort. (Give the participant an opportunity to come up with a plan for implementing some of these suggestions at home. The discussion also provides an opportunity to clarify misconceptions/confusion about the suggestions on the website. The plan for implementing these strategies at home should be reiterated during the final portion of the session as part of the participant’s homework prior to the next session.)

**Working with higher academia:**

Depending on the cognitive and behavioral affects of the participant’s injury, reviewing academic interventions may or may not be necessary. Therefore, reviewing the following information may not be necessary for all individuals. Some participants will have been referred for neuropsychological evaluation and have recommendations and accommodations in place. Other participants may have these recommendations and are in the process with their school or are unsure of how to proceed. Still others may be dealing with academic challenges with their participant and be unaware of the possible relation to the injury. They may have been advised to talk with the school about accommodations or special programming, and, for whatever reason (e.g., rationalization or confusion about changes being attributable to Character logical aspects such as “lazy” or “lack of motivation”, or stage of life “being a defiant participant”), have not followed through with this recommendation. Here the therapist’s clinical skills and understanding of the participant’s openness or readiness is necessary in deciding how to proceed. For more resistant participants (pre-contemplators in a motivational interviewing perspective) simply let them know that further information is available and instruct them where they to find the content on the website. Other participants (pre-contemplators and contemplators) should be reminded
throughout your interactions when academic issues arise of the possible actions they could take (e.g., evaluation of their participant’s strengths and challenges to better understand how to help the participant).

The goal of this section of the session is to provide participants with information regarding their rights as well as their rights in the education system, to provide him/her with materials to become advocates for themselves, and to provide them with ideas to create an optimal learning environment. This relevance of this information will differ with each participant as the problems they encounter with their school system, and teachers are unique. The following will be information that the parents will be able to use regardless of their school system. However, when possible, the therapist should seek to obtain information about the policies and programs in the participant’s school district and locate available advocates prior to session.

Discussion of Academic Problems since the Accident: (10 minutes)

Ideas for optimal learning environment

• Set goals for your participant with your participant
• Short term and long term (year long goals)
• use the ABCDE
  • continually redefine your short-term and long-term goals through re-evaluation
• Set up a special place for homework to be done (minimal distractions), also set up a usual time during the evening/afternoon so that a consistent schedule can be developed plans at the beginning of the year, after the injury, when teachers change, when grades change
• Don’t focus on problems, but also identify strengths

Introduce the Steps for Problem-Solving/Stop and Think (5 minutes)

The therapist should briefly review the steps of:
  Aiming/Identifying a goal.
  Brainstorming
  Choosing a plan.
  Do(ing) or implementing the plan.
  Evaluating what works and what doesn’t.

Depending on the participant, the therapist may want to have participant members identify each of the steps and take a stab at defining them. Participants typically enjoy this process and feel more involved, but if the participant appears reluctant, the therapist can do it. Remind the participant that they can print out the ABCDE framework and hang it on the refrigerator or recreation room.

In discussing the problem solving process, the therapist should remind the participant that “stopping and thinking” is a prerequisite to all problem solving. The therapist should take some time to underscore this point, since many persons with brain injury may have particular difficulty in this area. The participant
can be asked to identify a place where they can post the printable page/handout to help them remember to STOP and THINK! before acting.

Problem-solving: (15 minutes)

After discussing strategies for improving attention and concentration that the participant will implement at home, the therapist and participant should identify a problem that the participant wants to work on for the next session. Whenever possible, a problem should be identified that involves the type of cognitive problems discussed during the session. However, if no cognitive problems have been identified during either session, then the participant may elect to work on another problem.

Homework and Wrap-up: (5 minutes)

The homework assignment for this session will depend on the participant’s success implementing the solution from the previous session. If the solution identified in the previous session was not implemented, then part of the homework assignment will be to implement the agreed upon solution from session 1. If the participant had the opportunity to solve a new problem during the current session, then they should also implement the solution to this problem during the coming two weeks as well. With both problems, participants should have a written plan for implementing the solution and complete the online evaluation of problem implementation to track their compliance and success in implementing the plan. The therapist should also review with the participant the strategies to improve the participant’s attention and memory that they have agreed to implement at home. Before closing the session, the therapist should ask the participant to complete the session review checklist and briefly outline the objectives for the next session.

Post Session Therapist Tasks: (15 minutes)

Complete checklist of session tasks completed and rating of participant interest/cooperation.

Session note

Log any technical problems.

Release session 3 and VC 3.
VIDEOCONFERENCE 4: ATTENTION AND SELF MANAGEMENT

Overview:

Review problem-solving homework from VC 3 (10 minutes)
Discussion of behavior problems following TBI (10 minutes)
Identify the different types of Attention (10 minutes)
Distinguishing Consequent versus Antecedent Behavior Control Strategies (10 minutes)
Discuss self management strategies: SMART
Discussion of the importance of praise (5 minutes)
Practice problem-solving approach with a “high stress” problem (25 minutes)
Wrap up and homework assignment (5 minutes)

Objectives:

1. Review how the participant did implementing their solution from last session.
2. Identify the different types of attention
3. Explain potential causes of behavior problems following brain injury:
   - damage to the parts of the brain that control emotions and judgment
   - the participant’s frustration over physical or cognitive changes
   - a combination of the two.
4. Discuss behavior management and explain the role of parents in helping participant learn (or relearn) ways of coping with stress and managing angry impulses. Discuss strategies the participant can use to help manage their own behavior: SMART
5. Work through the problem solving process using a goal identified by the participant.
6. Ask the participant to complete online Session 6 prior to the next videoconference.
Reviewing success of plan implementation: (10 minutes)

Careful review of the participant’s success (and or difficulty) in implementing the plan developed at the end of videoconference 4 will provide important information about areas that may require further attention or intervention. If the participant did not attempt to implement the agreed upon plan or did not use the online evaluation form to monitor the success of the plan, this should be a focus of the discussion. It is important to provide participant members with praise and encouragement for the things that they did attempt even if the efforts were not entirely successfully. Empathize with how hard it is to change and develop new habits. It is also important to reinforce the sense of experimentation and trial and error in coming up with a successful plan. Every failure provides important information about what might work next time.

