Volume 4, Issue 1, Spring 2011

JCR

Journal of CyberTherapy &Rehabilitation

Official Journal of the International Association of CyberPsychology, Training & Rehabilitation

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In This Issue

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THE VIRTUAL REALITY MEDICAL INSTITUTE

JOURNAL OF CYBERTHERAPY & REHABILITATION

Volume 4, Issue 1, Spring 2011

THE VIRTUAL REALITY MEDICAL INSTITUTE

International Association of CyberPsychology, Training & Rehabilita

Brussels, Belgium – San Diego, California

JCR Journal of CyberTherapy & Rehabilitation

Journal of CyberTherapy & Rehabilitation

Spring 2011
Volume 4, Issue 1

Journal of CyberTherapy & Rehabilitation
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EDITORIAL

There is an emerging body of literature about the proliferation of social networking sites (SNS) and their effects on mental health. To date, much of it has focused on investigating the possible negative effects of SNS, such as Internet addiction. However, research also supports the benefits of SNS in mental health, addictions, stigmatized identities, trauma and violence recovery, and grief support. As clinicians and researchers, we are just beginning to harness the power of SNS to promote mental well-being.

Participation in SNS has increased dramatically over the past five years. A 2010 Pew report showed that 73% of online teens and 47% of online adults in the U.S. used SNS. Another survey conducted by Pew in April–May 2010 noted that Poland, Britain, and South Korea are close behind the U.S. in SNS usage, followed by France, Spain, Russia, and Brazil. Lower participation in other countries is due primarily to less-wired populations. Notable exceptions are Germany and Japan, where Internet usage is high but SNS usage is low.

The European Union has been investing in e-Health since 2004, when outgoing Public Health and Consumer Protection Commissioner David Byrne said, "We need a … Europe where people have easy access to clear and reliable information on how to be in good health and about diseases and treatment options." An outgrowth of the European Parliament hearing at which he testified was the creation of the ICT (information and communication technologies) for Health, enabling health service providers in different EU member states to work together to exploit these technologies. More recently, the First International E-Mental Health Summit in Amsterdam in 2009 organized by the Trimbos Institute in collaboration with the International Society for Research on Internet Interventions attracted 500 participants from more than 40 countries. In the U.S., the new healthcare reform law provides financial incentives for providers to use health information technology and electronic health records, and in March 2011 leaders in healthcare technology will share their innovations in San Diego and San Francisco, California for the Health 2.0 conference.

In one such innovation, a researcher used a GPS-enabled phone and a location-aware SNS to design a system to help trainees with cognitive impairment who felt lost to find a nearby caregiver. These individuals were enrolled in a supported employment program that provided them with a job coach to help them get to and from work for the first few weeks. The system was programmed to send text messages to the job coach and time and location alarms to help the trainee get to work on time. This type of SNS could enable parents, guardians, and caregivers to watch loved ones unobtrusively.

A recent study of 217 college-age participants in South Korea found that SNS network size was positively related to subjective well-being, and the results suggest that this is due to self-disclosure. In the SNS context, it is postulated that the positive association with well-being results from the self-disclosure "confession effect," the expectation of mutual self-disclosure, and the expectation of social support.

A case study report found that deploying the Three Good Things positive psychology exercise as a Facebook application was viable, with a 1% dropout rate, which is similar to or better than other online wellness applications. In the exercise, people post three good things that happened, along with the reasons they think they happened. People found that sharing with others and viewing other's posts were valuable, as long as they were able to choose which comments they made were public and which were private.

Specialized health SNS such as PatientsLikeMe and DailyStrength offer emotional support, social support, and

patient empowerment; some also offer physician Q&A, quantified self-tracking, and clinical trials access. PatientsLikeMe includes support for mental disorders such as anxiety, bipolar affective disorder, depression, obsessive-compulsive disorder, and Posttraumatic Stress Disorder; DailyStrength provides support for an even broader array of mental health issues. In an online SNS, inhibitions may be lowered, anxiety may be lessened, and anonymity may be increased. This presents the ideal 24/7 support for treatment of people with disorders such as depression. Indeed, the Pew report showed that teens look online for health information about issues they find are embarrassing to talk about such as drugs, sex, and depression.

