
VIRTUAL REALITY TREATMENT MANUAL

In Virtuo Physiologically-Facilitated Graded Exposure Therapy in the Treatment
of Recently Developed Combat-related PTSD

(Training Skill-Based Resiliency)



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Due to the horrendous nature of war, posttraumatic stress disorder (PTSD) has acquired an intensive focus in mental health in the time following armed conflict. Yet with tens of thousands of veterans flooding an initially unprepared Veterans Administration system in the years following the war in Vietnam, military health and VA systems have realized that they need to be prepared for up to 20% psychological casualties, with PTSD representing a large percentage of these casualties. Further, we now know that the earlier we identify and treat mental health problems, the better the chance of limiting or reversing the problems. This treatment manual will describe traditional experiential skill-based methods along with one of the most potent new tools that we have in our arsenal, the use of virtual reality (VR) in the treatment of PTSD. To put this relatively novel treatment into context, we will review various types of treatments used to treat the various forms of combat PTSD, and then describe the benefits of VR-assisted treatments. One approach in particular, a skill-based graded exposure treatment, will be described in depth for the first time in the literature.

Overview of PTSD

In order to appreciate the type of intervention selected and its expected efficacy, it is valuable to appreciate the particular nature of PTSD.

Epidemiology of PTSD

Prevalence

According to the National Institute of Mental Health (2008), 5.2 million (3.6%) Americans aged 18–54 have PTSD. A prospective, longitudinal study assessed 967 consecutive patients who attended an emergency clinic shortly after a motor vehicle accident, again at 3 months, and at 1 year. The prevalence of posttraumatic stress disorder (PTSD) was 23.1% at 3 months and 16.5% at 1 year. Chronic PTSD was related to some objective measures of trauma severity, perceived threat, and dissociation during the accident, to female gender, to previous emotional problems, and to litigation. Maintaining psychological factors, that is, negative interpretation of intrusions, rumination, thought suppression, and anger cognitions enhanced the accuracy of the prediction. Negative interpretation of intrusions, persistent medical problems, and rumination at 3 months were the most important predictors of PTSD symptoms at 1 year. Rumination, anger cognitions, injury severity, and prior emotional problems identified cases of delayed onset (Ehlers, Mayou, & Bryant, 1998).

The Veterans Administration (VA) operates more than 140 specialized programs for the treatment of PTSD through VA Medical Centers and Clinics. In 2001, VA specialists treated more than 77,300 veterans for PTSD (American Psychological Association, 2003).

Prevalence in Combat Veterans

“The violent guerrilla tactics used by insurgents in Iraq will take a considerable toll on the mental health of troops, resulting in a lifetime of disability payments for many of those who return from war,” said U.S. Secretary of Veterans Affairs Anthony Principi (September 23, 2004).

A 2006 study reported that 18.7% of Vietnam veterans developed lifetime PTSD (Dohrenwend, Turner, Turse, Adams, Koenen, & Marshall, 2006). Studies of other wars have found the prevalence of PTSD ranging between 8 and 12 percent, according to Dr. Matthew Friedman, executive director of the VA's National Center for Posttraumatic Stress Disorder and a Dartmouth professor of psychiatry. A major study of Vietnam veterans published in 2007 found that about 31 percent of men and 27 percent of women had suffered from PTSD at some point after their return from the war (National Center for PTSD, 2007).

While Vietnam has provided us an indication of what to expect from modern war, the situation in Iraq is an even more complex scenario, as there are no longer front lines and rear encampments to retreat to for rest and recuperation. Friedman believes the ambush tactics of the

insurgency potentially expose a greater percentage of soldiers to the kinds of stresses that cause PTSD. Indeed, VA officials have reported that so far, 20 percent of Iraq veterans who have sought VA health care did so for mental health issues. They expect those numbers to grow since many who suffer posttraumatic stress disorder and other mental illnesses haven't yet sought care. Of 168,000 service members who had served in Iraq and been discharged as of July 22, 2004, about 28,000 had sought medical care from the VA, according to the department's most recent statistics. Of those, about 5,400 had mental health issues and nearly 1 in 3 of those suffered from PTSD (Young, 2004).

Time Course of PTSD

Kessler et al. (1995) found that one-third of the respondents with an index episode of (non-combat) PTSD failed to recover even after many years. Breslau et al. (1998) found the median time to the remission of PTSD was 25 months. Prigerson et al. (2001) found that the risk of PTSD symptoms lasting longer than 2 years was significantly greater among men with combat trauma compared with men reporting other traumas as their most disturbing life event.

Types of PTSD

When discussing prevalence and treatment of PTSD, it is important to appreciate the chronicity and complexity of the illness.

Acute Stress Disorder (ASD) is characterized by a mix of hyperarousal, and dissociative and re-experiencing symptoms within the first month following a life threatening situation, and the symptoms last a minimum of 2 days and a maximum of 4 weeks.

Acute vs. Chronic PTSD: Acute PTSD differs from chronic PTSD only in terms of duration of symptoms, with acute being diagnosed 30–60 days post trauma, after which time the designation of *chronic* begins to be applied. Both acute and chronic PTSD are similar in that patients a) are exposed to a situation in which they believe their life is at risk, b) experience cognitive, affective, and physiological hyperarousal, c) have substantial avoidance of situations that remind them of the traumatic experience, and d) experience significant disruption in their work or social functioning because of these symptoms.

Delayed Onset PTSD: The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) defines delayed onset PTSD as onset of symptoms occurring at least 6 months after the traumatic event. Certainly most patients with PTSD have symptoms setting in within days or weeks of either a) a specific traumatic event, or b) an event which is the straw that “broke the camel’s back,” as in the case of a convoy driver just waiting for “his turn to get hit” by an improvised explosive device (IED), and then, finally, lack of sleep and a build-up of anxiety accumulate, resulting in an onset of symptoms. However, not nearly as well described in the literature, but which increasingly is being seen in troops returning from Iraq and Afghanistan is a delayed onset of PTSD symptoms. Certainly, there are those who are not being diagnosed with their PTSD because either they do not bring it to the attention of medical personnel, or because the medical personnel do not recognize it in some people. But what we are referring to as *delayed onset PTSD* is another matter altogether. While this has rarely been discussed in the literature, one study has attempted to put delayed onset PTSD into epidemiological perspective. Gray, Bolton, & Litz (2004) identified delayed onset PTSD in Somalia peacekeepers. Out of a sample of 1,040 returning peacekeepers filling out a PTSD Checklist upon initially returning from Somalia, follow-up data 18 months later revealed that 902 were found to be “resilient,” 70 had acute onset (significant symptoms at time 1) with 23 of those (approximately 30% of the acute onset group) remitting by time 2 assessment (thus, about 70% of the acute onset group remaining elevated). Sixty-eight (about 6.5% of the total sample) looked normal at Time 1, but at Time 2 assessment had scores that resembled the acute onset group. Thus, while only 6.7% of the sample had significant PTSD symptoms at Time 1, by Time 2, a full 13% of the sample had developed

significant PTSD symptoms at some point, with an equal number developing symptoms in a delayed time-course.

We have observed 2 distinct types of delayed PTSD. Some patients have delayed onset of a recent event. A Marine may return home after a 6-month deployment, successfully suppressing dysphoric thoughts and feelings, only to find that after some months, symptoms begin to emerge. Perhaps this is due to an inability to adjust to and integrate back into normal life stateside. Or it could be because once he “drops his guard” and begins feeling safe, his psyche no longer suppresses the horrors he experienced in combat.

Another type of delayed onset PTSD occurs when a recent event (divorce, head injury, alcohol abuse, new onset mental disorder) brings out trauma associated with an earlier event. This is being increasingly observed in troops who appear to be adjusting adequately upon their return, but suddenly develop PTSD symptoms months or years later due to a new event that disinhibits successfully suppressed distress from previous experiences. One of the most common places this is seen is when an active duty member is getting close to redeploying to a combat zone. If they developed an anxiety or depressive disorder in the interim, began using alcohol, have been having marital difficulty, or developed a head injury, then they have an increased chance of developing delayed onset PTSD. We have observed delays as long as 40 years, but most seem to be emerging with redeployment in the context of the Iraqi war. Of course, it is important, as with any subjectively reported diagnosis, to rule out malingering.

Simple vs. Complex PTSD: Another aspect of PTSD (indeed, of any mental health problem) is its complexity. We refer to *Simple PTSD* as a single event, with few risk factors. A person who experiences a life-threatening incident who has no history of mental health problems, but tends to ruminate and interpret the events negatively may develop PTSD, yet probably has a better chance of recovery than someone with complex PTSD. *Complex PTSD* refers to someone who has a history of mental health problems (such as prior chronic or acute trauma, or current anxiety or depression), who is exposed to a life-threatening incident, or who develops a physical injury due to the incident that may lower one’s threshold for coping with the trauma (such as a mild traumatic brain injury, or a bullet wound to the limb with resultant chronic pain and sleep loss). Complex PTSD is felt to be more difficult to treat, and may require a more intensive course of therapy.

Typical Treatments

To better understand VR-assisted treatments, a brief overview of other typical treatments for PTSD follows. The most common types of treatments include psychotropic medications, cognitive behavioral therapies (CBT), critical incident stress debriefings (CISD), sleep support, and various types of experiential therapies, including exposure therapies, many of which can be facilitated by VR. Far from being an exhaustive review, this brief overview is meant to provide a context for better understanding how VR-assisted therapy complements and differs from more typical interventions.

Medications

Different medications have been used for PTSD with varied effects. As with all treatments, it is important to distinguish the type of PTSD for which the treatments are attempted. In the past 2 years, there have been attempts to treat ASD with beta-blockers or benzodiazepine in order to ameliorate symptoms and prevent the further development of PTSD. Acute PTSD has been typically treated with selective serotonin reuptake inhibitors (SSRIs) and tricyclic antidepressants (TCA). Chronic PTSD has been treated with a wide range of medications, including SSRI, antipsychotic, and benzodiazepine class medications. The more complex the PTSD, the more different classes of medications tend to be utilized. Of course, sleep support is also frequently utilized to improve coping and reduce symptoms including nightmares. However, while simple to employ, the benefits of medication for PTSD have been found to be relatively

weak. In a comprehensive meta-analysis, Van Etten & Taylor (1998) found that medication management was half as effective as psychotherapy and had twice as many patients drop out of treatment.

Selective serotonin reuptake inhibitors (SSRIs) are recommended as first line treatment by the VA/DoD Clinical Practice Guidelines for Post-Traumatic Stress Disorder (CPG-PTSD), and 2 SSRIs (paroxetine and sertraline) are FDA approved to treat PTSD. Among the 7 randomized controlled trials of SSRIs conducted to date considered to have been “high quality” by the Institute of Medicine (IOM), 4 demonstrated statistically significant benefit (Institute of Medicine, 2007). However, the 2 trials of SSRIs (both of sertraline) conducted in populations of veterans were both negative trials, though trends favored sertraline over placebo (Zohar et al., 2002; Friedman, Marmar, Baker, Sikes, & Farfel, 2007). A third study conducted on a sample composed of 50% Israeli combat veterans, found that patients treated with fluoxetine had significantly better outcomes than patients on placebo (Martenyi, Brown, Zhang, Prakash, & Koke, 2002). Importantly, a subsequent analysis conducted on the subsample of veterans also indicated that fluoxetine had significantly better outcomes than placebo (Martenyi & Soldatenkova, 2006). Despite these mixed results, the expert consensus is that SSRIs are the first line medication of choice for PTSD, in part due to the fact that they are well tolerated and effectively address comorbid depression and other anxiety disorders. For patients that fail to respond to an SSRI, expert consensus guidelines have recommended switching to a different SSRI (or class of antidepressant) or augmenting with a wide range of psychotropic medications (Davidson et al., 2005).