Identifying the different types of Attention (10 minutes)

**Focused Attention:** is the ability to focus on specific sensory information. Focused attention represents the most basic level of attention observed when an individual acknowledges visual, auditory or tactile stimuli. Focused attention is most commonly disrupted in persons with decreased level of consciousness, such as those emerging from coma who gradually progress from responding only to internal stimuli to showing increasing responsiveness to stimuli in their external environment.

**Sustained Attention:** is the ability to maintain attention during continuous and repetitive activity. It incorporates concepts of vigilance, persistence and task consistency. At the highest level, sustained attention includes the ability of mental control or working memory incorporating the notion of holding and manipulating information in one's head such as required doing mental math. Impairments in sustained attention may manifest as difficulty maintaining attention over time, increased fluctuation in task consistency, or increased vulnerability to the effects of fatigue.

**Selective Attention:** This third component refers to the ability to selectively process target information and inhibits responding to no target information. It is the ability to maintain a behavioral set in the presence of distracters or other competing stimuli and thus incorporates the notion of "freedom from distractibility". Impairments in selective attention may be seen in individuals who are easily disrupted by surrounding noise or movements (external distracters) and/or who are distracted by emotional states such as worry or anxiety (internal distracters). The importance of selective attention is demonstrated by students in a classroom who must ignore noise from the playground outside in order to attend to class work.

**Alternating Attention:** This component refers to the ability to shift one's focus of attention. It is essentially the capacity for mental flexibility that allows an individual to switch attention between tasks or activities that demand different behavioral responses or cognitive sets. Impairments in alternating attention may be seen in patients who have difficulty starting up a task after they have been engaged in an alternate activity, or who continue performing according to the parameters of the previous task after they are supposed to shift to a new task. An example of the need for alternating attention may be seen in the work of a secretary who must rapidly switch between typing and answering phones.

**Divided Attention:** refers to the ability to simultaneously respond to two or more events or stimuli. It is the capacity that allows an individual to divide his or her attention between two or more ongoing events. Deficits in this ability are evident when an individual can only process one source of information at a time. Divided attention is a critical ability for many daily tasks such as driving where an individual must simultaneously process traffic information, operate the vehicle and perhaps converse with a companion.
Discussion of behavior problems following TBI: (10 minutes)

When discussing self management, it is important that the therapist highlight the following points. First, participants need to know that behavior problems following TBI can be caused by damage to the parts of the brain that control emotions and judgment (for example, frontal lobe injuries); the participant’s frustration over physical or cognitive changes; or a combination of the two. Second, how the environment is structured (antecedent behavioral controls) and the participants reactions to the behavior will effect how likely the behavior is to happen again. (Because frontal lobe injuries are less responsive to behavioral consequences, the discussion will emphasize antecedent behavioral control strategies.) Finally, family members may need to help participant learn (or relearn) ways of coping with stress and managing angry impulses. The strategies discussed in the supplemental session for managing negative emotions can be used here. However, the participant and family may be able to come up with other strategies as well. (See sample script below.) Depending on the age and level of functioning of the participant, it may make more sense to conduct this session with parents alone. Many participants may be uncomfortable discussing behavior problems and may find it uncomfortable to listen to this discussion. The basic take home message for participant is that although changes in behavior following TBI may be caused by the injury to the brain, behavior can be improved by structuring the home environment differently.

In some families, the discussion of self management strategies may be more relevant to a family member other than the one with the injury (e.g., a sibling with ADHD or LD). In this case, the therapist can help the participant make the link with the behaviors of the other participant. In families with no behavioral issues in any of the participant, the review of antecedents and consequences can be relatively brief. However, Stop and Thinking and Monitoring the impact of one’s behavior on others can be an important skill for all participant members and thus bears some discussion regardless of the degree of behavior problems in the participant.

As I indicated earlier, injuries to the brain can also cause changes to behavior. In particular, injuries to the front of the brain often create significant behavior changes marked by increased impulsivity and an inability to learn from the consequences of his or her actions. With frontal lobe damage, a participant may have trouble getting along with other participant because he/she has trouble reading behavioral cues (such as facial expressions) and recognizing when his/her behavior is annoying to others. The participant may also have more difficulty controlling his or her emotions. As a result, even minor annoyances can lead to mood swings or angry outbursts that seem to come out of the blue. In participant with damage to other parts of the brain, behavior problems may be caused by the participant’s emotional reactions to the thinking problems caused by the injury. Have you noticed any changes in (name’s) behavior since the injury?

Allow the parents and participant an opportunity to identify some behavioral problems that have become an issue for their participant. Participants may more readily identify with emotional labiality rather than behavior problems.