Of course, there are cautions. One study found that people with depression who used an online SNS spiraled down if they had friends who were moderately or severely depressed and had a negative opinion of the SNS. The researchers concluded that the SNS could be helpful if people take a break from it if their posts elicit these reactions.

A position paper on pervasive healthcare concludes that "[provided-designed systems and services] should include help for people to access peer-to-peer social support sharing and caring in order to encourage sustained engagement with self management to build positive healthy identities for themselves." Online health consumers are beginning to rely on "patient opinion leaders" for advice on chronic conditions such as mental disorders, and we need to be there with them. Of course, we must be mindful of issues such as privacy and data accuracy as we create tools to help SNS participants balance their needs to share information with their needs to manage self-presentation. Nonetheless, as clinicians and researchers, we should take advantage of SNS to extend the practice of evidence based medicine and mental health.

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GUEST EDITORIAL
Cognitive Engineering in Mental Health Computing

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Computer applications in the support of mental healthcare and rehabilitation are becoming more widely used. They include technologies such as Virtual Reality (VR), electronic diaries, multimedia, brain computing and computer games. Research in this area is emerging, and focuses on a variety of issues such as clinical effectiveness of a computer supported intervention, usability of a system, human values that are affected by a technological intervention, actual use, acceptance, and accessibility of these systems. To classify and to understand the objectives of the work presented in this special issue the mental health computing research model is presented. This descriptive model identified four research categories: (1) technology elements, (2) technology intervention, (3) clinical effect, and (4) field use. Each category has its own focus, methods and set of researchers.

Keywords: Cognitive Engineering, Mental Health Computing, Research Model

Special Issue

Mental disorders make up a large amount of the global burden of disease, with an estimation of 14% attributed to neuropsychiatric disorders, and 28% of non-communicable diseases (Prince et al., 2007). Computer support in the diagnosis, care or rehabilitation of these disorders is increasing, motivated by the improvement of effectiveness or more efficient use of healthcare resources. Computer support in prevention programs to make individuals more resilient against mental stress and enhance their overall mental wellness is also receiving research attention. Considerable attention has been devoted to studying the efficacy of some of these systems, and some attention is now being given to the use of these technologies, for example, in a recent special issue in the Interacting with Computers journal (Doherty & Bickmore, 2010). As has been recognized in areas such as consumer electronics and office applications, the interplay between technology and humans is an important factor in determining the use and acceptance of technology. Likewise, as a result, these aspects also seem to be important in the domain of mental health computing, considering the use, acceptance and accessibility of computer support systems for clinical psychology and also the human values these systems effect.

This special issue, therefore, focuses on cognitive engineering for technology in mental healthcare and rehabilitation, or more specifically, mental health computing. While cognitive engineering is an approach to analyze, model, design and evaluate interactive, complex systems, cognitive ergonomics is a relatively young branch of science, which focuses on the reciprocal influence between work and the human mind (Hollnagel, 1997), which often nowadays involves the use of computer technology. In this context, work could mean the activities of the therapist, for example, when administering treatment, but also include physical or mental efforts of a patient to accomplish a specific goal. Enhancing knowledge in this area seems essential, as computer support systems for mental health are becoming more complex as multiple actors are supported (e.g. patients, therapists, technical support, social support network, daily care takers), systems are distributed over time and place (e.g. a-synchronized, mobile, and remote care or treatment), and technologies are become more sophisticated (e.g. physiological sensors, artificial intelligent, multi modal interaction). Adding to the complexity of the situation is also the mixture of mental health researchers and technology oriented researchers that are active in this field. However,

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PHYSIOLOGICAL MEASURES AND SELF-REPORT TO EVALUATE NEUTRAL VIRTUAL REALITY WORLDS

Bert Busscher[1,2], Daniel de Vliegher[3], Yun Ling[3] and Willem-Paul Brinkman[3]

Using virtual reality technology for exposure therapy to treat patients with anxiety disorders is attracting considerable research attention. The ability to monitor patient anxiety levels helps therapists to set appropriate anxiety arousing situations. Physiological measures have been put forward as objective indicators of anxiety levels. Because of individual variation, they need a baseline recording which is often conducted in neutral virtual worlds which do not include phobic stressors. Still, because of the novelty of the virtual worlds, reports in the literature suggest that individuals already show some level of arousal when placed in these worlds. This paper presents two studies which look at the effect two different neutral virtual worlds can have on individuals. Findings suggest that a neutral world does not have to result in an increased level of arousal.