Psychotherapy Options

The most recent VA/DoD Clinical Practice Guideline for PTSD recommended cognitive therapy, exposure therapy, and stress inoculation as first line treatments (Veterans Health Administration, Department of Defense, 2004). In contrast, the IOM report (2007) stated that there is only sufficient evidence to conclude that therapies with an exposure component are efficacious and only when delivered one-on-one (as opposed to group format).

Prevention

Critical incident stress debriefing (CISD) (Mitchell & Everly, 1996) is an example of an innovative cognitive/exposure-based treatment that has been employed immediately following a disaster to prevent PTSD. The military has used this extensively for attempting to assist active duty personnel to cope with disasters both due to training as well as actual combat. Here, persons exposed to a disaster sit in groups and describe their experiences of the events in detail. It is believed that “getting it all out” early on prevents the need to suppress one’s experiences and therefore ameliorates the development of symptoms in the future. However reasonable this may seem, results have been mixed at best. Studies appear to suggest that professionals (such as fire, police, and emergency rescue teams) have their own ways of coping with disasters and CISD trainings may not be of value for most of them (van Emmerik, Kamphuis, Hulsbosch, & Emmelkamp, 2002; Kuroski, 2006). On the other hand, some civilians traumatized by a disaster may reap some benefit from such an early and brief group discussion. Sufficient research is lacking on the benefits of CISD for military groups exposed to combat to know if it is truly of value. Many mental health professionals, however, believe that this simple intervention could not hurt, and may at least help identify those with early onset ASD who may benefit from further therapy, or can “normalize” therapy for those who later wish to seek it out. Interestingly, the approach used in CISD to describe the sights, sounds, smells and feelings that occurred during the sentinel event are techniques central to standard exposure therapy, as will be discussed below.

Treatment

Cognitive Behavioral Therapy (CBT)

Cognitive therapy, the most common form of psychotherapy conducted in the United States currently, is not surprisingly the most frequently used form of psychotherapy for treating PTSD as well. Therapists help patients target inappropriate automatic cognitive, affective, physiological and behavioral responses to current events and focus instead on rational responses appropriate to the situation. This type of therapy can be conducted in group or individual formats, and often incorporates other therapeutic modalities, especially the experiential forms discussed below. Cognitive therapy, which has patients discuss their symptoms and describe the traumatizing event, can also be considered to be engaging in a mild form of exposure therapy.

Cognitive behavioral therapy has been used effectively in both acute and chronic, simple and complex PTSD. In a study by Resick, Nishith, & Griffin (2003), 121 female rape victims, most of whom had extensive histories of trauma, were randomly assigned to cognitive-processing therapy, prolonged exposure, or a delayed-treatment waiting-list condition. Both types of treatment were equally effective for treating complex PTSD symptoms. The sample was then divided into 2 groups depending upon whether they had a history of child sexual abuse. Both groups improved significantly over the course of treatment with regard to PTSD, depression, and the symptoms of complex PTSD as measured by the Trauma Symptom Inventory. Improvements were maintained for at least 9 months. These findings indicate that cognitive behavioral and exposure therapies are effective for patients with complex trauma histories and symptom patterns.

Interpersonal Therapy

Although cognitive therapy and CBT have received the greatest attention as psychotherapeutic interventions for PTSD, interpersonal therapy—probably due to its popularity in general across all diagnostic categories—has also shown benefits in the treatment of PTSD. Interpersonal therapy (Sullivan, 1953; Weissman et al., 2000) explores the interpersonal nature of one's PTSD symptoms, both currently and in the past.

Experiential Therapies

The rest of this treatment manual will be spent describing *experiential therapies*, including somatic-based (tending to develop control over physiological reactivity from distress and establish a basis in somatic comfort), attentional-based (developing control over cognitive processing) and exposure-based (extinguishing arousal and in some cases re-associating with a competitive positive affect). Some approaches to exposure include hypnosis, which attempts to distance (thus better tolerate and reflect upon) arousing images, while eye movement and desensitization (EMDR) and other types of imagery exposure attempt to maintain arousal in order to exhaust the arousal. Some of these approaches simultaneously bring a competitive somatic or affective sensation to the foreground in order to break cognitive-affective links conditioned by the traumatic event and re-associate a neutral or comforting sensation when considering the traumatic event (dissociative trance state in hypnosis, relaxation in imagery, eye movements in EMDR).

The type of exposure therapy we will be outlining below combines many of these features: establishing a comforting somatic base, learning to control one's attentional focus, exposing to arousal, and then gaining mastery over cognitive/affective/physiological arousal by re-focusing away from the internal arousal and comfortably into the moment at hand. Therefore, it will be useful to examine components of these therapies that will be utilized in the VR-assisted graded exposure discussed later on.

Somatic-Based Approaches

Many popular treatments for PTSD include as part of their treatment a skill-based somatic component. Relaxation exercises have a physical (autonomic) emphasis. Typically, an effort is

made to train an individual to reduce sympathetic arousal and enhance parasympathetic recuperation, something very much lacking in persons with PTSD, as is clear from the levels of stress hormones present. Progressive muscle relaxation is most typically taught, but other approaches such as slow breathing with or without physiological feedback may be used. Efficacy of this approach for reducing PTSD diagnosis or symptoms when attempted alone is low, however, when compared to other therapeutic approaches (Taylor et al., 2003). Yet training in self-regulation of physiological arousal makes sense when used in combination with other cognitive approaches.

Physiological monitoring and feedback is particularly useful as a method of self-regulation. Practiced for more than 40 years, there are a variety of approaches to physiological monitoring and feedback. The oldest forms have the patient watch a monitor or listen to a tone that reflects autonomic arousal by reflecting one or more peripheral physiological functions including skin temperature, skin conductance, muscle tension, respiration, and heart rate. Patients are told to manipulate the monitor (sound or graphic) by any means they can, or by breathing slowly in their abdomen. It is felt that learning to regulate autonomic arousal will allow patients to not only control their physiological arousal, but to calm their thoughts and emotions as well. Modern technology has allowed physiological monitoring and feedback practitioners to extend monitoring to include heart rate variability (HRV) and electroencephalography (EEG) spectral analysis. HRV is an excellent indicator of sympathetic arousal, and the very low frequency spectral analysis of HRV permits for monitoring of cognitive vigilance associated with sympathetic arousal (Spira & Kotay, 2004). EEG spectral analysis permits for monitoring and even training of different attentional states of mind (beta, alpha, theta, delta). Rather than simply instructing the patient to “make the tone go up” any way they can, modern-day psychophysiology practitioners are more often found to be *part of the feedback loop* in that the provider is continually monitoring the physiological data, and suggesting attentional and somatic exercises for the patient to find which approach works best for them. In this way, each patient finds the approach to calming mind and body that works best for them. Such physiological monitoring is an excellent tool to use with other modalities, including VR, for continual objective assessment of arousal in patients with PTSD (Wiederhold et al., 2002).

Attentional-Based Approaches

Eastern meditative traditions, especially of the type used by Zen practitioners, are specifically geared toward training one to achieve a calm, focused clarity of mind. Research shows that the EEG alpha state is especially enhanced (sensory absorption) while theta and beta are reduced during meditative practice (Hirai et al., 1999). However, other mental states, including beta (focused effortful attention), theta (recuperative, creative thinking) and delta (restorative sleep) are beneficial sequelae of regular meditation practice. Meditative traditions share with relaxation training, physiological monitoring and feedback, and other somatic approaches an emphasis on skill development for self-regulation. However, while somatic approaches attempt to train the patient to directly control their physiology, meditation typically emphasizes cognitive control over attention. Meditative traditions share with cognitive therapies the belief that cognitive processes drive affective, physiological, and behavioral reactivity. While cognitive therapy emphasizes underlying rigid beliefs as the cause of current dysfunction, meditative traditions emphasize fundamental cognitive processes (attachment to thoughts as if they are real phenomena themselves), and therefore train one to suspend reflective thought when it is unnecessary and instead to simply “be in the moment.” From this perspective, relaxation training and physiological monitoring and feedback might calm the mind, not by directly changing the physiology through slow breathing or muscle relaxation, but instead from becoming more fully absorbed in comfortable sensation rather than continuing to attend to and stimulate distressing thoughts and feelings. Indeed, when patients are asked to attend to a distressing thought or feeling, their sympathetic arousal is significantly increased. By contrast, when asked to engage in

Zen meditation (attending to what they see, hear and feel), patients significantly reduce their sympathetic arousal, even without controlling their breathing or otherwise consciously manipulating their physiology (Spira & Kotay, 2004; Spira et al., 2007). Thus, attentional control through Zen meditation is thought to reduce both psychological and physiological arousal.

Zen meditation can also be thought of as *attentional retraining*, where attentional control is enhanced. Attention is an important survival mechanism. This is important, since whatever one attends to, one enhances. If one attends to worry or pain, one enhances the processing of that activity. Similarly, if one attends to the breath or to the work one is engaged in, one enhances those activities. Further, one's brain and body gear up to support whatever one is attending to: the activity of the hypothalamic-pituitary-adrenal (HPA) axis is well known in support of this function. When one attends to a crisis situation (saber tooth tiger, gunfire) the brain activates areas responsible for arousal and response (HPA axis, autonomic nervous system [ANS] activation, periaqueductal gray [PAG] relay, limbic arousal, frontal interpretation). Similarly, when one attends to safe and soothing sensations (doing meditation, watching television in bed), these areas of the brain reduce arousal and increase parasympathetic recuperation. Anxiety makes one hypervigilant, maintaining awareness of affect-laden cognitive content, even when there is nothing that can be done to act on that content. Meditation teaches one to focus in the moment, to act on what can be acted upon, and to let go of what can not be addressed at that time, returning to the moment at hand. In other words, if one can address a problem, then one should do so, otherwise it is better to focus on neutral or positive sensations or activity.