Even when behavior is caused by brain injury, it is important to remember that the participant’s environment at home and in school can cause the behavior to improve or get worse. Sometimes, injuries can affect the behavior of other participant members. For example, other participant may feel that the injured participant is getting too much attention or that they have been asked to take on too many responsibilities. The behavior of other participant is also determined, in part, by how parents and other participant members react. Attention, even yelling, can make it more likely that a brother or sister will act up.
Positive Proactive Behavior Management

Review the major points listed below. In discussing individual points, the therapist should try to provide concrete examples to illustrate the point. For example, for teaching adaptive behaviors, the therapist can provide the example of teaching the participant some anger management strategies to replace tantrums. The therapist should also provide some examples of how to break a problem down into small goals. Again the therapist should emphasize the importance of setting the situation up so that the participant will succeed rather than relying on consequences (either positive or negative).

1. Establish a Positive Setting

   Now we are going to talk about strategies that focus on making good behavior happen rather than dealing with the consequences of bad behavior. A good place to begin is by establishing a positive setting. This means getting the participant in a positive frame of mind before undertaking a tough task. This seems wrong because it’s the opposite of Grandma’s rule—eat your vegetables and then you can have some cake. Instead, we’re saying take some time to relax and then you can do your chores. For everyone, and especially participant with brain injury, their approach to a task is greatly influenced by their attitude. If you begin a chore feeling hungry, tired, and frustrated, it is unlikely that you will do a good job. However, if you begin, feeling relaxed and rested, you can probably give it your best. Establishing a positive setting is even more important for participant with brain injury. At this point, you can ask participants how they can establish a positive setting for themselves.

2. Build Positive Behavioral Momentum

   Closely related to creating positive setting events is the concept of positive behavioral momentum. This means building enthusiasm for the task by ensuring early success. You can think about behavioral momentum as the fuel for the work ahead. You’re not likely to get far if you start with an empty tank. For participant with brain injury building Positive Behavioral Momentum can be a key to heading off a tantrum or outburst down the road. Think about a parent whose son gets frustrated and walks away every time he has to do his algebra homework. What can this parent do to help build PBM before asking him to do his algebra? (Give the participant a chance to generate some suggestions.) For example, it might be useful to start out with some easier problems. It’s also important to provide praise or other rewards for completion of each step. When the first few problems are complete, the participant should be praised and allowed to do something fun for a few minutes before moving on to the next step.

3. Make Tasks less Burdensome and more Doable

   Another strategy for reducing resistance to necessary tasks is to give the participant choice and control when possible. For example the participant may have a number of chores that need to be completed. However, he can have some say over what he does first and, when possible, the timing of when he does the chores. For example, taking out the garbage after he’s had a chance to relax and
watch the news rather than before. Try to be creative about making tasks more interesting for the participant. Are there ways to turn chores into a game?

4. **Use Positive Roles and Scripts to Provide a Model**

Positive role model or script can be used to help guide or shape your participant’s behavior. For example, if she has trouble managing her anger, perhaps you can come up with an example of someone who has channeled her anger in positive ways. For example, a famous athlete who is angry over barely losing but uses that anger to practice harder and perform better next time.

Ask the participant how he or she can get psyched up for difficult or unpleasant tasks. It’s important to find examples and metaphors and examples that are relevant to the individual and his or her life.

**Distinguishing Consequent vs. Antecedent Behavior Management Strategies: (10 minutes)**

This discussion can segue into the discussion of behavior management strategies following brain injury. If the participant indicates that his/her previous strategies continue to be effective, it may be necessary to present the antecedent strategies as useful adjuncts to more traditional behavior management emphasizing positive and negative consequences.

Because many of the changes following TBI may be the product of neurological damage, behavior management strategies that involve future reward or punishment may not be particularly effective. This initial discussion with the participant regarding behavioral management strategies will focus primarily on general principles of behavior management and antecedent behavioral control strategies. The antecedent behavioral control strategies may be counterintuitive to many families and require fairly extensive discussion. Additionally, there will be an opportunity to discuss more specific strategies when working with the participant to come up with a behavioral management plan to implement as homework. See sample script below for suggestions on how to present the general behavior management principles.

The discussion should be centered on how they can set themselves up for success. Participants can brainstorm about things they can do for themselves to minimize meltdowns and build positive momentum. They can also identify things that other participant members can do to help them with this process.

**What do you usually do when [name of injured participant] is having a behavior problem?** (Give the participant an opportunity to respond) **How well does [strategy] work in handling problems with [link to behavior problems identified earlier]?**

If the participant indicates that the identified strategy is still effective, indicate that you will be talking about some other kinds of strategies that may also be helpful. If the parent indicates that the
strategy doesn’t work well, indicate that you will be teaching them some alternative strategies that may be more successful.

The website described common strategies for influencing behavior by focusing on the consequences. You talked about doing *(insert parent’s strategy)* when your participant is acting up. This is an example of *(tie to grid on the website)*. *(The therapist should go on to briefly review the other options indicating that each is successful and appropriate for modifying behavior in certain circumstances.)*

Sometimes parents find that behavior management strategies that worked before the injury do not work as well as they did before. For example, the threat of taking away T.V. privileges may have been a good way to get your participant to clean his room before the injury. After the injury, the participant may forget to clean his room and become really angry when he learns that he has lost TV privileges. If a participant is having problems being organized as a result of the injury, he or she may not be able to figure out where to begin cleaning the room and may forget what will happen if the room is not cleaned. He/she may also have a negative attitude about beginning a task because he/she anticipates that it will be difficult or that he/she won’t be able to do it. For this reason, the strategies involving rewards and punishment may not work as well following a brain injury. Can you think of any behavior strategies that you use that don’t seem to work as well anymore? *(Parents should have an opportunity to discuss what doesn’t work for them anymore.)*

That’s one of the nice things about proactive behavior management; it can be very effective when participants have a hard time thinking about what the consequences of their actions will be.