Keywords: Virtual Reality, Exposure Therapy, Physiological Measurements, Neutral Worlds, Fear of Flying

Introduction

Virtual Reality Exposure Therapy (VRET) is receiving considerable research attention for treatment of patients suffering from anxiety disorders such as claustrophobia, fear of driving, acrophobia, spider phobia, social phobia, panic disorder with agoraphobia, Posttraumatic Stress Disorder (PTSD), and fear of flying. VRET is based on the idea of gradual exposure in vivo, considered the gold standard for treatment of phobias. Recent meta-studies (Gregg & Tarrier, 2007; Parsons & Rizzo, 2008; Powers & Emmelkamp, 2008) show that exposure in VR is as effective as exposure in vivo. An important element of the therapy is that the exposure is done gradually to more anxiety-arousing situations. Therapists are, therefore, continuously monitoring the anxiety level of a patient. This can be done using Subjective rating of Anxiety (SUD), behavioral observations or physiological measures. The latter has the advantage of being more objective and can be used directly by a computer to assist a therapist in a multi-patient VRET setting (Paping, Brinkman, & van der Mast, 2010). Physiological measures, however, need a baseline measurement because of individual variation. One often used procedure is to obtain a physiological baseline recording when the patient is placed in a neutral VR world, i.e. a VR world which should not include phobia-related stressors. Even if this world has no phobia-related stressor, it is not clear whether the experience of being placed in a Virtual Environment (VE) causes some level of anxiety. Some authors (Wiederhold & Wiederhold, 2005) have suggested that the majority of non-phobic individuals do get some level of arousal when placed in a VE. For example, Jang et al. (2002) report a study with non-phobic individuals and observed that participants were initially aroused in the VR exposure, but returned to a normal baseline after approximately seven minutes. In another study, Wiederhold et al. (1998) also report that non-phobics, when placed in a VE, initially show some level of anxiety. They argued that the VE is a new and novel stimulus and therefore causes this effect. Expanding on this line of reasoning, this paper explores whether the design of the neutral world can also contribute to this effect. Or in other words, would it be possible to design a truly neutral world? As reported in this paper, we were confronted with this question after the re-

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EEG ALPHA ASYMMETRY, HEART RATE VARIABILITY AND CORTISOL IN RESPONSE TO VIRTUAL REALITY INDUCED STRESS

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We propose to combine Virtual Reality (VR) and bio-neuro feedback to help treat stress-related disorders. As a first step in that direction, we here attempted to induce stress through VR and identify (neuro)physiological correlates. Nine participants performed a surveillance task in two different cities within VR while EEG, ECG and cortisol level were recorded over time. We aimed to induce stress by simulating a bomb explosion and providing negative feedback about the participant's performance. Associative stress was elicited by having participants return to the city where the bomb explosion occurred and they supposedly performed badly. (Associative) stress was reflected in EEG mid-frontal alpha asymmetry, heart variability and cortisol level. General stress levels as expressed by cortisol and mid-frontal alpha asymmetry correlated between participants. These results are promising for a successful implementation of a VR bio-neuro feedback system.

Keywords: Virtual Reality, Stress, PTSD, Physiological, EEG

Introduction

In diverse domains – such as defense, police force and first aid – there is a risk that professionals encounter traumatic events during their work. For some of these professionals, it is difficult to imagine, reminisce and discuss such events. For caregivers, it may be difficult to address the many differences in how professionals cope with traumatic events, show specific symptoms and handle confrontations. Desensitization through (gradual) exposure is a generally accepted component within diverse psychotherapy formats aimed at phobia and Posttraumatic Stress Disorder (PTSD: Shearer, 2007) and may also be useful to train professionals who are likely to encounter traumatic events. Virtual Reality (VR) could be a particularly suitable tool in exposure. It provides a flexible, controlled setting to systematically evoke personal experiences which may arguably be stronger than memorizing or imagining the experiences. Simultaneously obtaining information about an individual's (neuro)-physiological correlates of stress could be helpful in several different ways. Firstly, it can be used (online) to tailor the appropriate level of VR exposure. Secondly, it can be fed back to the individual online such that he or she can attempt to get the values within normal range, therewith hopefully speeding up recovery or boosting stress resilience (Repetto et al., 2009). Finally, (neuro)physiological information can provide objective data on patient's responses to stressors, which may be used in clinical decision making and in systematically monitoring treatment or training results over time.