Attentional Retraining

- 1) Whatever you attend to, you enhance
 - a) attending to worry or pain will enhance those experiences
 - b) attending to comfort or work will enhance those experiences
 - 2) Your body and brain gear up to support what you attend to
 - a) attending to worry or pain will activate stress responses
 - b) attending to comfort or neutral sensations will activate recuperative responses
 - 3) If you can act on what you are worrying about, then do so. Otherwise, redirect your attention back to the situation at hand, or a positive comforting sensation
-

Meditation helps reduce background “noise” and enhance foreground signal. Different types of meditation emphasize different aspects of this. Zen meditation emphasizes signal enhancement—attending to and becoming absorbed in what one sees, hears, feels, and smells at each moment. When thoughts arise, practitioners note that “noise,” let it go, and return to the sensations (“signal”) at hand. Vipassana meditation emphasizes noise reduction—notice what arises, but don't react to it or judge it. Simply notice what arises, passively attending to it until it dissipates, then return to the moment at hand (such as feeling the breath flow in and out). These practices are complementary, merely emphasizing different aspects of the same principle: Focus in the moment, calmly and comfortably, noticing thoughts and other distractions that arise, but not holding onto them, but simply letting them pass and then refocusing back into the moment at hand. Research on the effectiveness of meditation for PTSD is lacking; however, this is a component that, in combination with other approaches, appears to be a beneficial addition. Dialectical behavior therapy (DBT) utilizes these principles with chronic, complex PTSD (PTSD and comorbid borderline personality disorder) somewhat effectively (Linehan, 2002; Linehan, 2003).

A word of caution, or perhaps clarification, is appropriate here with regard to avoidance and the use of meditation: Meditation is the antithesis of avoidance of thoughts and suppression of feelings. The more one clears one's mind through meditation (as described here), the more open one is to deep-seated thoughts and feelings rising to consciousness. When one becomes calmly and comfortably absorbed in sensation in the present moment, thoughts and feelings will

rise to consciousness, where one observes them and lets them go. They are neither pushed out of consciousness nor clung to, and that is the difference between meditation and anxious worry (on the one hand) or fearful avoidance (on the other hand). The more one engages in the meditative process, the easier it is to let these intrusions arise, recognize them, and let them go. Therefore, the calmer one's mind becomes and the more previously suppressed thoughts and feelings can arise, the more capable one is to let them go, until there are no more thoughts or feelings agitating to intrude into consciousness.

Exposure-Based Approaches

Many of the above approaches (with the exception of medication or somatic-based approaches) could be considered a mild form of exposure therapy, in that they help patients tolerate sustained attention to the arousing stimuli. CBT encourages discussion of the sentinel event and one's reactions to it while in a safe therapeutic environment. Vipassana meditation encourages passive awareness to arousing thoughts without habitual reactivity to it, until the thoughts extinguish and one can return to the moment at hand. Yet the most effective treatments of PTSD reported in the literature are those that directly confront the internal arousal of the patient.

There are 3 general approaches to exposure therapy:

- 1) *Minimal Arousal with Graded Exposure*. This approach follows the principles of Jacobsen's desensitization (1938) with progressive muscle relaxation. It is based on the belief that one can learn to maintain minimal arousal in the face of increasingly arousing cues. This approach has proven effective for a wide range of phobias. However, there is a lack of strong evidence for its use in PTSD. The Foa group has some evidence that minimizing arousal through relaxation decreases effectiveness from their flooding type exposure approach (Cahill & Foa, 2004). Apparently, combining these 2 approaches has not proven effective.
- 2) *Flooding-type Exposure*. This approach follows the principles of Edna Foa. It is based upon a strict behaviorist approach to break conditioning. Personal control over physiological and cognitive arousal is not emphasized. This approach has proven effective for phobias, and has been shown to be effective in treating PTSD, and in at least one small, single-group design with chronic combat PTSD (Boudewyns & Hyer, 1990). This approach uses maximum tolerated exposure for at least 20 minutes per session with specific cues/scenarios. Foa has conducted research demonstrating that, at least in terms of using this flooding paradigm, efforts to reduce arousal during this flooding technique detract from the effectiveness of flooding alone. On the other hand, this group has also shown that when using d-cycloserine (a medication intended to reduce limbic arousal), patients can both tolerate higher levels of arousal and apparently reduce anxious symptoms more rapidly than using the maximum exposure model alone (Davis, Ressler, Rothbaum, & Richardson, 2006). Therefore, it may be that a combination of maximum arousal with the ability to better tolerate the exposure is optimal (see approach 3, below).
- 3) *Skill-based Arousal Control during Exposure*. This approach is based upon a cognitive behavioral model, emphasizing cognitive restructuring for thought content, biofeedback for controlling physiological arousal, and utilizing principles and practices of Zen meditation for attentional focus and distancing of distressing thoughts. Here, patients learn to tolerate maximum exposure to a wide range of external and internal cues through controlling physiological and cognitive arousal. This approach is more interested in controlling reactivity than extinguishing specific conditioned responses, and is therefore intended to be more generalizable to everyday situations, with its ability to be applied to any situation where arousal occurs. Once the patient is trained in controlling cognitive and physiological arousal, it is important to provide the patient with intense exposure in order to trigger high levels of arousal, so that the patient has ample opportunity to learn to control reactivity in a variety of situations.

A more complete discussion follows of the 2 effective interventions—flooding, or prolonged exposure, and skill-based arousal control during exposure, or graded exposure therapy.

Flooding

Flooding types of exposure therapies or prolonged exposure therapies attempt to present the patient with as much stimulation as possible, and have the patient sustain attention to that stimulation until it begins to extinguish, usually in about 20 minutes. Several theories support the use of flooding-type exposure. Classical conditioning is the original theoretical basis of this approach, in which the conditioned stimulus (loud sound, internal memory) no longer is paired with a conditioned response (fear arousal), and therefore this conditioned response extinguishes over time. Cognitive therapy would say that the unrealistic response has been tested, and found to be unfounded—the fear was baseless, as “I am still here, alive and healthy.” The neurobiology of PTSD also supports this approach, in that intensive limbic arousal, supported by cortisol and other stress hormones, cannot sustain that level of arousal for more than about 20 minutes (Kemeny, 2003). This is also supported from those experiencing panic attacks, which rarely last for more than 20 minutes.

Various approaches can be used for sustaining arousal. Talking about the sentinel event and internal imagery or feelings in a therapeutic setting (individual or group) is a common technique. This is often supported with imagery, where one recreates in their imagination the sounds and sights associated with the traumatic event for at least 20 minutes, or longer if possible. Some therapists use narrative writing or speaking during therapy, and then record this narrative in order for the patient to listen to or read it daily, until it no longer provokes a response. Various aspects of the trauma are “replayed” over and over until there is no longer any aspect that elicits arousal. The art of the therapy comes in eliciting as much arousal that is possible, without over-arousing or re-traumatizing the patient. Continual communication with and observation of the patient is required to maintain this optimal level of arousal.

In the 1980s, Terence Keane and colleagues found that exposure therapy was effective in treating the PTSD symptoms of Vietnam War veterans (Keane & Kaloupek, 1982; Keane et al., 1989). In the 1990s, research by Edna Foa and her colleagues showed that exposure therapy was perhaps the most effective treatment for reducing PTSD symptoms of rape victims, including persistent fear. Improvements were seen immediately after exposure therapy, and sustained during a 3-month follow-up (Foa, Rothbaum, Riggs, & Murdock, 1991; Foa & Meadows, 1997). Other studies have, however, cautioned against flooding. Kilpatrick and Best (1984) cautioned against treatment with flooding, as it pays no attention to learning of coping strategies.

Eye Movement Desensitization Reprocessing (EMDR)

Eye movement desensitization reprocessing can be thought of as a type of exposure, in which an image is maintained until the arousal is extinguished. Rapidly moving the eyes (following a practitioner’s finger movements side to side in front of the patient) is considered an integral part of the treatment, and might be effective in disassociating the “hippocampal images” from the “limbically associated emotions.” It may also be effective in re-associating the images with a new, neutral sensation. However, research seems to show that EMDR is no more effective with or without the eye movements, and may be just another type of exposure therapy. Meta-analyses and comparative studies show it may be effective in PTSD, but is not more effective than other therapies. In fact, EMDR may just be a flooding type of exposure with ritual associated with it (the eye movements).

Researchers examined the efficacy, speed, and incidence of symptom worsening for 3 treatments of PTSD: prolonged exposure, relaxation training, or EMDR (N = 60). Treatments did not differ in attrition, in the incidence of symptom worsening, or in their effects on numbing and hyperarousal symptoms. Compared with EMDR and relaxation training, exposure therapy a) produced significantly larger reductions in avoidance and re-experiencing symptoms, b) tended to be faster at reducing avoidance, and c) tended to yield a greater proportion of participants who no longer met criteria for PTSD after treatment. EMDR and relaxation did not differ from one another in speed or efficacy (Taylor et al., 2003).

EMDR was evaluated in a meta-analysis of 34 studies that examined EMDR with a variety of populations and measures. Process and outcome measures were examined separately, and EMDR showed an effect on both when compared with no treatment and with therapies not using exposure to anxiety-provoking stimuli and in pre-post EMDR comparisons. However, no significant effect was found when EMDR was compared with other exposure techniques. Additionally, no incremental effect of eye movements was noted when EMDR was compared with the same procedure without them (Davidson & Parker, 2001). R.J. DeRubeis and P. Crits-Christoph (1998) noted that EMDR is a potentially effective treatment for non-combat PTSD, but studies that examined such patient groups did not give clear support to this. In summary, EMDR appears to be no more effective than other exposure techniques, and evidence suggests that the eye movements integral to the treatment, and to its name, are unnecessary.

While clearly beneficial in the treatment of PTSD, it is unclear how effective a flooding-type exposure is in the context of acute combat PTSD. It is important to avoid re-traumatizing the patient, and to avoid treatment dropouts where the patient will suffer in silence rather than continue to seek treatment. Much of the work conducted with PTSD patients, including combat-related PTSD has been with patients whose trauma was many years in the past (e.g., Vietnam Veterans at a VA setting or victims of rape in years past). Therefore, an alternative form of exposure therapy, graded exposure, has been utilized and is thought to avoid the problems associated with flooding while still attempting to reap the same benefits.

Graded Exposure

An alternative approach to flooding, commonly used to treat PTSD is a method that is more graded in the arousal presented to patients. This approach attempts to elicit arousal at the level the patient can tolerate, and then increase gradually over time. This approach is most often coupled with a skill-based de-arousal method, such as relaxation training (progressive muscle relaxation, biofeedback), distancing (hypnosis, visual imagery) or attentional retraining. This can also be thought of as *skill-based resiliency training*, in that patients learn a skill to control their cognitive, affective, and physiological reactivity to arousing stimuli. Moreover, they are able to tolerate arousing stimuli during the exposure sessions, since they both have the skills and confidence to be able to control their reactivity to the external or internal stimuli. Emmelkamp, Bouman, and Scholing (1992) also suggest PTSD treatment should involve acquisition of coping skills in addition to fear reduction through exposure.

Hypnosis has a half-century history of treating combat-related stress disorders (Watkins, 2000), but its efficacy is not well researched (Cardena, 2000). Hypnotherapy takes many forms, but has several elements in common. It is considered a controlled dissociation (suspending conscious awareness of time, place, logic, self) in order to enter into a comfortable and creative mental state (EEG theta predominant). Here, the patient is able to bypass typical conscious inhibition or habits in order to a) more readily access past or present resources and b) imagine a more optimal future. That some persons are more highly hypnotizable than others has been well established, and hypnotizability may be related to symptoms of acute PTSD (Bryant et al., 2003) as well as potential for improvement with hypnotherapy (Cardena, 2000).