Review with the participant the concept of negotiable and non-negotiable. Ask the participant to share with you their examples of what is nonnegotiable (too important and severe natural consequences) and non-negotiable in their participant. Understanding what exactly is and is not negotiable helps set the framework for compromise. Often parent will express the desire for their participant to take more responsibility. Review with the participant how empowering allows participants to make more decision in their own life helps train the participant to make decisions and understand the consequences of their actions.

SMART: review the steps the participant can use to empower and manage their own behavior (5 minutes) Help the participant look at what they can do for themselves to stay in control and achieve their goals. Use the video examples to elaborate your point.

Stop and Monitor: Many times participants say they do things without thinking. One way we can change this behavior is to pay attention by asking yourself: what am I doing and Am I doing what I planned to do?

Appraise: How can I tell? Look at how others are reacting. What is their body language (non-verbal cues)

Reflect: Ask yourself some important questions: What do you know? What is happening and what might happen next? Are things going how you want them to? What can you do differently?

Try: try something new or different. If you cannot think of something on your own ask a trusted friend or parent for suggestions.
The importance of praise: (5 minutes)

This is an opportunity for the therapist to stress the importance of praise as a crucial element of creating positive momentum. When a participant is having problems regulating his or her behavior, parents often become focused on the negative. Further, if the participant has been seriously affected by the injury, he or she may not be doing things that would have warranted praise in the past. For this reason, the parent needs to learn to focus on times when the participant is behaving appropriately. For example, the parent could say- “I really like how quietly you are sitting there watching T.V. with your brother” or “I really liked the way you were listening when I was going over your chores with you”. See sample script below.

We have just been talking about strategies for starting and keeping things positive. I wanted to talk a bit more about using praise. Praise can help create a positive situation and can also reinforce the behaviors that you’d like your participant to do. Sometimes, when a participant is having a lot of problems with his/her behavior, it’s hard to find things to praise. This can mean that the parent-participant relationship becomes increasingly negative and conflictual. To avoid being a “nagger”, look for opportunities to praise your participant when he/she is doing what he/she is supposed to. For example, you could praise your participant for listening attentively, playing nicely with siblings, or finishing a meal without any disruptive behaviors. Although you may not have felt the need to praise such “routine behaviors” in the past, doing so can increase the likelihood of your participant behaving that way in the future and improve the quality of your relationship. Remember, if the only attention a participant gets is negative, he/she may still do things to get your attention.

(Remember to review the opportunities for praise that the parent has identified on the website. Praise good suggestions and correct suggestions that involve rewards rather than praise. For example parents will sometimes say, “Give them treats for doing their chores”. This is a reward not praise. Both can be effective reinforces but praise is always available and useful for situations that might not merit tangible reinforcement.)

Building Motivation for Non-Negotiable Tasks (5 minutes)

Every participant has things that he or she has to do (i.e., non-negotiable) that are dreaded or detested. The therapist should talk with the parent about how to try to build motivation for these “yucky” responsibilities or tasks. The webpage on Strategies for Building Motivation provides suggestions on how to do this. The therapist and participant should work together to flesh these suggestions out with specific examples.

Problem solving/development of a behavioral management plan: (25 minutes)

After reviewing these general principles, the therapist will ask the participant to identify a behavior problem that they want to work on for the next week. The therapist should encourage the participant to identify a relatively circumscribed problem that they may have some success with. Once the participant has identified a behavior problem, the therapist should lead the participant through the
steps of problem solving, sharing the problem solving worksheet for VC 4. Because the goal here is to facilitate optimal behavior management, the therapist may be more proactive during the brain-storming and evaluation phases of problem solving by offering additional ideas or pointing out shortcomings that the participant may not have recognized with their strategies. This should always be done in a spirit of partnership and support. The goal is for the participant to have identified a strategy to implement between now and the next session. The parent(s) should be encouraged to keep a behavioral log to provide feedback regarding the success of the strategy and the consistency with which it is implemented.

**PTSD Information**

During the Battle at Waterloo in 1815, the Duke of Wellington noted that, "All soldiers run away, the good ones return".

During the Civil War, doctors noted that battle caused a medical condition in some soldiers that they referred to as "soldier's heart" which were later thought to be the body's automatic cardiac (or heart) response to trauma in battle.

During World War I, many soldiers experienced something that at that time was called "shell shock"—air pressure from exploding shells that caused brain trauma. Doctors began to consider what causes one person to get it and another to not and they started thinking about how trauma effects the brain.

During World War II, PTSD symptoms in enlisted men were called "exhaustion" or "shell shock" while the same symptoms in officers were referred to as "battle fatigue". Similar symptoms were also seen in survivors of Nazi concentration camps and those who survived the atomic explosions in Japan. These symptoms were referred to as "operational fatigue" and "combat neurosis".

In 1951, during the Korean War, doctors finally identified these symptoms for the first time as "Gross Stress Reaction." In the 1960s, during the Vietnam War, doctors and psychologists identified it as "Stress Response" or "Adjustment Reaction to Adult Life." This was also the same time (1968) that these symptoms were listed as a legitimate disorder in the DSM II (the listing of all identified psychological disorders).

Finally, in the 1980s, the term PTSD (post-traumatic stress disorder) was created. It was in 1980 for the first time that the PTSD diagnosis was seen in the Diagnostic and Statistical Manual for Mental Disorders—III. This was also when the VA began treatment for PTSD symptoms.