The aim of this study is to make the first steps toward a VR neuro-bio paradigm to treat or train individuals who were or are likely to be exposed to stressful or traumatic events. We have two main questions. Firstly, can we elicit stress– direct and through memorized negative association – through a VR simulation of patrolling a city? Secondly, which of several (neuro)physiological variables correlate

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DESIGN AND EVALUATION OF A VIRTUAL REALITY EXPOSURE THERAPY SYSTEM WITH AUTOMATIC FREE SPEECH INTERACTION

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Research on Virtual Reality Exposure Therapy (VRET) to treat social phobia is not new. Still, few studies focus on creating an elaborate conversation between the patient and characters in a virtual environment. This study focuses on techniques to run a semi-scripted conversation between virtual characters and a patient considering both manual and automatic speech response. Techniques evaluated are a speech detector and a speech recognizer. They were compared to a human control condition. We analyzed the flow and interaction individuals (N = 24) experienced and did a Turing-like test. A case study with two phobic patients was also conducted. Both the patients and therapist, and their interaction with the system, were observed. The study showed that the different automatic techniques had their (dis)advantages, but often did not show any significant difference with the human control condition. A VRET system with semi-scripted conversations might therefore be suitable for the treatment of patients with social phobia. Using automatic speech response techniques might reduce the system workload demand placed upon therapists, allowing them to devote more attention towards monitoring the patient.

Keywords: Social Phobia, Virtual Reality Exposure Therapy, Natural Speech, Public Speaking, Dialogue

Introduction

People that suffer from social phobia fear social situations in which they believe embarrassment may occur. This often leads to avoidance behavior. They fear scrutiny and negative evaluation by others. Making a phone call, asking for assistance in a shop, or speaking in public, are all situations they might dread. Social phobia is one of the most common types of anxiety disorders, estimated to affect 13.3% of the U.S. population in their lifetime (Kessler, et al., 1994). The disorder is associated with depression, substance abuse (e.g. alcoholism, drug abuse), restricted socialization, and poor employment and education performance (Katzelnick, et al., 2001; Kessler, 2003). The disorder leads to intensive use of health services in the western world (Wiederhold & Wiederhold, 2005).

Exposure in vivo is the gold standard for the treatment of phobias. However, for social phobia this treatment might be difficult to arrange (e.g. arranging an audience), and for the therapist difficult to control (e.g. a patience or a hostile audience). Exposure in Virtual Reality (VR) has therefore been suggested as an alternative with some initial encouraging results (Klinger, et al., 2005; Robillard, Bouchard, Dumoulin, Guitard, & Klinger, 2010). Most VR research focuses on one specific social situation i.e. speaking in front of a small group of virtual characters, also called avatars (Anderson, Rothbaum, & Hodges, 2003; Klinger, et al., 2005; Pertaub, Slater, & Barker, 2001; Slater, Pertaub, & Steed, 1999). Still, in the development of these settings the main focus is often on the body posture of the avatars (Anderson, et al., 2003; Herbelin, 2005; Klinger, et al., 2004; Slater, et al., 1999) and less on oral communication between the patient and the avatar. In work (Grillon, Riquier, Herbelin, & Thalmann, 2006) that does report on oral communication, implementations are often relatively limited in their flexibility to support free natural dialogue. This has motivated the following study into a public speaking scenario with virtual

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COMBINED USE OF MUSIC AND VIRTUAL REALITY TO SUPPORT MENTAL PRACTICE IN STROKE REHABILITATION

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Mental practice consists of rehearsing a movement with the goal of improving performance. Recent clinical studies suggest that mental practice can be an effective way to facilitate motor recovery after stroke. Though healthy subjects can easily learn to visualize a movement mentally, brain-injured individuals may perceive this task as difficult and overwhelming. We report progress of a research project, which has investigated the feasibility of combining music and Virtual Reality (VR) to support stroke patients in performing mental practice. We tested this approach in two chronic stroke individuals. After four weeks of treatment, both patients showed improved motor function and reported reduced feelings of anxiety. The results of this pilot study are encouraging and deserve further research.

