February 18, 2018

The Honorable David J. Shulkin, MD
Secretary of Veterans Affairs
Office of the Secretary
U.S. Department of Veterans Affairs
810 Vermont Avenue, NW Room 100
Washington, DC 20420

Dear Dr. Shulkin,

Attached you will find my formal report entitled *Virtual Reality Therapy in VA Hospitals* summarizing the research and recommendations for the expansion of virtual reality therapy treatment in VA hospitals.

It is unacceptable that 20 military veterans per day commit suicide (Maffucci, 2017) mainly in part to untreated Post Traumatic Stress Disorder (PTSD). Cognitive Behavioral Therapy with Virtual Reality Technology dramatically improves outcomes for these veterans. The Department of Veterans Affairs must make Bravemind: Virtual Reality Exposure Therapy (VRET) available for every veteran with PTSD in its hospitals, clinics, and partners to curb this dangerous trend and reduce veteran suicides.

The quality of life lowers drastically for those with PTSD (Tull, 2017). They are at increased risk of developing additional mental health disorders like anxiety, depression, eating disorders and substance abuse. Personal relationships are strained as are working relationships. This results in a higher unemployment rate for those with PTSD and for those who are employed, more missed days. A distressing state for anyone and even more so for our veterans. Veterans that have sacrificed so much in their service are still made to suffer at home with PTSD. We must make all effective treatments available for every veteran.

In this report, I exam and recommend an exciting therapy that is helping veterans to manage their PTSD and live a considerably improved life. I trust that your interest in this subject and any potential solutions brought to your attention will inspire you to thoroughly read and consider this report's conclusions.

Sincerely,

Madeline Merced, Champlain College Student

Summary

It is unacceptable that 20 military veterans per day (Maffucci, 2017) commit suicide mainly in part to untreated Post Traumatic Stress Disorder(PTSD). Cognitive Behavioral Therapy with Virtual Reality Technology dramatically improves outcomes for these veterans. The Department of Veterans Affairs must make Bravemind: Virtual Reality Exposure Therapy available for every veteran with PTSD in its hospitals, clinics, and partners to curb this dangerous trend and reduce veteran suicides.

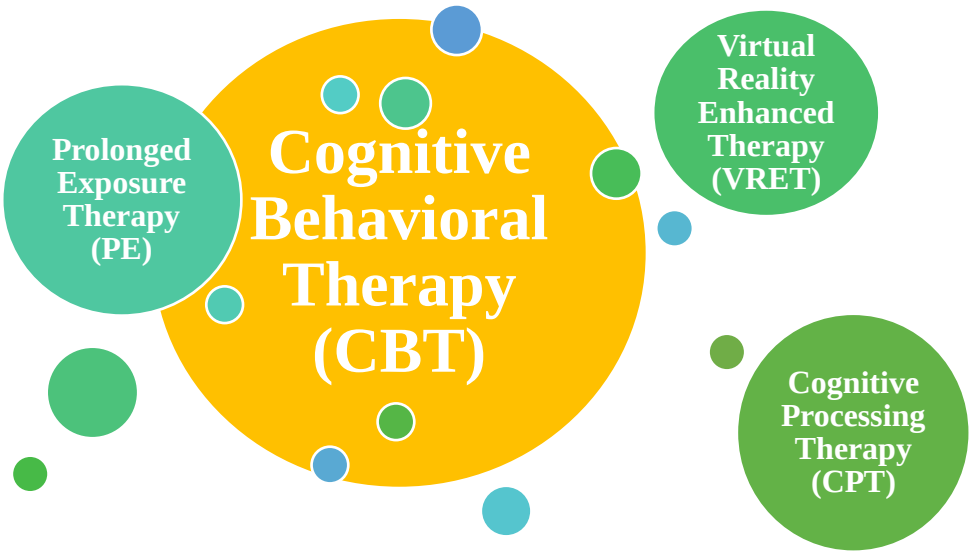
In 2012, there were 311 deaths from military action and 349 deaths by suicide; this is just for active duty and reserve soldiers (Rogers, 2013). The number more than doubles when it includes military veterans, to an average of 20 per day or 7,403 for the year of 2014 (Mclaughlin, 2016).