**PTSD Today**

Today, it is widely recognized that PTSD occurs not only in soldiers but also in civilian victims of traumatic events. For example, 1/3 of the survivors of the Oklahoma City Bombing had PTSD symptoms 6 months after the attack.

PTSD is a result of trauma, when a person has experienced, witness, or been confronted with an event or events that are outside the range of usual human experience and also involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others.

What are common symptoms of PTSD and how do you know if that is what you or a loved one is experiencing? There are some basic things to look out for when thinking about PTSD.

**Some things to look for are:**
• Spending a lot of time and energy to avoid thoughts, feelings, conversations, people, places or things associated with the trauma.

• Forgetting parts of the traumatic event (for example the name of person who was hurt)

• Losing interest in things you once enjoyed doing (losing interest in hobbies or spending time with friends and family)

• Feeling detached or estranged from other people; being unable to connect emotionally

• Having a hard time with emotions/affection (having a hard time feeling close, affectionate or loving feelings)

• Feeling numb or like you can't have as many emotions as other people

• Feeling like your future will be cut short (you don't expect to have a career, marriage, children, or live very long)

• Having difficulty falling or staying asleep

• Being irritable or having outbursts of anger

• Having difficulty concentrating

• Being hyper vigilant, that is, always being "on guard" or "super alert", easily be awakened by noises at night, walk perimeter around the house, check the door and window locks multiple times during the night or sleep with weapons near bed

• Being easily startled (for example unexpected loud noises may cause them to seek cover or to assume a defensive posture)

**Anxiety Disorders and Depression**

People who experience PTSD are at risk for depression or anxiety disorders. Here we will discuss what anxiety disorders and depression are, what to look for, and what to do if you think you or a loved one are experiencing an anxiety disorder or depression

**Anxiety Disorders**

Everyone feels anxious now and then. It is normal to feel anxiety in the face of danger or a challenging situation. Anxiety disorders are different. A person with an anxiety disorder has fear and worry that: may be severe or last a long time, may often be out of proportion to the actual situation or can force him or her to take extreme action to avoid the source of the anxiety (for example, refusing to leave the home).

An anxiety disorder can severely disrupt a person's life. It can harm a person's health, job performance, relationships with others, or the ability to handle everyday tasks and situations. Anxiety disorders can be a result of experiencing a traumatic event. There are also other causes such as: other illnesses (anxiety
problems may stem from having thyroid problems, asthma, hypoglycemia, depression or other health problems) or the use of alcohol or other drugs. Using these substances or withdrawing from them may also lead to anxiety problems.

**Depression**

Depression can manifest itself in many different ways. All human beings feel depressed or down at times; however, the disorder of Major Depression is more than just feeling the "blues" every once in a while. Some people with anxiety disorders may also have depression.

Depression is a lasting feeling of sadness or hopelessness that interferes with life. It may exist along with an anxiety disorder or develop in response to an anxiety disorder.

Some common symptoms of depression include:

- Feeling sad, blue, or down
- Loss of interest in previously enjoyed activities
- Change in appetite or weight
- Change in sleep patterns
- Feeling tired and fatigued OR feeling restless
- Feeling worthless or guilty
- Trouble concentrating, thinking, or making decisions
- Thoughts of death or suicide

**Wrap-up and homework (5 minutes)**

As part of the wrap-up, the therapist should review with the participant the behavioral management plan/solution that they have chosen to implement. This review should be very specific taking into consideration possible contingencies. The participant’s homework is to implement the agreed upon plan during the two-weeks between now and the next session. Before closing the session, the therapist should ask the participant to complete the session review checklist and briefly outline the objectives for the next session.

**Post Session Therapist Tasks: (15 minutes)**

Complete checklist of session tasks completed and rating of participant interest/cooperation.

Session note

Log any technical problems.

Release session 5 and VC 5.
VIDEOCONFERENCE 5:  CONTROLLING YOUR BEHAVIOR

Overview:

Review of homework from VC 4 (5 minutes)
TBI-related anger challenges (5 minutes)
Avoiding Assumptions (5 minutes)
Six Steps of Anger management: STARRS (10 min)
Becoming a good communicator using “I messages” (10 min)
Problem Solving with a TBI related behavior problem (20 minutes)
Homework and wrap-up (5 minutes)

Objectives:

1. Review how the participant did implementing their solution from last session.
2. Discuss how TBI can affect emotions.
3. Discuss avoiding assumptions
4. Discuss the six steps of Anger management: STARRS
5. Practice using “I messages” to improve communication
6. Work through the problem solving process using a goal identified by the participant.
7. Ask the participant to complete online Session 7 prior to the next videoconference.
Review of previous session: (10 minutes)

Careful review of the participant’s success (and or difficulty) in implementing the agreed upon behavior management strategy will provide important information about areas that may require further attention or intervention. If the participant did not attempt to implement the agreed upon plan or did not use a behavior log to monitor the success of the plan, this should be a focus of the discussion. It is important to provide participants with praise and encouragement for the things that they did attempt even if the efforts were not entirely successfully. It is also important to reinforce the sense of experimentation and trial and error in coming up with a successful plan. Every failure provides important information about what might work next time.

TBI-related anger challenges (5 minutes)

Discuss with the participant why a person may have more problems with anger after TBI: For example the part of the brain that controls your feelings may have been hurt by the injury, some things may be harder after the injury, which may cause more frustration than it did before the injury, or you may feel “less connected” (relationships may be different) and you may find it harder to let things go or laugh them off. Point out to the participant that this is really a continuation of the previous session focusing on skills the participant can learn to use to manage anger.