Light trance techniques are typically employed following a rapid induction, and can utilize a *screen technique* where patients remain comfortable while at the same time imagining a traumatic event off in the distance. This permits patients with PTSD to a) dissociate the event from the reaction, b) better tolerate consideration of the traumatic event and c) re-associate being able to remain calm and comfortable while considering the traumatic event, thus extinguishing the limbic-hippocampal conditioned response associated with PTSD. Deep trance techniques, where a therapist utilizes longer and more individualistic induction methods is thought to even further bypass conscious resistance and habit schema in order to re-associate positive or neutral emotions with traumatic memories and find better ways to respond to arousing internal and external stimuli.

Visual imagery is another popular therapeutic device to be better able to tolerate exposure to arousing stimuli. It is employed by cognitive therapists along with relaxation and graded exposure (Leskin, 2005). It is also used in exposure-based treatments without relaxation in order to maintain and consequentially extinguish hyperarousal. It has also been used alone, similar to hypnosis, but without the sophisticated induction methods by persons trained in hypnotherapy.

While hypnotic and imaginal methods have promise when used either alone or in combination with CBT and exposure methods, up to 50% of the population can be considered to be low or moderately low in hypnotizability (Spiegel & Spiegel, 2004) and it is estimated that about 20% of the population reports no visual imagery whatsoever (Pavio, 1986). In addition, although patients are asked to imagine various elements and to associate a comfortable feeling along with them, it is unclear to what extent a patient is complying with such therapeutic requests, despite their willingness or report to do so.

Summary of Exposure-Based Therapies

In summary, exposure-based therapies have been found to be the most effective form of treating PTSD. Van Etten and Taylor (1998) analyzed 61 treatment trials that included pharmacotherapy and modalities such as behavior therapy (particularly exposure therapy), EMDR, relaxation training, hypnotherapy, and dynamic psychotherapy. Overall, this meta-analysis found that exposure therapy was more efficacious than any other type of treatment for PTSD when measured by clinician rated measures. Specifically, the effect size for all types of psychotherapy interventions was 1.17, compared with 0.69 for medication. Perhaps more significant, the mean dropout rate in medication trials was 32%, compared with 14% in psychotherapy trials. A second meta-analysis of psychotherapeutic treatments found that treatment benefits for target symptoms of PTSD and for general psychological symptoms (intrusion, avoidance, hyperarousal, anxiety, and depression) were significant, with effect sizes ranging from 0.2 to 0.49 (Sherman, 1998).

The Consensus Panel on PTSD concluded that selective serotonin reuptake inhibitors are generally the most appropriate choice of first-line medication for PTSD, and effective therapy should be continued for 12 months or longer. The most appropriate psychotherapy is exposure therapy, and it should be continued for 6 months, with follow-up therapy as needed (Ballenger et al., 2000).

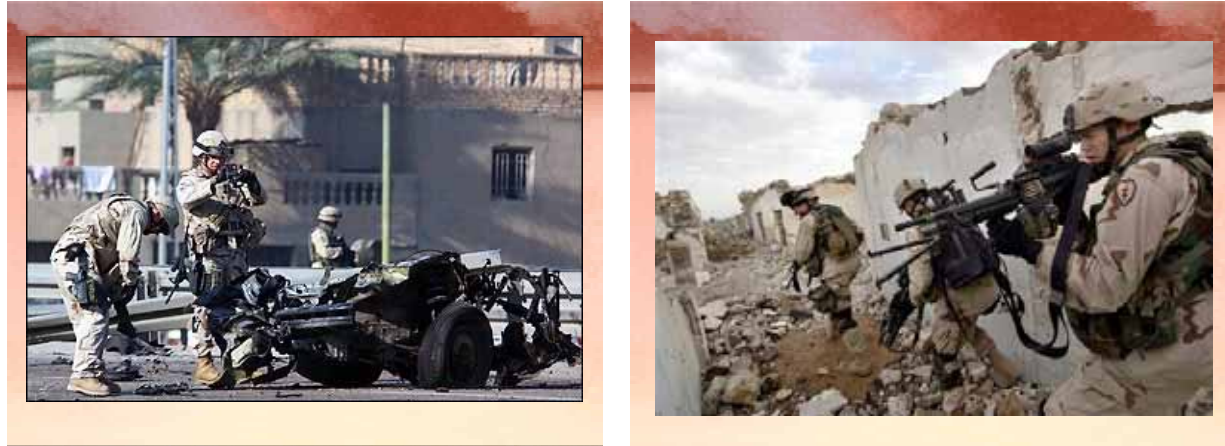
Virtual Reality-Assisted Exposure-Based Treatment for Combat PTSD

VR environments can be especially useful in treating PTSD through exposure, due to the control the therapist has over the exposure presented, and because such exposure does not rely upon individual imagery ability, hypnotizability or ability of the patient to verbalize his or her experiences, although these latter approaches can also be utilized within a VR environment to increase personal relevancy and increase arousal. In addition, for many situations, it would not be feasible, or advisable, to place the patient back in the real world situation where the actual trauma had occurred. For a full review of VR Exposure for PTSD in various populations over the past decade see Wiederhold & Wiederhold, 2008.

The VR Environment

VR has been used to support both types of exposure, flooding type and graded exposure type. In both instances, a virtual reality environment can be used to present both general and specific stimuli to patients in order to assist them to reduce reactivity to these stimuli. A general VR environment (e.g., Iraqi village) is often sufficient to elicit a general reminder of the general arousal one experienced during deployment. In addition, if the VR environment allows for operator control over a repertoire of various optional stimuli, then a graded exposure of relevant arousing stimuli can be individually tailored to allow for an arousal hierarchy to be developed and presented to each patient as is appropriate. For example, a marine who conducted night

operations may not get sufficiently aroused in a daytime environment. A Navy Construction Battalion (Seabee) driver may require a convoy scenario to elicit arousal. An optimal VR environment would therefore contain a general reminder of the deployment, yet have a range of options that the therapist can employ to bring out the arousal specific to each patient's unique experience.



How to develop the general and specific content of the VR environment is also an important factor. Certainly viewing scenes of the Iraqi conflict from videos can be of assistance for developing the general environment. However, patient interviews are necessary to develop a range of specific options that can be employed to ensure a proper hierarchy of arousal for each individual patient. We interviewed 18 Marines and Navy support personnel (such as corpsman assigned to assist wounded Marines, or Construction Battalion convoy drivers) in order to determine the precise sights, sounds, smells, and feelings that represent the recurring intrusive thoughts they experienced upon returning from their combat tours (Spira et al., 2007). From this information, The Virtual Reality Medical Center (VRMC) was able to design and develop Virtual Baghdad, a rich VR environment to be used with Navy support personnel and Marine Corps personnel with combat-related PTSD (Wiederhold, Bullinger, & Wiederhold, 2006).

We have been using these environments to treat acute and recent chronic combat-related PTSD in troops returning from Afghanistan and Iraq (Operation Iraqi Freedom, Operation Enduring Freedom). Some relevant specific stimuli that can be turned on or off as needed include voices of Iraqi civilians, Arabic prayer, sounds of gunfire and rockets fired and exploding, helicopters flying overhead or landing, terrorists running and firing guns, comrades being wounded by gunfire, buildings and vehicles burning, and driving through dangerous areas.

Realism: Although technology has been steadily improving with regard to video graphics and VR in particular, it is not necessary that the environment be completely "realistic." In fact, it is not only impossible, but also undesirable, to fully represent the same level of realism that a patient had when exposed to the actual trauma since some distance from the trauma is useful during therapy. If the virtual environment is for instance, 50% realistic, then that should be sufficient to trigger internal memories of the trauma and the reactions one continues to have to these memories, while at the same time being sufficiently *distanced* from the actual event to permit therapy to proceed. In the future, the degree of realism (pixel density, for example) could be a factor that might be able to be manipulated, along with the content of what is presented to patients.



Immersion and Presence are important factors in reaping the benefits of VR. VR technology allows for interaction and immerses the user's senses. This sets it apart from other technologies such as television or books. Presence, in relation to immersive VR, is usually characterized by the concept of presence as transportation: People are usually considered "present" in an immersive VR when they report a sensation of being in the virtual world ("you are there"). Using a head-mounted display (HMD) with the greatest clarity, viewing range and comfort, along with the patient's ability to see the environment move as they move their head or body through the use of a tracking device, allows the patient greater immersion and therefore greater arousal. Sounds presented through headphones are also a critical element for improved immersion. Although more expensive and less transportable, it is also possible to enhance immersion by placing a vibration platform underneath the patient (to vibrate with helicopters going overhead, rockets exploding, steps being taken, etc), matching climate (dry heat blowing on the patient), or even using a cannula to present smells to the patient (e.g., burning rubber, gun powder, burning flesh, spices, body odor). While relatively expensive, having visual and auditory reminders of these smells or feelings may also elicit their memories.

Interactive nature of VR: The more interactive the VR environment, the better the immersion and therapeutic results (Wiederhold & Wiederhold, 2000). Optimally, the patient will be given a joystick or computer mouse to navigate through the environment. This gives them a measure of control, but also increases the immersive quality of the VR environment. It is also one more level of arousal that can be utilized by the therapist, when needed.

Using virtual reality assisted exposure therapy has been demonstrated to be an effective means of delivering exposure therapy in treating phobias (Wiederhold, Gevirtz, & Spira, 2001; Wiederhold & Wiederhold, 2005a; Moore et al., 2002) and PTSD (Astin & Rothbaum, 2000; Rothbaum et al., 2001; Tarnanas & Manos, 2001; Wiederhold, Jang, Kim, & Wiederhold, 2001; Wiederhold & Wiederhold, 2005b). These studies have all used a graded exposure approach, sometimes in combination with physiological monitoring and feedback.

The use of *in virtuo* physiologically-facilitated graded exposure therapy in combat PTSD has only recently begun to be studied in a randomized controlled design. Funded by the Office of Naval Research, the first study site was Naval Medical Center San Diego (Drs. Jim Spira, Jeff Pyne, & Rob McLay, site Principal Investigators) in partnership with The Virtual Reality Medical Center (Drs. Brenda & Mark Wiederhold, Principal Investigators).



In Virtuo Physiologically-Facilitated Graded Exposure Therapy with Attentional Retraining

The treatment we use in the VRMC/Naval Medical Center San Diego research protocol to determine the relative value of VR-assisted therapy compared to treatment as usual, as well as what we have been using clinically to assist patients with recently developed combat-related PTSD is multi-faceted, drawing from principles of cognitive behavioral and experiential therapies discussed above. In contrast to flooding type exposure therapy which attempts to extinguish conditioned reactions, this approach trains patients to control their physical arousal and attentional focus in order to tolerate exposure to a wide range of cues. This approach is based upon the third exposure paradigm described above. Due to the emphasis on personal control and skill development, we believe that this approach will be optimal for those suffering from acute or early chronic combat PTSD, better generalize to a wide range of symptoms and situations, and have the best chance likelihood of long-term benefit. Especially utilized are the following modalities:

Attentional Retraining

Principally using attentional retraining techniques based upon Zen meditation to focus into the moment (attentional retraining), yet also training patients how to distance themselves from arousing thoughts and feelings taught by Vipassana traditions, meditation is a foundational technique utilized in this treatment. In fact, the first 2 treatment sessions are devoted to learning how to practice meditation, especially with regard to management of problem thoughts and feelings experienced by patients with PTSD. One of our intake questions we always ask patients is “How frequently are you able to feel safe and comfortable, able to focus completely in the moment, without worrying about the past or the future?” (Responses are 1x/day; 1x/wk; 1x/mo; rarely feel this way anymore; never felt this way.) If patients state that they feel this way at least once/day, then they should have a quicker recovery. If they feel it less than once/week, then they will have a longer recovery. Therefore, the first thing we do is assist patients to learn how to focus comfortably in the moment whenever they need to or want to.