Keywords: Stroke, Virtual reality, Music, Mental practice, Neurorehabilitation

Introduction

Recent years have seen a growing interest towards the application of motor imagery-based training, or "mental practice," in stroke rehabilitation. According to this approach, patients mentally rehearse a movement with the goal of improving motor performance (Dickstein and Deutsch, 2007; Gaggioli et al, 2009). Neurophysiological studies have shown that prolonged mental practice induces plastic changes in the brain, which are similar to those resulting from physical training. For example, Pascual-Leone and colleagues (1995) used transcranial magnetic stimulation to test patterns of functional reorganization of the brain after mental or physical training of a motor skill. Participants practiced a one-handed piano exercise over a period of five days. Results showed that the size of the contra-lateral cortical output map for the long finger flexor and extensor muscles increased progressively each day and that the increase was equivalent in both physical and mental training.

Sharma and colleagues (2006) conceptualized motor imagery as a "backdoor" to accessing the motor system after a stroke because "it is not dependent on residual functions yet still incorporates voluntary drive" (p. 1942). Brain imaging studies indicated that motor imagery involves a complex distributed neural circuit, which includes the activation of primary motor cortex (M1), supplementary motor area, dorsal and ventral lateral pre-motor cortices, superior and inferior parietal lobules, pre-frontal areas, inferior frontal gyrus, superior temporal gyrus, primary sensory cortex, secondary sensory area, insular cortex, anterior cingulate cortex, basal ganglia and cerebellum (Decety, 1996). However, the use of mental practice in stroke rehabilitation is problematic. Patients often report difficulties in performing mental simulation. Also, neuropsychological evidence suggests that after stroke motor imagery is not symmetrical and that motor imagery vividness is higher when imagining movements on the unaffected than on the affected side. Finally, it is not a simple task to instruct patients to imagine movements using a first-person perspective (kinesthetic imagery), an approach that is believed to be effective to train fine motor skills (Jackson et al, 2001).

In order to support stroke patients in performing mental practice, we developed an integrated training approach, which combines the use of VR technology and mental

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EVALUATION OF CARD-BASED VERSUS DEVICE-BASED REMINISCING USING PHOTOGRAPHIC IMAGES

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Pamela Topping[1] , Karl Boyle[1] and Suzanne Martin[1]

Reminiscence activity is commonplace as an activity that is widely recognized as beneficial to people with dementia. It can offer alleviation of the burden of care for those who look after people with this disease. In reminiscence activities, people may use items including photographs representing their lives, in some form. Reminiscence systems are the use of technology to support reminiscence work. This paper describes a study that carried out an evaluation of card-based versus device-based reminiscing using photographic images. The outcome of the study demonstrated no difference between traditional and device-based reminiscing of photographic images, indicating no barriers to the use of systems for reminiscing activities.

Keywords: Reminiscence Systems, Reminiscing, Assistive Technology, Reminiscence Therapy, Reminiscence Work

Introduction

The response at policy level to the demographic ageing or the "greying" of our populations in developed economies is a move towards self-management where possible, as well as supporting "ageing in place" where the older person can receive care at home, in the supportive circle of family and friends. However, many of these people may not have opportunities for social contact, even at home, and as such, potentially face a degree of social isolation. The paper outlines work in support of reminiscing, which is recognized as an activity that provides benefit to, for example, people with dementia. The activity also is of benefit as a therapeutic intervention to this group and is recognized as beneficial also to the wider, older population. As we age, we gather a large number of life experiences, many of them signifying important life stages – for example, as our family grows, as we impact on the world, and as the world impacts on us. An old photo, of sentimental value, can mean everything to a person, becoming imbued with tremendous significance and often-talismanic importance. These artefacts, whether a location, person or event, or indeed a photo of such an artefact, become the stuff of reminiscing, fuelling what is viewed as a therapeutic process, that, when managed, offers benefits (Koretsky, 2001; Sandoz, 1996) but can reinforce feelings of isolation and depression when unmanaged. As people age, they also increasingly face old age alone, especially in developed economies, as the demography of the post-war (1939-45) period is realized in societies today. The baby boomers of the post-war period are now at or past retirement age, and this increase in numbers of older people results in a significant strain on social and health services. It is projected that by 2025 over 70% of UK households will comprise of people living alone, where a majority will be elderly people. This large body of people, each of whom may have gathered many sets of memories as photographs, has no real facility to use material for reminiscing or share these and to enjoy the therapeutic benefit arising from sharing.