Avoiding Assumptions (5 minutes)

Discuss with the participant what assumptions are: decisions we make about someone’s behavior without all the facts. Refer to the example in the web content of the kid who bumps you in the hall way. Review with the participant possible assumptions and responses: For example the assumption: someone did it on purpose, they were not watching where they were going, or you were not watching where you were going. The possible responses: angry, upset, or embarrassed. It was the same situation so what changed. The only change was your assumption. This means you have the power to make a different choice. Once you know you have a choice; you can choose! You can take control.

Six Steps of Anger management: STARRS (10 min)

Review with the participant the 6 steps: STOP, Think, Accept, Relax, Reframe, & Solve. We learned Stop and think in session 3 and looked at it as Stop and Monitor in session 5. If you stop and think you are less likely to do something that will get you into trouble. Pay attention to your bodily cues to help you become aware. Ask the participant to give examples of how their body feels when they are getting angry. Give them examples if they struggle to come up with examples.

Accept: empathize with them how hard accepting can be. Acceptance can be hard especially when you are already angry but it can also reduce your anger. Talk about concrete examples of things that you cannot change e.g., broken dish. You cannot change it but you can change your reaction. Empower the participant by reminding them that they can choose.

Relax: acceptance is easier to do if you are calm. Remind them of attending to physical cues to their feelings and to use them as a sign to cool down. Discuss with the participant different strategies they can
use to relax or calm themselves. If they struggle disclose examples of your own (e.g., take a deep breath, take a walk, and count to 10). Discuss “change the channel” analogy.

**When we are watching TV and we do not like what we are watching what do we do? Change the channel, well if you do not like what you are thinking you can chose to change the channel by thinking of something else, something funny, or something that makes you feel good.**

Next, discuss with the participant how to reframe or look at a situation differently. Discuss with the participant words that increase emotionality: always, never, should, and ought. Make it concrete: Use them in a sentence emphasizing the word asking them what emotion it evokes then, replace the word with sometimes and ask the participant to attend to how much differently the sentence sounds and feels. Empathize with the participant how they can try all these things and sometimes they will still have a problem to solve. This will then lead into the problem solving process, the final step of STARRS.

**Becoming a good communicator using “I messages” (10 min)**

In session 6, “I messages” are presented as a way of expressing angry or upset feelings effectively. Since many participant and participants with TBI have difficulty with anger as well as communicating, this can be an important skill for them to learn. However, it is also important for parents to learn this skill as well to use when communicating with their participant and one another. There is a separate supplemental session on marital communication for participants who have more persistent problems. Although clear and non-critical communication is always useful, it is especially important when a participant may already be feeling frustrated and vulnerable to criticism. Throughout the intervention, the coach should make an effort to model effective communication skills and to rephrase critical statements made by participants. For example, the statement “you never do anything” could be rephrased to “I feel angry when I ask you to do something and you don’t do it”. By this point in the intervention program, the coach should already have some sense of the participant’s strengths and weaknesses when discussing problems and should frame this discussion with those issues in mind. It is important to praise the things that the participant is already doing well.

Most people become defensive and angrier when they feel that they are being criticized or attacked. One way to reduce the likelihood of escalation is to put statements about negative behaviors or problems in the form of an “I Statement”. Always begin by stating your feelings and then indicating the situation when you feel that way. For example if the problem is that your friend doesn’t wait for you at lunch, you could say “I feel bad when you go to lunch without me, and I’d like you to wait for me”.

The coach should talk with the participant about their responses to the “I message” exercise giving the participant an opportunity to talk about what, if anything, was difficult for them. If the participant “doesn’t seem to get it”, the coach can spend some time contrasting the listener’s probable reaction to personal attacks versus I statements. For example, “You never listen to me” versus “I need to tell you something important, so I want you to listen”. The coach should have the participant discuss with the parents what feels like nagging to him or her and what kinds of comments or feedback are helpful. If appropriate, this can also be tied to the homework from the previous week. It is important to reassure the participant that this is a tough skill (even though it doesn’t seem like it) and often doesn’t come naturally.
Problem Solving with a TBI related behavior problem (20 minutes)

The coach will ask the participant to identify a problem that they want to work on for the next week. If possible, it is helpful to select a problem that ties in with the session content (controlling your anger or expressing emotions appropriately). Once the participant has identified a problem, the coach should lead the participant through the steps of problem solving sharing the problem-solving worksheet page of the VC6. Because the goal here is to facilitate optimal problem solving, the coach may be more proactive during the brainstorming and evaluation phases of problem solving by offering additional ideas or pointing out shortcomings that the participant may not have recognized with their strategies. The coach should also link possible solutions to the website content when possible. This should always be done in a spirit of partnership and support. The goal is for the participant to have identified a strategy to implement between now and the next session. The parent(s) should be encouraged to keep a behavioral log to provide feedback regarding the success of the strategy and the consistency with which it is implemented.

Wrap-up and homework: (5 minutes)

As part of the wrap-up, the coach should review with the participant the plan/solution that they have chosen to implement. This review should be very specific taking into consideration possible contingencies. The participant’s homework is to implement the agreed upon plan during the two-weeks between now and the next session. For participants who did not implement the behavioral plan from the previous session, the coach may encourage them to implement both plans. However, if the participant seems to be overwhelmed by trying these behavioral plans, then the coach and participant should agree upon one plan to implement. Before closing the session, the coach should remind the participant to complete review checklist and briefly outline the objectives for the next session.