Findings Demonstrate Critical Need for Effective PTSD Treatment:

- 39 percent of veterans screened positive for probable alcohol abuse (Eisen, Schultz, Vogt, Glickman, Elwy, et al., 2012)
- 31 percent of Vietnam veterans, almost 10 percent of Desert Storm veterans, 11 percent of Afghanistan war veterans and 20 percent of Iraqi war veterans have PTSD. (NIH Medline Plus, 2009)
- Risk of suicide among veterans is 22 percent higher than non-veterans in the United States. (USDOVA, 2017)
- Rick for suicide for female veterans is 2.5 times higher than non-veteran women in the United States. (USDOVA, 2017)
- The suicide rate for female veterans increased by 62.4 percent from 2001 to 2014 and increased 29.7 percent for male veterans over the same period. (USDOVA, 2017)

- Veterans make up just 8.5 percent of the U.S. population but account for 18% of all suicides in the united states. (USDOVA, 2017)

Current Effective Treatments for PTSD



Conclusions

- Veteran Suicide Rate is Reaching Critical Levels
    - The critical need to expand Virtual Reality Therapy to other VA hospitals and clinics.
    - Increase access to therapy to reduce suicide rate and PTSD symptoms.
- Bravemind: Virtual Reality Therapy Will Save Lives
    - PE has been proven to reduce symptoms of PTSD and reduce risk for suicide
    - Emerging data showing that virtual reality-enhanced PE is even more effective
    - The dramatic difference between those willing to participate in traditional PE vs. Virtual Reality PE dramatically reduces the common barriers to treatment.

Recommendations

- Wide-spread implementation of Bravemind Therapy to as many VA hospitals as feasible.
- Comprehensive training and marketing plan to reach as many at-risk veterans as possible.

Table of Contents

Introduction

It is unacceptable that 20 military veterans per day commit suicide mainly in part to untreated Post Traumatic Stress Disorder(PTSD). Cognitive Behavioral Therapy with Virtual Reality Technology dramatically improves outcomes for these veterans. The Department of Veterans Affairs must make Bravemind: Virtual Reality Exposure Therapy available for every veteran with PTSD in its hospitals, clinics, and partners to curb this dangerous trend and reduce veteran suicides.

Background

As someone with PTSD due to chronic childhood trauma, I have a strong understanding of just how profoundly PTSD symptoms can negatively affect one's life. Panic attacks, anxiety, and depression are just some of the common symptoms As are constant fear, hypervigilance, and nightmares that plague everyday life and mark every decision.

Thoughts like *"Should I walk on this side of the street or that one?"* Or in response to an invitation to the Christmas Market, *"No thank you even though I love Christmas and it sounds wonderful. I will be unable to enjoy it because my mind will be hyperaware of the large crowd and constantly preparing myself for an attack."*

When my symptoms were unmanaged, my life was controlled by them. Leaving the house was a herculean effort, as were the constant safety rituals that I HAD to follow or else. This disorder ruled every part of my life and drained any energy away from meaningful pursuits and relationships. This left me reaching for any shred of hope I could hold onto.

Working with my therapist the last few years has clearly shown me how much unnecessary suffering I endured during these years. In my case, my trauma began at such a young age, that I

didn't know life without it. However, people can quickly adapt to a "new" reality, and I am afraid this is also the case for life after a traumatic event for people with PTSD.

Technology is an area of interest for me, and the emerging field of using new technologies to treat mental illness is a particularly special area of focus for me. Some of these technologies, like the one I have written about in this paper, are reducing suicidal thoughts, improving lives and increasing positive outcomes for veterans with PTSD at much better rates than traditional treatments. The ability to help people that are currently suffering as I've suffered is an inspiring thought for me and a treatment I would like to see available to as many sufferers as possible.

Scope

This report will focus on Virtual Reality Prolonged Exposure Therapy more specifically, Bravemind: Virtual Reality Therapy to treat U.S. military veterans and active duty personnel. Limited by the amount of available research, conclusions are drawn by looking at the more widely research traditional therapies that VRET is based on like Cognitive Behavioral Therapy and Prolonged Exposure Therapy.