This approach teaches the patient to establish a basis of attending to the moment at hand, noticing but not reacting to thoughts and emotions. It also teaches a re-identification of self, ceasing to identify with one’s arousing thoughts and feelings as oneself. Instead, patients learn to identify self with calm, comfortable body sensations along with clarity of mind. Just as the sounds around one are allowed to pass, so too can thoughts and feelings that arise simply “be there” in the distance, while calm comfortable body sensations (such as the warmth of one’s body, the air passing in and out, and the expansion and contraction of one’s body) are always present and to some extent attended to.

Psychophysiological Monitoring and Feedback

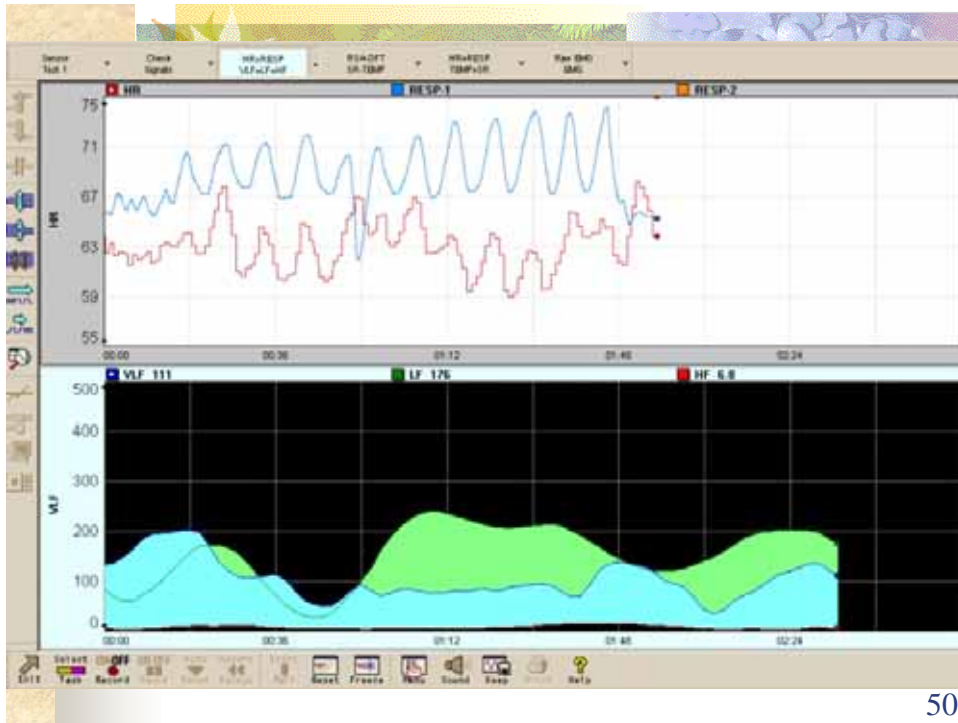
Physiological monitoring and feedback is an important tool in both helping to establish a relaxed state of mind and body, but also for monitoring level of arousal during VR exposure.

Establishing a comfortable state of mind and body is greatly facilitated by physiologically monitoring heart rate, respiration, skin conductance, and finger temperature. Heart rate variability and EEG spectral analysis are also useful, although the latter is more difficult to obtain and interpret, and so will only be mentioned briefly here. Some therapists also use EMG to monitor muscle tension, although this has minimal value with PTSD except within a startle paradigm (especially compared to the other measures reviewed) and will not be discussed here.

Although there are some absolute guidelines in terms of interpreting autonomic arousal, it is also of value to establish baselines of rest (observing physiological levels while attaching the leads and “getting set up”), during a stressor (“what is the most stressful thing that’s happened to you in the past week” or “what are the nightmares that are most disturbing to you”), and during relaxation (“clear your mind, and focus on your breath, especially in your belly, noticing the warmth of your belly, the way the belly floats in and out” or equivalent calming activity). This information not only permits the therapist to gauge how aroused the patient is compared to others, but also to gauge the patient’s state compared to him or herself at any given moment.

- *HR*: Heart rate is a relatively crude measure in most individuals, and does not typically reveal useful information in “real time” although it may be useful to some extent over longer periods for research purposes.
- *Respiration*: In general, most people breathe between about 8–14 breaths per minute, depending upon age and autonomic tone. Above 14 is typically a clear indication of sympathetic drive, while below 8 is a good indicator of parasympathetic dominance. This is useful information for the therapist, since encouraging the patient to breathe at about 6 breaths/minute can rapidly induce parasympathetic tone. Especially useful is to direct the patient to breathe into one’s abdomen, rather than into the chest, which is typical of anxious breathing patterns. Some patients become increasingly anxious when asked to attend to their breathing, or tend to over-control it. In such cases, patients should be directed *away from* attending to their breathing. Instead, patients can be directed to other comforting sensations (e.g., the warmth of their belly, the way it rocks forward and back).
- *Finger temperature*: Monitoring finger temperature is very helpful as it is an immediate indicator of both baseline arousal and moment to moment change. Typically a person with autonomic balance has finger temperatures between about 85–90 with temperatures below that range indicative of sympathetic arousal and above that range of parasympathetic predominance. Moreover, a continuous visual temperature monitor can indicate both immediate change as well as sustained direction of change in arousal during a therapeutic intervention. Like skin conductance, finger temperature can change as soon as a therapist asks a question, often before the patient even opens their mouth to answer.
- *Skin conductance (SC)/resistance (SR)*: Similar to finger temperature, skin conductance is an excellent indicator of rapid change in stress. However, while finger temperature seems to be a good indicator of general autonomic arousal, skin conductance (and its inverse measurement, skin resistance) is an excellent indicator of emotional arousal. Ranges vary widely between patients due to differences in baseline skin moisture between patients. And while extremes can often indicate significant emotional distress ($SC > 8$; $SR < 300$) or relaxation ($SC < 2$; $SR > 700$), changes in SC/SR are more useful indicators for the therapist.
- *Heart rate variability*: Over the past 5 years, HRV has become the indicator of choice for many psychophysiological monitoring and feedback therapists and those who wish to monitor physiological reactivity in their patients or research subjects. Most modern

sophisticated monitoring devices not only allow for HRV but also display it predominantly for the operator. Respiratory sinus arrhythmia (RSA) reflects that the heart beats slightly faster following an inhale and slightly slower following an exhale. However, this natural variability becomes restricted in sympathetically aroused individuals, while for relaxed persons the variability increases. There is typically about a 30 second delay between a person's change in autonomic tone and its reflection in HRV caused by the time it takes to analyze changes in the EKG R-R (R wave) interval.



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- *HRV spectral analysis:* As important an indicator as is HRV for general autonomic arousal, the real value of assessing HRV is obtaining the frequency spectral analysis, including very low, low, and high frequency contribution to the overall HRV.
 - *High frequency:* HF contributes to the overall HRV indication of autonomic arousal; however, it is not of very much use in clinical monitoring of patients' real-time arousal.
 - *Low frequency:* LF is an excellent indicator of a patient's parasympathetic tone. When sympathetically aroused, a patient's LF is suppressed significantly below their baseline. When resting and recuperating, their LF is substantially higher than their baseline.
 - *Very low frequency:* VLF is the most useful of all indicators of arousal and recuperation, and seems to be a reflection of cognitive vigilance. When patients focus on worry or pain, or are vigilant to what is going on around them, their VLF raises significantly. However, when patients are instructed to attend to what they see, hear, and comfortably feel in the moment, their VLF is greatly reduced.
 - *VLF/LF ratio:* The best single indicator of when a patient is focused comfortably in the moment without significant cognitive/affective/physiological arousal is the VLF/LF ratio. Simply, when VLF is between 25–50% greater than LF, the therapist should instruct the patient to relax and focus in the moment, or reduce the stimulus presented if this is not possible for the patient after a brief effort. When the VLF is

less than 25–50% of the LF, then the patient is very calm and relaxed. When the VLF and LF are roughly in the same range, the patient is somewhat aroused, but not overwhelmingly so. Spending some time in this range allows the patient to get used to this level of arousal (akin to mild flooding). But after several minutes, patients should be encouraged to reduce arousal to the point that $VLF < LF$, to ensure that patients a) can gain a sense of mastery over arousal, b) develop the confidence to be able to handle even more arousal (since they know they can reduce it at any time), and c) establish that this comforting presence is their natural baseline (and hence, the state of arousal is an exception they can tolerate, but need not remain at for very long). In this way, they are learning how to generalize this training into their everyday lives.

Potential of Virtual Reality Assisted Graded Exposure

The final element in this approach to therapy is the use of a tailored VR environment developed for troops with PTSD who were in combat in the Middle East.

Potential Advantages

We advocate an approach that uses VR-assisted graded exposure to facilitate resilience skill training in combat veterans with acute or recent chronic PTSD or PTSD symptoms. Based on our experience in its clinical use, we believe this approach to be most appropriate for this population because:

- It limits the potential for retraumatization in this recently traumatized population, which is *possible with flooding-based exposure methods, VR or otherwise*.
- Skill is developed first, then further developed within the VR environment, and then practiced at home, where it can be continually applied to intrusive thoughts and feelings, *rather than simply attempting to passively “extinguish” arousal (in that no continued skill is developed)*.
- It allows for close monitoring through physiological recordings, in order to assure a safe level of arousal *rather than merely relying on patient self-report alone, which is often less than forthcoming in a military population*.
- Physiological monitoring and feedback can be used to determine the best way for the patient to gain self-control over intrusive thoughts and feelings, *rather than relying on a single method of relaxation*.
- Zen mediation is taught to gain better attentional control *rather than relying solely on reducing somatic arousal, which is usually stimulated by intrusive thoughts*. Meditation also encourages a distancing of intrusive thoughts and feelings, learning to identify with “being comfortably in the moment” and not reacting to intrusive thoughts or feelings, *rather than focusing on and analyzing the intrusive thoughts or feelings as often occurs in other forms of psychotherapy*.
- Better control over presentation of arousing stimuli is achieved *than by other non-VR methods, or VR methods that do not have a menu of gradient exposure. It also avoids the problems in imagery (50% of people report poor or no visual imagery) and hypnotizability*.
- Real control is encouraged during the treatment, in that patients feel they have control over the environment (where they go in the environment, and what they can do once they become overaroused) *vs. being continually directed by a therapist*.
- Military members frequently find this type of therapy more appealing *than talk therapy, in which one is asked to express intimate thoughts and feelings, since verbal and emotional expression, while potentially valuable, is often seen as a sign of weakness in combat troops*. Instead, these service members are used to gaming and skill development, and so this may be a more comfortable route into therapy.