Post Session Therapist Tasks: (15 minutes)

Complete checklist of session tasks completed and rating of participant interest/cooperation.
Session note
Log any technical problems.
Release final session
FINAL VC6: WRAP UP AND PLANNING FOR THE FUTURE

Overview:

- Review of homework from previous session (if appropriate) (5 minutes)
- Review of goals that have been addressed during the intervention (10 minutes)
- Discussion of unresolved goals/problems (15 minutes)
- Planning for future transitions and surviving the tough times (25 minutes)
- Wrap-up and goodbye (5 minutes)

Objectives:

1. Review how the participant did implementing their solution from last session if appropriate.
2. Review initial goals, identifying those that have been achieved and those that remain unresolved.
3. Discuss the participant’s responses to the exercise on what good help looks like and identify how they will help participant in the future.
4. Problem solve around a future concern or transition using the problem solving framework.
5. Review participant accomplishments and say goodbye.
This is the final session of the intervention program. The goal of this session is to provide a wrap-up that helps participants feel confident in their ability to solve their own problems in the future and helping them to anticipate future transition points. For participants that are still having difficulties, it may be necessary to refer them to a counselor for continuing intervention.

**Review of Participant Goals Addressed during the Intervention (10 minutes)**

This portion of the session will require the coach to review the goals identified in session 1 and compare these with the goals that were successfully addressed via participant problem solving throughout the intervention. The coach will also want to identify other problems that have improved or resolved, but were not part of the original goals. It is crucial to stress the successes that the participant has had and the goals that they have been able to achieve through their efforts. By emphasizing successes, the participant will hopefully complete the intervention with a sense of confidence (self-efficacy) in its ability to master future problems.

**Discussion of Unmet Goals/Outstanding Problems (10 minutes)**

Even the most successful participants may have goals that weren’t addressed during the course of the intervention or outstanding problems that have not been resolved. During this final session, it is important to touch upon these unresolved issues and discuss with the participant their plans for addressing them in the future. The overall emphasis of this discussion should be that problem solving does not end with the intervention and that the participant has the skills to continue addressing problems on their own. For participants that are still having significant difficulties, it may be necessary to make a plan for referral to a therapist for ongoing counseling.

**Planning for Future Transitions and Surviving the Tough Times (25 minutes)**

This is an opportunity to help parents (and participant) look ahead and talk about concerns for the future. While this discussion should be directed as much as possible by the parents and their concerns, the coach may want to help the parents think about future transitions (e.g. to a new teacher; new school), that may pose problems. Again, the orientation should be positive, emphasizing the participant’s ability to anticipate and cope with new challenges.

We’ve worked on a lot of things together and you have done a great job achieving some of the goals that you identified when we started. As we end this part of the program, it’s a good time to talk about how you will handle problems when they come up in the future. All parents have tough times and (name of participant)”’s previous problems increases the likelihood that you’ll run into problems in the future. Therefore, we need to have a plan for the tough times.

It’s best to plan for future problems when things are going OK, because once you’re having problems, it's harder to think straight and effectively problem-solve. To plan for tough times, you need to think about how things are in the participant when things are going well and what it looks like when things start to take a negative turn. You’ve agreed in your participant that ...(relate participant’s responses to the web exercise). (Address the participant.) You need to know how to let your parents know when you need help. You said that you can ask your parents for help by… (refer back to the participant’s responses on the website). (Address the parents.) You need to know how to offer help without nagging or criticizing. (Talk about how they agreed to help the participant based on their responses on the website.)
Remember, when you’re having problems, you may need to go back to the drawing board and come up with a new plan. If you work together and use the process we discussed you should be able to get back on track. Remember, don’t dwell on problems or failures, just think about how to start making things better.

If the parents have identified a specific future issue that they are concerned about, this can be an opportunity to work through the problem solving process a final time to address the hypothetical problem. This will reinforce the problem-solving process in the participant’s mind before termination and provide them with a solution to head off or avert the anticipated problem.

Review the web page Keys to Surviving the Tough Times. The therapist should indicate that even though tough times will probably come up, it’s important to try to move past them. The strategies on the handout should be reviewed as general guidelines for getting back on track after a crisis or problem.

Review the memory, attention and concentration strategies and attempts to generalize to the participants everyday life. Afford the participant the opportunity to ask questions.

Wrap-up (5 minutes)

This is an important opportunity to reinforce the participant’s progress, praise their efforts and say goodbye. Participants with significant ongoing difficulties may be referred for ongoing counseling if they have not already received a referral.

Make follow up appointment for post intervention testing
Appendix D

Test of Memory and Learning 2nd Edition

TOMAL-2
The TOMAL-2 includes 8 core subtests, 6 supplementary subtests, and 2 delayed recall tasks. For the purposes of this intervention, the 6 supplementary subtests and 2 delayed recall tasks will not be administered. Individually administered, the core battery that provides 3 Core Index scores that can be completed in 30 minutes. Core indexes include: verbal/non-verbal and composite memory. Specific core subtests include the following: memory for stories, facial memory, word selective reminding, abstract visual memory, object recall, visual sequential memory, paired recall and memory for location. The TOMAL-2 was standardized on a nationally representative sample of more than 1,900 children, adolescents, and adults aged 5-0 through 59-11, and evaluated at the item and subtest levels for gender and ethnic bias, the TOMAL-2 can be administered with confidence to both males and females, across U.S. ethnic populations. Familiarity with this assessment by the PI, ease and timeliness of use and national AVASLP recognition of the instrument lead to the inclusion of this memory instrument.