Reminiscing includes a range of activities and traditional tools aimed at stimulating thoughts, feelings and memories of times gone by. For example, these could

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VIRTUAL INFORMATION DISPLAY FOR COGNITIVE REHABILITATION: CHOICE OF SCREEN SIZE

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In VR-based cognitive rehabilitation, there is a particular interest in the subject's performance in the virtual tasks in which patients are engaged. This performance is a function of many factors, among which includes the characteristics of visual information delivered by the virtual system. This study was designed to examine the impact of the size of the display screen on the performance in a virtual task in the Virtual Action Planning Supermarket (VAP-S) among patients with brain injury and healthy control subjects. We designed two configurations – Config L with a large screen and Config S with a small screen. Results show that participants of both groups made a fewer number of incorrect actions in the virtual task in the large screen condition. We conclude that, in our study, increasing the size of the screen improved subjects' perception of the visual information and consequently, the performance of the task.

Keywords: Cognitive rehabilitation, Virtual Reality, VAP-S, Field of view, Performance

This work was conducted at Arts et Métiers ParisTech-LAMPA, in the Handicap & Innovative Technologies Entity, Laval, France.

Introduction

After stroke or traumatic brain injury, cognitive rehabilitation aims to promote the recovery of autonomy using training in Activities of Daily Living (ADL). Due to the frequent lack of efficient resources to deliver the necessary interventions for patients' rehabilitation, therapists are interested in functional virtual environments (VE) (Rizzo, Schultheis, Kerns and Mateer, 2004) that afford the simulation of instrumental ADL, e.g. shopping in a virtual supermarket (Klinger, Chemin, Lebreton and Marié, 2004). The information related to the task has to be delivered in an appropriate way by the virtual system in order to allow the patient to perceive it realistically, and to result in the best conclusions and thus, generate successful reactions. Given the necessary choice of an adequate device to display visual information, we are interested in the impact of the screen size on information perception and on the performance in completing the virtual task. Performance can be defined as a set of recorded data that documents the way in which the subject performs the task.

This study is a continuation of previous works that aimed to compare visual interfaces for better treatment of cognitive dysfunction with virtual reality systems. The use of a large screen is often accompanied by the intuition that such display affords a better presentation of the information and a stronger feeling of immersion. However, there is a lack of research that empirically demonstrates how users benefit from an increase in the screen size (Ni, Bowman and Chen, 2006a). The physical field of view (PFOV) has to be considered. PFOV corresponds to the space seen by both patient's eyes, not moving and fixed in front of them (Zanglonhi, Avital and Prigent, 2000). It depends on the screen size and the distance between the user and the screen.

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COGNITIVE ENGINEERING OF A MILITARY MULTI-MODAL MEMORY RESTRUCTURING SYSTEM

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Several methods have been proposed to treat combat veterans with Posttraumatic Stress Disorder (PTSD). Still, a recent review reports on high drop-out and non response rates. This has motivated work in the design of a software application to support and increase the appeal of traditional face-to-face trauma-focused psychotherapy. The research followed a situated cognitive engineering approach, which included a domain analysis, scenarios and claims analysis based on experts reviews (N=10), user evaluations, and a case study. This resulted in the identification of nine core application functions: (1) provide a flexible way of storytelling, (2) provide a structured way of storytelling, (3) prevent losing track of changed and added events, (4) ensure patient trust, (5) ensure usage for therapists with different backgrounds, (6) ensuring awareness of treatment, (7) provide a personal approach, (8) prevent unexpected exposure to emotional material, (9) and ensure an appealing and motivating approach throughout the therapy. These functions formed the basis for the design of a military multi-modal memory restructuring (Military - 3MR) system, which focuses on restructuring and relearning of past events. The system allows the patient and therapist to visualize past events using personal photos, narrative text, online geographical maps, webcam snapshots, and patient created 3-D virtual worlds. Results of the usability evaluation (N=18) suggest key design features, such as the time line, content management, and the 3-D world editor, meet an acceptable perceived usability level. Results of a storytelling experiment (N=18) between telling an autobiographical story with or without the Military-3MR system found that with the system, time referencing and event description were more precise, and a smaller time period in the story was covered. In the case study, the veteran suffering from combat-related PTSD was pleased with the system and felt encouraged talking about past events.