Cautions

Techniques, no matter what they are, do not provide for a full therapeutic context. Whatever technique is used, it needs to be used within a full therapeutic setting, including assuring for safety, discussing how the treatment is going for the patient within the context of the patient's life, along with suggestions for ways to incorporate what is learned into one's daily life. (For example, "If you wake from a nightmare, how do you usually react, and what can you do now that you've learned these skills?") And, as with any other type of therapy, if insufficient progress is being made, then other approaches should be considered.

Treatment Hardware

In order to develop a system that can be widely disseminated, useful not only in a highly funded research environment, but also in a typical treatment center or in the field, we have opted to stay with visual and auditory presentation, rather than add vibrational platforms, smells, dry heat, etc. Therefore, The Virtual Reality Medical Center has developed a VR package that can run on 2 computers, one that displays the visual and auditory displays to the patient through a VR headset with built-in headphones, and a second system which has the control panel and menu which therapists can use to add arousing elements into the VR environment (e.g., various combat events and background sounds, weather, and time of day). A third computer can be used to run the physiological monitoring and feedback system. Relevant scents (smells) may be added for further enhancement although expense increases and portability decreases with this addition.

Treatment Software

The software developed by The Virtual Reality Medical Center has elements for both combat troops as well as for support personnel. The software is unique in that to turn and move in a direction, you turn your head and your whole body in that direction (adding to the sense of realism and thus immersion). The patient sits on a chair that can rotate 360 degrees in order to move where one chooses to go. One can walk or drive an armored Humvee around a city, through an Arab bazaar, down an abandoned street with signs of recent fighting, through downtown, with helicopters and jets flying overhead, and to a Battalion Aid Station (BAS), among others. The therapist can add elements such as time of day (day, night), weather (clear, sand storm), and apparatus such as gun sights, gun barrel, and night-vision goggles. The therapist can also add sounds such as prayers, Arab voices, and voices of children and women. In addition, the therapist can add elements of gunfire, rockets, and other combat events. Also unique about this program is that different combat phenomena occur in different parts of the city. Marines are wounded and require medical support in several parts of the city and the BAS, fighting occurs in other parts of the city, normal daily activity goes on in still other parts, and the patient rides in a convoy over and under bridges with unknown figures standing off in the distance.

Clinical Protocol

The protocol we are using can be varied according to patient needs. However, for our controlled research study, we are using the following protocol, which was developed based on our clinical experience with VR exposure for over a decade.

Prior to treatment: Patients should have a thorough intake evaluation to determine current mental status and risk assessment. Their combat experience, as well as prior personal and family mental health history should be taken, along with a history of substance use, personality style, coping strategies, and willingness for treatment. The patient's current social support system should also be assessed. If outpatient treatment is deemed to be of value, and the patient is offered and interested in the treatment, all records should be fully reviewed prior to treatment.

Number of treatment sessions: Patients come for treatment, at minimum, once a week for 10 weeks. However, as this is a skill-based protocol, it is optimal for patients to have twice-weekly sessions, and to do homework daily.

Session Detail

Session 1—Orientation and Introduction to Meditation

(Note: The patient should be physiologically monitored throughout all sessions, so that the therapist can “calibrate” and monitor the patient’s level of arousal. It can be explained to the patient that you want to teach them to relax, but also want to see what distresses them).

- A) Discuss the *symptoms of PTSD* and ask them which they have.
- B) Let patients *tell their story* about their sentinel event, as well as about their feeling about having gone through the experience and now being back home.
- C) *Normalize PTSD*, as a normal response to an abnormal situation.
- D) *Explain that PTSD* occurs when automatic thoughts and feelings from a past traumatic event intrude into their minds without their control. The point of this treatment is to help them gain control over these intrusive thoughts and feelings and learn to tolerate things that currently bother them now.
- E) *Teach them about attentional retraining.* Explain that the problem with PTSD is that they are distracted by intrusive thoughts and feelings from the past, and that even their avoidance and emotional reactivity are them reacting to past events. Explain that:
 - 1) *Attention is enhanced processing.* Whatever they pay attention to they will enhance. So, if they pay attention to thoughts and feelings that are uncomfortable, they will enhance those uncomfortable thoughts and feelings. If they focus on comfortable sensations in the moment or their work in front of them, they will enhance those activities.
 - 2) *Whatever they pay attention to, their brains and bodies will gear up to support those thoughts and feelings.* If they pay attention to distressing thoughts and feelings, their brains and bodies will become highly aroused, and put them on alert. If they pay attention to comfortable sensations in their body, and what is going on in the moment, their bodies will become more calm and react more appropriately to what is actually happening now, rather than what happened before.
 - 3) Explain that *when they have a nightmare, get angry, jump at a sound, or worry* about being in a crowd (whatever symptoms they described above), then that is an opportunity for them to:
 - a) Recognize that pattern
 - b) Let it go, telling themselves “I’m just reacting that way because I’m reacting to the past”
 - c) Redirect their attention to calming their bodies and focusing on the present.
 Ask them what they do to focus more on comfort and being in the moment.

Acknowledge healthy approaches, and discourage unhealthy approaches. State that the rest of the session will be geared toward teaching them how to start doing this better.

(Note: Handouts can be used for helping them to understand about the role of attending to their symptoms vs. attending to comforting sensations and the moment at hand.)

F) *Teach Zen Meditation:* 15 minutes at the end of session 1 should be devoted toward teaching them to focus on comforting sensations (*such as the air passing in and out of their body, the warmth of their belly, warming their hands, the way their body effortlessly expands and relaxes*). If they want to keep their eyes open, they can take in what they see and hear. Anytime they are aware of their thoughts or any disturbing feeling, they should let that go, and refocus as fully as possible on the comforting sensations and what they see and hear right here in the room. See Appendix I for Meditation Instruction. A basic handout can be given to them to facilitate their meditation for the first week at home, practicing for at least 20 minutes in the morning and evening.

Physiological monitoring should be used to discover what type of activity works best for them. If they have difficulty slowing their breathing, or being in the moment, then using paced abdominal breathing of about 6 breaths/minute is often helpful. They can do this either by watching a paced breathing indicator on the physiological monitoring screen, or using internal

counting (first supplied by the therapist, and then proceeding on their own) such as counting 5 on the inhale, and 7 on the exhale. This slower-paced breathing may require effort to begin with, but should eventually be without effort, while still maintaining full attention, as soon as possible.

Session 2—Meditation Instruction

A) *Check-in.* Session 2 should begin with a brief check-in, to see how things are going in general, and to review the meditation exercise they were given. This should take no more than 10 or 15 minutes.

B) *Teach Attentional Refocusing.* After assessing what has worked and what has not for the patient, a modified attentional refocusing instruction, based upon Zen meditation, but tailored to their specific needs, should be developed for them. This might be more or less complex, depending on what is needed to capture all their attention into the moment. This could include an eyes-open focus on visual sensation (in case they have too many intrusive images) or attention to auditory sensation (in case they have too many intrusive verbalization or sound memories) or comfortable somatic focus (in case they are focused on negative emotions or pain).

C) *Test Attentional Refocusing During Stressor:* Once patients are able to show a $VLF < LF$ for several minutes, and report that they have been able to feel some measure of comfort and focus in the moment, they should then be asked what has been the most stressful thing that's happened to them in the last week or two. After their arousal goes up, point out their arousal to them on the physiological monitor, and then ask them to let those thoughts and feeling go, and begin doing their meditation as previously instructed. Once they can achieve a comfortable state for at least 2 or 3 minutes (reflected in $VLF < LF$), then ask them about their stressor again. Repeat this process 3 or 4 times, possibly with different stressors, until they can demonstrate control over their arousal. (If they have difficulty, then either a) improve their attentional technique, or b) reduce the stressor to a milder one they *can* gain control over.)

Note: Attentional refocusing instruction should be made as simple as possible, but tailored to their particular cognitive style and needs. A written instruction sheet or even a recording on CD can be made if that helps them, at first, before they can fully incorporate this into their lives.

Sessions 3–6—VR Graded Exposure

Subsequent sessions will apply the above skill within a VR environment. These VR sessions should proceed as follows:

A) *Check-in* (about 10 minutes): Ask how their week has been (positive and negative aspects) and how well they have been able to use the attentional techniques during times of intrusive arousal. Tell them that you will work with them to improve their coping with these techniques.

B) *Attentional refocusing training* (about 10 minutes): As above, but refining and tailoring to their cognitive style and needs.

C) *Place patient into VR environment:* Patient should be placed into the VR environment for about 20 minutes.

First, let them get used to a safe area in the VR world. Work with them to control their arousal through attentional focus and breath awareness (e.g., eyes-open attentional refocusing, if possible, going to eyes-closed attentional refocusing only if need be). Make sure that they can achieve a state of mental and somatic comfort (i.e., self-report as well as $VLF < LF$ by at least 25%, and 50% if possible within 2 minutes).

Slowly increase arousal elements until $VLF > LF$ by at least 25%, although attempt to achieve 50% if possible for several minutes. At that point, instruct the patient to use their attentional refocusing to calm their minds and comfort their bodies. (If this is not possible, then decrease arousing stimuli until they can, then repeat until they can control their reactivity with that amount of arousal.) When they can achieve self control (i.e., $VLF < LF$), then more stimuli can be introduced.

D) *Debriefing* (about 10 minutes): Ask about their experience in the VR, and give them feedback about what you observed on the physiological monitoring of their state. Complement them thoroughly on a job well done.

Discuss using these skills in the context of their lives, practicing attentional refocusing every day (AM and PM), and especially when symptoms are present.

Sessions 7–10—VR Adding Narrative

Same as sessions 3–6, but now that patients will most likely have adapted to the VR environment by showing low arousal and good control over their arousal, have patients discuss the most arousing elements of their memories of Iraq and also of coming home, while moving about within the VR environment.

In these later sessions, continually search for arousal and practice control until no more stimuli works to arouse them, or until they can control their arousal rapidly on their own, or with little encouragement. At first, allow them to tolerate distressing stimuli and arousal (with VLF > LF by never more than 100% and preferably only by about 50%) for about 30 seconds at first, before starting to control it. Later, they should be able to tolerate arousal for up to a minute or 2, before decreasing it.

Final Session 10

Try your best to get arousal out of the patient, through adding stimuli or eliciting troubling narrative from the patient (of Iraq or of what they are struggling with currently). Ask them what they think will get them most aroused so that they can have the opportunity to gain mastery over their reactions to these events.

Explain that, while they are probably not completely symptom-free, they now have the skills to continue to practice and utilize these skills on their own. Like any skill, if they stop practicing, the skill weakens, and they will not be able to apply it as well. Therefore, they are encouraged to practice their attentional refocusing, cognitive restructuring, and psychophysiologic reactivity modulation daily, and apply it whenever arousing stimuli intrude on their thoughts, feelings or activities.

Session Frequency

Although this protocol can be conducted on a weekly basis, due to the skill development nature of the intervention, twice per week is often preferred.