The Test of Everyday Attention

TEA
The TEA test has three parallel versions, allowing for test/re-test without testing effect. The test gives a broad-based measure of the most important clinical and theoretical aspects of attention. It is the only test of attention based largely on everyday materials: the real-life scenario means that patients in it relevant to the problems faced in life and is the reason for utilization in this study. The assessment was standardized on individuals with moderate to severe closed head injury, results indicate that with a small sample (n=15) with a mean age of 37.47. A significant discrimination in scores between this population and controls on the following subtests: map search, telephone search, telephone search while counting and lottery suggesting this group had deficits in both sustained and selective attentional processes.
Peabody Picture Vocabulary Test 3rd Edition

PPVT-III

The PPVT-III is a measure of receptive vocabulary for standard English and a screening test of verbal ability. Verbal intelligence has shown to an excellent predictor of pre-injury intelligence. This individually administered, norm-referenced instrument is offered in two parallel forms—III A and IIIB—for reliable testing and retesting. PPVT-III features: Quick administration time of 10 to 15 minutes, no reading or writing required of examinee, national norms extended to include ages 2-6 to 90+ years, items reviewed by a multicultural panel. The PPVT-III was selected for usage in this study to help obtain verbal intelligence scores in the absence of pre-injury IQ.

Behavior Rating Inventory of Executive Function-Adult Version

BRIEF-A

The BRIEF-A is a standardized measure that captures views of an adult's executive functions or self-regulation in his or her everyday environment. For the purposes of this intervention the self-report form will be utilized. The Self-Report Form is designed to be completed by adults 18-90 years of age, including adults with a wide variety of developmental, systemic, neurological, and psychiatric disorders such as attention disorders, learning disabilities, autism spectrum disorders, traumatic brain injury, multiple sclerosis, depression, mild cognitive impairment, dementias, and schizophrenia. The BRIEF-A, is composed of 75 items within nine non-overlapping theoretically and empirically derived clinical scales that measure various aspects of executive functioning including the following: inhibition, self monitoring, planning/organization, shifting, initiation, task monitoring, emotional control, working memory and organization of material. The BRIEF-A was standardized and validated for use with men and women from ages 18-90 years. The normative sample includes adults from a wide range of racial/ethnic backgrounds, educational backgrounds, as well as geographic regions that are matched to U.S. Census data (U.S. Census Bureau, 2002).
State Trait Anxiety Inventory
STAI
State Trait Anxiety inventory is a self-report measure of both state and trait anxiety. Trait anxiety refers to relatively stable individual differences in anxiety proneness, that is, the differences between people in the tendency to perceive stressful situation as dangerous or threatening and to respond to such situations with elevations in the intensity of their state anxiety (S-Anxiety) reactions. T-Anxiety may also reflect individual differences in the frequency and intensity with which anxiety states have been manifested in the past, and in the probability that S-Anxiety will be experienced in the future. The stronger the trait anxiety, the more probable that the individual will experience more intense elevations in S-Anxiety in a threatening situation. Norms are available for male and female working adults in 3 age groups; female and male high school and college students, and male military, prison inmates, medical and neuropsychiatric patients.

Center for Epidemiologic Studies Depression Scale
CES-D
The CES-D scale is a concise patient-report scale designed to measure depressive symptoms and behaviors within the last week in the general population. The items of the screening tool are symptoms associated with depression which have been used in previously validated longer scales. The new scale was tested in household interview surveys and in psychiatric settings. The CES-D has very high internal consistency and adequate test-retest repeatability. Validity was established by patterns of correlations with other self-report measures, by correlations with clinical ratings of depression, and by relationships with other variables which support its construct validity. The scale may be used as a tool for epidemiologic studies of depression (Applied Psychological Measurement, Vol. 1, No. 3, 385-401 (1977).
Appendix E

Quantification of cognitive impairment based on assessment

Test of Memory and Learning
To interpret the index scores, it is important to understand that they are constructed to have a mean of 100 and a standard deviation of 15.

<table>
<thead>
<tr>
<th>Index Interval</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-110</td>
<td>Average</td>
</tr>
<tr>
<td>80-89</td>
<td>Below Average</td>
</tr>
<tr>
<td>70-79</td>
<td>Deficient</td>
</tr>
<tr>
<td>&lt; 70</td>
<td>Very Deficient</td>
</tr>
</tbody>
</table>

*An index score of 89 or below on 1 of the 3 indexes will constitute a cognitive impairment

Test of Everyday Attention

The authors transformed each subtest score (map search, elevator counting, elevator counting with distraction, visual elevator, elevator counting with reversal, telephone search, telephone while counting, lottery) to a 19 point scale, which corresponds to a range of + or - 3 standard deviations of a matched normal distribution with a mean performance equal to 10. Each scale point represents 1/3 of a standard deviation, thus a scaled score of 7 represents one standard deviation below the norm of 10 (average). Based on the closed head injury sample discussed in the examiners manual, the map search, telephone search, telephone search while counting and the lottery subtests significantly discriminated between the head injured and controls, even at a mean of more than 14 months post injury and is the reason those 4 subtests were selected as inclusion criteria for this study.

*A scaled score of 7 or below on 2 of the 4 subtests will constitute a cognitive impairment
Behavior Rating Inventory of Executive Function Adult Version

T-scores were developed for each of the nine BRIEF-A scales, the two indexes, and the GEC. The T-scores were generated as smoothed linear or polynomial transformations of the raw scores. For the BRIEF-A the mean t score was established to be an M=50 with SD=10.

*A T score of 40 or below on 4 of the 9 scales will constitute a cognitive impairment