Keywords: PTSD, Trauma-focused Psychotherapy, Memory, Multimedia, Cognitive Engineering

Introduction

Warriors that served in combat or peacekeeping operations have often witnessed or experienced traumatic events, such as attacks, serious personal injuries, and the death of comrades or civilians, including children. On their return from deployment these warriors can suffer from Posttraumatic Stress Disorder (PTSD). For example, a survey (Hoge, et al., 2004) among members of four U.S. combat infantry units found that between 12-20% of them reported PTSD symptoms a few months after their duty in Iraq or Afghanistan. Similarly, in another survey (Milliken, Auchterlonie, & Hoge, 2007) among U.S. Iraq war veterans 17-25% exhibited PTSD symptoms three to six months after their return. Several methods have been proposed to treat patients with PTSD ranging from pharmacological approaches to Cognitive-Behavioral Treatments (CBT), with exposure therapy currently considered the first-line treatment for PTSD (Cukor, Spitalnick, Difede, Rizzo, & Rothbaum, 2009). Still, a recent review (Schottenbauer, Glass, Arnkoff,

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Journal of CyberTherapy & Rehabilitation
Spring 2011, Volume 4, Issue 1

PREDEPLOYMENT STRESS INOCULATION TRAINING FOR PRIMARY PREVENTION OF COMBAT-RELATED STRESS DISORDERS

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Predeployment stress inoculation training (PRESIT) is designed to help personnel cope with combat-related stressors and trauma exposure. PRESIT comprises education on combat and operational stress control, attentional retraining and relaxation training, and practice and assessment via a multimedia stressor environment (MSE). Heart rate variability (HRV) and a reaction time task assessed learned skills and inoculation to MSE arousal. Participants with deployment experience and who were in the experimental group demonstrated improvement, measured as greater relaxation demonstrated during the MSE of a follow-up session relative to that of a baseline session. There was also a training effect for this group, such that those participants who showed greater relaxation from a baseline HRV state during the training (i.e., on relaxation breathing and focusing) showed more improvement between sessions. In contrast, there were no significant predictive variables for the participants in training who had never deployed. Participants with more Posttraumatic Stress Disorder (PTSD) symptoms at baseline showed more capability for improvement, as was true for participants who were more anxious about their next deployment.

Keywords: Stress Relaxation, PTSD Prevention, Combat, Operational Stress

Introduction

Concern over large numbers of psychological casualties in military personnel returning from Operations Enduring Freedom and Iraqi Freedom has led to renewed impetus to identify those at risk for serious mental health problems and treat those already suffering from negative mental health consequences (e.g., Hoge et al., 2004; Office of the Surgeon Multinational Force-Iraq, 2006; APA 2007; DoD, 2007; Litz, 2007; Seal et al., 2008; Burnam et al., 2009; Marmar, 2009, Safran et al., 2009). Deployed Soldiers and Marines have an estimated prevalence rate of 16-17% for major depression, Posttraumatic Stress Disorder (PTSD), or generalized anxiety about four months after their return from Iraq (Hoge et al., 2004), and 19% one year after deployment (Hoge et al., 2006). It has been estimated that the two-year PTSD and depression-related costs for the approximately 1.6 million troops who have deployed since 2001 could range from $4.0 to 6.2 billion (Tanielian & Jaycox, 2008).

Consequently, substantial resources are being expended on the treatment of combat-related stress disorders. Although there is much ongoing research to determine the most effective *treatments* for PTSD, little is known about *preventive* efforts designed to prepare personnel to cope with potential deployment and combat-related stressors. As increasing numbers of military personnel continue to engage in combat and other stressful operational situations during deployment, attention is only beginning to shift toward predeployment efforts to reduce the potentially harmful psychological effects of traumatic exposure. Predeployment primary prevention efforts should improve combat effectiveness in the field,

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