Homework

Homework should be tailored to the individual. However, it is optimal to have the patient practice a meditation method to become comfortably focused in the moment. Once achieved, they can begin a Foa-type imagery exercise in which they recall a difficult scenario, distance it in their minds, and stay as calm as possible while observing it. After it causes no arousal for a few minutes, they can drop the image and return to the meditation exercise.

Overview of Treatment Protocol

Step 1: Orient the patient

Step 2: Teach how to reduce physical arousal

Step 3: Teach how to immerse oneself fully and comfortably in the moment

Step 4: Elicit the hierarchy of intrusions (thoughts, feelings, situations)

Step 5: Biofeedback training (and establishing patient metrics of arousal and relaxation)

Step 6: Orient the patient to VR controls and operation

Step 7: Practice relaxation and attentional retraining in the VR world (neutral)

Step 8: Elicit and maintain arousing response (VLF > LF by 25%—maintain as tolerable)

- Step 9: Elicit relaxation response and being able to be comfortably focused in the moment (VLF < LF by 25%)
- Step 10: As the patient is able to demonstrate the ability to tolerate arousal for several minutes, and then return to a comfortable baseline, repeat Steps 8 and 9. Increase exposure as necessary to elicit sufficient arousal
- Step 11: When arousal can no longer be sufficiently elicited, have patient tell narrative of arousing memories while navigating within VR world
- Step 12: When arousal can no longer be elicited, treatment has been completed

NOTE: Daily homework is important:

Type 1: Practice relaxation and attentional focus (See Appendix I: HOMEWORK 1)

Type 2: Practice self-elicitation of arousing stimuli, but distance it and tolerate with new skills (See Appendix I: HOMEWORK 2)

Individualizing the Protocol

Naturally, individual differences are to be expected. There are 2 types of individual differences we will consider here, typical and atypical.

Typical Differences

By typical differences, we mean individual personality and cognitive and coping styles that are to be expected and planned for. Examples of these include:

Different levels of arousal: Every patient will enter therapy with a different level of cognitive, affective, and physiological arousal. Hence, the attentional refocusing selected and the rate at which VR stimuli is to be presented will of necessity vary from patient to patient.

Differing types of arousal: Although there are some commonalities among veterans of recent Middle East combat, there were many different functions the troops fulfilled during their time there, from combat medic to infantryman to convoy driver; these should be appreciated when selecting stimuli to present. Of course, listening to the patient's narrative history of sentinel events and reports of their intrusive thoughts and feelings and nightmares will assist in this selection as well.

Differing coping styles: Some patients tend to become hypervigilant, which will necessitate both convincing them about and then showing them the need to reduce that vigilance and focus in the moment. Other patients tend to be more defensive and avoidant, suppressing thoughts and feelings and often using alcohol or other numbing substances (prescription or nonprescription) to assist in this avoidance. Whereas the former (hypervigilant coping style) manifests as worry, affective lability and insomnia, this latter type (avoidant) can manifest as angry outbursts, becoming sullen and withdrawn, and other displaced behaviors. The avoidant patients must be treated with greater care, as they may tend to drop out of therapy, or abreact and become depressed or suicidal. One productive approach with avoidant types is to show them a healthier way to develop control over physiological reactivity from their distress, using self-comforting and focusing in the moment. At the same time, it is helpful to normalize that thoughts and feelings will come up, that this is a healthy phenomenon, and that they should allow things to emerge for a moment, and then go back to self-comforting and focusing in the moment. Over time, by building confidence in their self-comforting abilities, they should be better able to look squarely in the face of their fears, confront them, and let them go.

Differing self-comforting skills: Some patients are naturals at self-comforting, and will progress rapidly, just given the chance within this environment. Others, however, have far more difficulty self-comforting, for any number of reasons. One reason is that they do not have much body awareness. Another is because they have had a painful childhood, not bonding well with a parent, or a victim of chronic abuse. If a patient says "I can't relax or feel comfortable," it is important to understand if a) it is simply this approach they are not connecting with (in which

case another approach should be tried) and they do have the ability to self-comfort in another way, b) they have not been able to feel comfortable since returning from the war (in which case it is important to help them re-establish self-comforting ability), or c) they have never been able to self-comfort. It is valuable to ask the question “How often are you able to feel safe and comfortable, able to focus completely in the moment without worry about the past or the future? At least 1x/day, 1x/week, 1x/month, haven’t felt this way since returning from Iraq, haven’t felt this way in years, never felt this way.” If they have not felt this way in years, it will be difficult to overcome their deficits. If they have never felt this way, it may be impossible to instill this sense in them. In these cases, rather than attempt to get them feeling comfortable, frame the exercises as *control over attention*. Tell them that certain thoughts and feelings are controlling them, and you’d like to show them how to control their thoughts and feelings better. This allows for a greater ‘buy-in’ than attempting something that years of therapy may not be able to correct.

Atypical Differences

By atypical differences, we mean complications that are not expected for the majority of patients, but which the therapists should be able to accommodate in one form or another.

Complex PTSD: This protocol has been written for patients with simple acute or recently chronic PTSD. However, our clinical experience also affords us some insight into its use with patients who have complex PTSD of various sorts. This protocol should work quite well for those with comorbid pain, since many of the same techniques (attentional retraining, self-comforting) work equally well for both pain and PTSD. However, more existential work should be incorporated with service men and women who have been disabled, possibly permanently to some extent, due to physical injury. Examining and respecting their loss, along with helping them move into the future as fully as possible, will be an additional challenge with this population.

Blast injury patients with mild traumatic brain injury (mTBI) and resultant post concussive syndrome require special consideration as well. Such individuals will have become disinhibited due to frontal-lobe dysfunction. They may require additional medication (such as an SSRI and/or a mood stabilizer) to reduce symptomology and speed recovery. Treatment should proceed as outlined above; however, they may also require a longer course of treatment than the 10 sessions recommended here. They may also need to keep arousal levels to a minimum and increase more subtly, since their normal filtering and inhibition mechanisms are (temporarily) disabled.

Those with comorbid psychopathology, such as mild depression or substance abuse, should be expected. PTSD rarely comes along in isolation. However, more significant psychopathology that may have been present but not previously dysfunctional (such as OCD, or personality disorder) or which was lying dormant but which was then brought to the surface (such as bipolar disorder or psychotic disorder) poses a much more complex problem. It may be that those disorders must be addressed through medication and other psychotherapies before exposure therapy can be attempted.

Passive Helplessness: There is a subset of patients who, for various reasons (personal and cultural) tend to adopt the “sick role” (Parsons, 1959). Those who adopt a sick role attitude often develop passivity, focusing on external causes and corrections for their problems. They seem reluctant to take responsibility for effecting their own improvement. Referred to as *Factitious Disorder* in the Diagnostic and Statistical Manual of Mental Disorders Text Revision (DSM-IV-TR), these individuals receive some secondary gain, often unconsciously so, for remaining injured and helpless. Every attempt must be made to determine what their underlying intention is, and to convince them that they can achieve it better if they are healthier. Secondly, these (and frankly all) patients must believe that they contain the power within themselves to improve. But to do this, the therapist has to a) offer rapport on their thoughts and feelings (without supporting those thoughts and feelings) and b) encourage them to actively cope with their problems

through the methods we are showing them. Every statement can contain a rapport statement and a lead to improve (“You seem very discouraged about your condition, and feel you will never be able to get better. Do you want to get better? Do you want to try everything possible to improve your condition?” or “Yes, this is very difficult for you and you still feel pain and difficulty concentrating. But it’s good to know that every effort you make lets you get a little stronger and healthier—as long as you make the strongest effort possible, and you focus on what you *can* do rather than what you *can’t* do.”) This type of counseling will be critical prior to and along with the exposure therapy. Establishing a strong bond with the patient can cut both ways. First of all it will be necessary to have a strong positive relationship before any progress will be made. However, a strong relationship can lead the patient to become dependent upon the therapist, and so the therapist must always offer both strong encouragement and expectations of improvement in order to continue treatment, along with rapport and understanding in such patients.

Future Directions

Although exposure therapy has been used for years and found to be the most effective treatment for patients with phobias and PTSD, and VR has been found to be a highly effective form of exposure therapy, various questions remain as to the relative efficacy of this form of exposure therapy for patients with combat-related PTSD of recent origin. If found to be of increased value relative to other forms of therapy (e.g., group CBT plus SSRI, flooding-based exposure), then this approach should be widely disseminated. It is relatively inexpensive to set up, and the hardware can be placed in any therapist’s office. As with any new form of treatment, training should include not only study of this protocol, but also live training of at least 20 hours (depending on therapist skill level), plus practice with patients and review by an expert in this approach. Of course, any therapist who is not already expert with treating PTSD with exposure-based approaches or physiological monitoring and feedback would require additional training and supervision.

The use of this approach in the combat zone is also under consideration. Once a combat troop comes to a BAS for rest and evaluation of acute combat stress (or, *3hots and a cot*, as it is called in the field), this system could be used to evaluate when they are truly ready to go back. If they react with a high level of arousal, they could be encouraged to spend some extra time in debriefing, learning to relax and talk about their experiences.

To reduce the incidence of PTSD, a shortened use of this protocol for stress inoculation is also under consideration. Since 2003, we have been conducting stress inoculation training with military medics and other elite units. Troops prepared to deploy could be taught a briefer version of the attentional retraining techniques (*combat breathing*) and then practice this when exposed to video footage of actual Iraqi violence. Another possibility is that those deemed to be at high risk of PTSD could be put through this same protocol as described above, in hopes that they will build resilience that will help them through combat.

Another future possibility is the use of medication that will assist the patient to better tolerate the exposure. According to those advocating a flooding approach to exposure, it is necessary to have a high level of arousal in order to overcome the symptoms of PTSD. Thus, reducing this arousal should be less effective than allowing high levels of arousal to be sustained. The graded-exposure approach does not share this view. The latter would say that learning to relax and confront the potentially arousing stimuli is more effective in overcoming the PTSD symptoms. This has been tested to some extent with the discovery of D-cycloserine (DCS). Ressler et al. (2004) found that the N-methyl-D-aspartate (NMDA) agonist DCS reduces limbic arousal. When used with patients who developed PTSD as a consequence of a motor vehicle accident, it allowed more exposure to occur, and resulted in better and longer outcome in at least one small, well-conducted study using DCS.

Whether attentional retraining is as effective or more effective than DCS or other agents is not yet known. Certainly attentional retraining is a skill that can be utilized in many

situations, while the drug is very narrow in its application. Perhaps future research will find that these therapies together, in combination, are optimal for persons with PTSD.

Another obvious extension of this work is into other forms of PTSD and phobias. The drawback of using this high-tech form of therapy is that a different program must be written for different situations. This has already been started, since companies throughout the world, such as VRMC (USA), Previ (Spain), Istituto Auxologico Italiano (Italy), and Hanyang University (Korea), currently have developed programs for use with patients with phobias or PTSD who have fear of agoraphobia, acrophobia, claustrophobia, as well as fear of flying, driving, and public speaking. As more programs become available, this form of therapy is sure to become more widespread. Many of our programs can now be ported over high-speed Internet connections, allowing for further dissemination.

Finally, a future direction that is guaranteed to occur is changes in technology. As technology continues to improve, it could be that everyone will have a VR headset (just as now most systems are speaker and headphone capable). Software could be downloaded or presented on the Internet for specific problems. Clearly, VR is in our future, and therapeutic uses are sure to be close behind.

Conclusion

VR-assisted, physiologically monitored graded exposure affords the therapist the greatest measure of control over the patient's arousal. While VR is not a substitute for good clinical skills, it allows the therapist more precise control over the stimuli in this graded exposure treatment. Incorporating attentional retraining, cognitive restructuring, and psychophysiological reactivity modulation into the therapy allows patients to gain skills to assist them in the therapy, and afterward, to reduce PTSD symptoms and improve their overall quality of life. This form of therapy has potential to benefit not only those with recently developed combat PTSD, but also those in the field who assure that troops are ready to return to combat, or even as a way to build resilience prior to deployment as a way to curtail the development of PTSD.

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Appendix I

Homework 1

Meditation Exercises

Somatic Self-Comforting

The following is a standard attentional retraining that is simple to learn yet highly effective:

Squeeze your hands, raise your shoulders, squeeze your eyes shut, and take a deep breath in, as deep as you can... And then release, let go of all your tension, your breath flows all the way out, and you can sink down into your chair.

Feel gravity helping your body to relax down into your chair:

- *Feel the weight of your legs, letting gravity pull the weight of your bones toward the floor... And then let the muscles relax, as if they are melting down along your bones.*
- *Feel the weight of your pelvis, sinking into the chair... Your muscles "melting" and your pelvic organs sinking down into the chair.*
- *Feel the weight of your abdomen settling into your pelvis.*
- *Feel the weight of your spine resting into the pelvis, and all the muscles of your back "melting" like honey.*
- *Feel gravity taking your shoulders, lungs and heart down to rest in your abdomen.*
- *Feel your head, face, and even your brain relax down into your shoulders.*

As your body continues to relax and rest and feel comfortable, focus on your breath.

- *Notice the air flowing into and out of **your nose**...*
- *Notice the change in temperature as the air flows in compared to when the air flows out...*
- *Notice the change in texture as the air flows in compared to when the air flows out...*
- *Notice the place that the air touches your nose and throat as the air flows in versus out...*

If your thoughts or feelings distract you, notice that distraction, let it go, and come back to feeling the breath flowing into and out of your nose.

<Feel this calm soothing flow of air for about 20 breaths>

Place your hands on **your chest**..

- *Notice how your hands rock forward as your chest expands with each inhale, and returns back to your center with each exhale...*

- *Notice how your elbows are gently expanded out to the sides, released back toward the center...*
- *And you may even be able to notice how your back gently expands into the chair behind you and slightly releases the pressure on that chair with each breath...*

There's no need to make any effort to breathe. Rather, allow the breath to happen effortlessly, as if the breath is breathing you. In fact, to help you release your excess effort to breathe, at the bottom of each exhale let the breath out just a little bit more, relaxing it out as much as possible, before the inhale begins anew.

<Feel this gentle massage from the inside, as if a balloon is expanding and releasing effortlessly, for about 20 breaths>

*Place your hands over your **lower abdomen**...*

- *Feel the warmth of your hands merging in with the warmth of your belly...*
- *Allow that warmth to float forward and back, effortlessly, soothing and comforting...*
- *Allow that warmth to soothe and comfort your body...*

Imagine the breath to be centered in your pelvis, expanding down and out (like a balloon effortlessly filling and expanding in all directions equally, and then easily releasing, letting go of any tension, any effort, any pain. Each inhale is as fresh as the first breath you've ever taken, and each exhale is as precious as the last breath you'll ever take.

<Feel this soothing rocking of the warmth, back and forth, for about 20 breaths>

***Finally, simply sit, feeling your body expanding and releasing effortlessly, silently, soothingly.** If your attention is drawn away by a thought or feelings or sounds, simply notice that your attention is being pulled away, let go of that distraction, and absorb yourself as fully as possible in the body, expanding with every inhale and releasing with every exhale.*

It's nice to know that you can return to this state of relaxation any time you need to or want to, simply by doing this exercise. And you can bring this comfortable feeling back with you now, as you feel your chest rising during the inhale... and with the next inhale or the one after, you can... raise your eyes and eyelids up toward the ceiling, and then focus back in the room, feeling clear and calm and alert.

This simple breathing exercise takes only about 5 or 6 minutes. It is useful to practice when first waking up. When you drive to work, you can sit in your car for 5 minutes doing this breathing exercise before you go in to face the day. It's useful to practice this for 5 minutes before lunch. And when you drive home it's helpful to sit in the car for 5 minutes doing this exercise before you go in to begin your evening routine. Finally, it's valuable to do this practice just before going to bed.

Alternatively, you can practice this for about 20 minutes morning and evening. Count 30 breaths at each part, and then simply sit and "be," with the body expanding and releasing, comfortably and effortlessly, for the rest of the time. Whenever distraction arises (thoughts, sounds, discomfort), notice it, and then redirect your attention to the feeling of your body breathing.

Attentional Absorption

The following exercise is useful after one has learned to calm one's body and mind, using the above exercise.

Sitting with your eyes open, allow your gaze to fall on a general area of the floor, about 6 feet in front of you. Feel as if, with each inhale, you are allowing the light pattern to flow in and fill you, until at the top of the breath, you are completely filled with the light pattern. Then, as you exhale, give your breath and all your feelings completely to what you are seeing, until at the bottom of the breath there is nothing left but the light pattern. Make no effort to breathe, simply allowing the breath to fill you and empty you, along with the light patterns.

Note that the light pattern you see is not "out there" separate from you. Instead, what you see is merely the light pattern falling across your retina. By the time you are aware of what you see, it is already an image in your brain. Simply allow that image to fill your brain, accepting it with the inhale, and giving yourself to it with the exhale.

There is no need to comment upon this light pattern, or to react to it. Simply allow it to occur. If you find yourself creating any visual images in your mind—visual memories, associations, or any "pictures" at all—just let go of that image, let go of the effort required to create that image, and instead allow yourself to be filled with the visual images that are presented to you effortlessly through your eyes.

(Allow the patient to practice this for several minutes)

Similarly, allow yourself to become absorbed in the sounds that are present. Feel as if, with each inhale, you are allowing the sound to flow in and fill you, until at the top of the breath, you are completely filled with the sound. Then, as you exhale, give your breath and all your feelings completely to what you are hearing, until at the bottom of the breath there is nothing left but the sound. Make no effort to breathe, simply allowing the breath to fill you and empty you, along with the sound.

Note that the sound you hear is not "out there" separate from you. Instead, what you hear is merely the vibration of your eardrum. By the time you are aware of what you hear, it is already a sound in your brain. Simply allow that sound to fill your brain, accepting it with the inhale, and giving yourself to it with the exhale.

There is no need to get an image of this sound, or to comment on it, or to react to it. Simply allow it to occur. If you find yourself creating words, music or sounds in your mind—such as conversations—just let go of those sounds, let go of the effort required to create those sounds or words, and instead allow yourself to be filled with the sounds that are presented to you effortlessly through your ears.

(Allow the patient to practice this for several minutes)

Similarly, allow yourself to become absorbed in the feelings that you feel in your skin. Notice the warmth of your body. How your body expands and releases, effortlessly with each breath.

Notice the air passing gently over your skin

(Pause)

And notice the air, flowing effortlessly in and out of your body.

(Pause)

And allow the flesh in between to be massaged by the air inside and out.

(Pause)

If you find yourself focusing on physical or emotional pain or discomfort, notice that, let it go, and focus all your attention on the warmth of your body, your body expanding and releasing, and the air around you and inside of you.

(Pause for several minutes)

Whatever you pay attention to, your body and mind become more like that.

If you pay attention to worry and distress and pain, you become more like that.

If you pay attention to what you are seeing, and hearing, the warmth of your body, the gentle expansion and release of your body, the air inside and out, you become calmer and clearer.

(Pause for several minutes)

If you find yourself creating visual images, let those images go, and absorb yourself in the images being presented to you by the light in the room.

If you find yourself creating words or sounds, let those sounds go, and absorb yourself in the sounds being presented to you by the vibrations in the room.

If you find yourself focusing on uncomfortable feelings, let those feelings go, and absorb yourself in the sensations of warmth and breath.

Practitioners can select one of these sensations to become absorbed in at first. After a while, when they stop creating thoughts, they will notice all sensations at once, effortlessly.

If their minds are particularly active, a useful exercise is to:

- Focus on what one sees for 3 breaths
- Focus on what one hears for 3 breaths
- Focus on a comfortable feeling for 3 breaths

If one can do this for 3 breath cycles, then increase the focus on each sensation to 4 breaths each, then 5 breaths each, etc. If one loses one's place, then repeat the last successfully completed cycle.

Distancing Distress and Redefining Self

Once the above exercises have been practiced, and the patient states some degree of success in being able to do them, the following suggestions are useful during attentional retraining, especially during intrusive thoughts or during VR exposure.

You can allow those images and sound to flow in and out without reaction. To hold onto them is to give them power. Just let them go. Focus instead on what you see, hear and feel in this moment. These sensations are what are real. The thoughts and feelings that intrude into your mind are just creations of your mind. Don't give them any power. Just let them go.

Just as there are sounds in the distance, you don't need to pay attention to them. You can notice them, and let them go. Just as there are feelings of you sitting on the chair, you don't have to pay attention to that. You can notice it and let it go. In the same way, you can notice those thoughts and sounds and images off in the distance. They are not you. They are just images and sounds. You can notice them, and let them go. Instead, pay attention to the feelings of the breath flowing in and out, the warmth of your body, the way your body expands and releases. This is your core self. This is always here with you. This is real. No matter what is going on around you, you always can bring your attention to your core, your self, and let this core self soothe you and comfort you.

NOTE:

If they are troubled by intrusive thoughts and feelings, then refocus them on what they see, hear and feel, without reaction.

If they are troubled by the VR exposure, then refocus them on soothing, somatic feelings, and distance the stimuli as "off in the distance, not real."

Homework 2

Once you have gotten yourself into a calm and relaxed state:

- Remember difficult things that happened in combat
- First, pick difficult things that intrude into your mind during sleep or work
- Each day, pick more difficult things that happened, or that intrude into your daytime activity or sleep
- Put these thoughts and feelings off in the distance, as if you are seeing them on a screen
- Continue to watch them, but stay as relaxed and comfortable as possible. Don't react to them; instead just let them be there, off in the distance, without disturbing you. If you become too distressed, distance the thoughts as much as you need to:
 - Put them further off, until they are barely noticeable
 - Make the screen smaller
 - Turn down the sound

When you are able to tolerate these thoughts and feelings, without reaction to them, and staying fairly calm and comfortable, you can bring these thoughts closer to you, turn up the sound, and make it bigger and more vivid.

Continue to observe this thought, holding it there in the distance for at least 5 minutes, while you also continue to stay calm and relaxed. If at any time you become too uncomfortable or upset, then:

- Distance that image (as above). If that does not work,
 - Let that image go, calm yourself again, then regenerate that same image (but further away and with no sounds) or pick a different problem you can tolerate

Each day, pick something that is difficult for you. The more you do this, the less control these thoughts and feelings will have over you, and the more control you will have over them.