Discussion

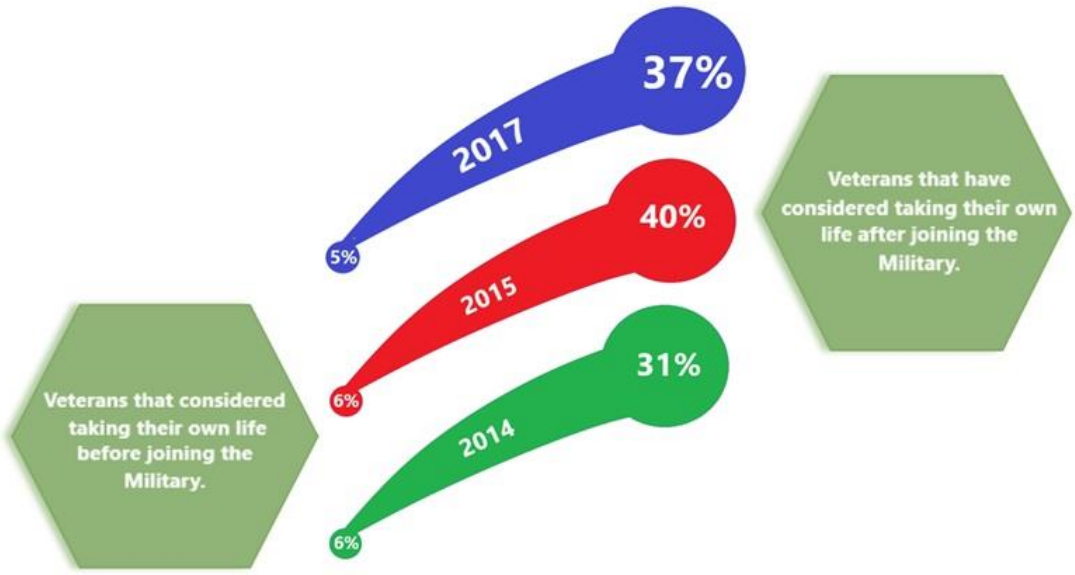


Figure 1. Comparison of Military Before & After

Suicide and PTSD. Ask anyone what they believe the leading cause of death is for soldiers, and they will answer combat. Surprisingly, this is no longer the case. In fact, the current leading cause of death for soldiers and veterans is suicide (Rogers, 2013).

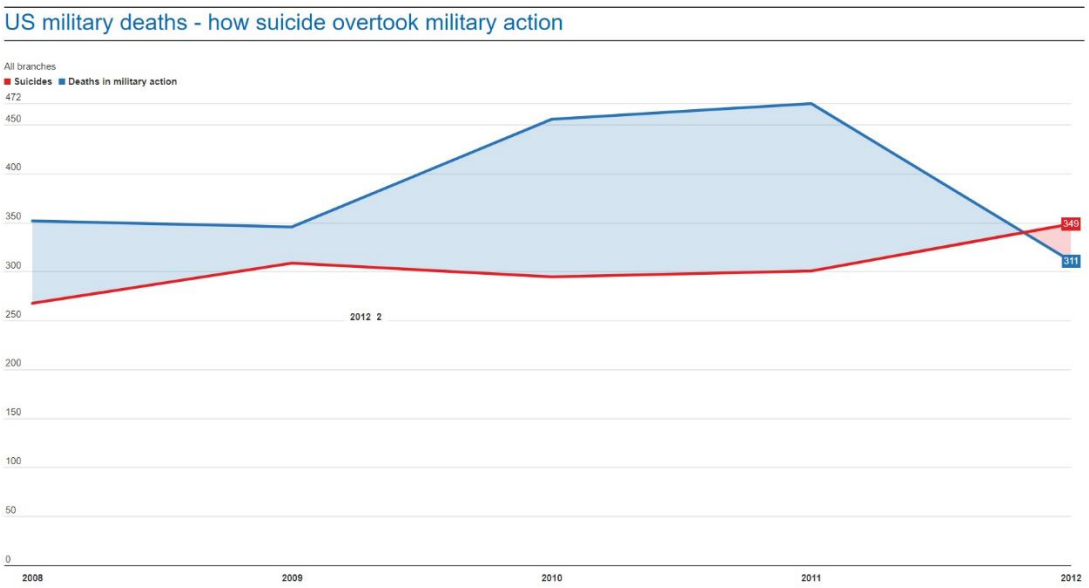


Figure 2 Combat vs. Suicide Deaths (Rogers, 2013)

In 2012, there were 311 deaths from military action and 349 deaths by suicide; this is just for active duty and reserve soldiers (Rogers, 2013). The number more than doubles when it includes military veterans, to an average of 20 per day or 7,403 for the year of 2014 (Mclaughlin, 2016).

PTSD SUD relationship. There is a strong relationship between Post Traumatic Stress Disorder and Substance Use Disorder (SUD). SUD is described as a condition in which an individual overuses or is dependent on one or more substances disregarding the increased adverse effects on their lives. The National Institute on Drug Abuse (2010) found that individuals diagnosed with mental disorders, like PTSD, were twice as likely to also suffer from SUD than those without a mental disorder.

According to the VA (2014), almost one out of every three veterans that are being treated for SUD has also been diagnosed with PTSD. In a study of 596 Iraq or Afghanistan veterans, 39% of them had positive screenings for probable alcohol abuse and 3% for probable drug abuse (Eisen et al., 2012).

PTSD Symptoms. Additionally, typical PTSD symptoms result in even more startling statistics. The unemployment rate for those with PTSD is higher than those without it (Tull, 2017). And if they are working, those with PTSD are more likely to miss work days and work less efficiently. These are just the effects on work life. The problems are even more pronounced when we look at the impact on family life and personal relationships.

The VA (2007) lists these probable adverse effects as the following:

- Intense anger and impulses that may cause those with PTSD to push away loved ones.
- SUD can destroy friendships or more intimate relationships.

- Co-dependency from those with PTSD that can cause their loved ones increased stress.
- Less interest in intimacy or social activities from the PTSD symptom of feeling alone or distant from others.
- Inability to relax because of the dramatic increase of nervous, worried or anxious feelings of those with PTSD can cause loved ones to feel stressed.

These are just some of the ways in which PTSD can negatively affect those with it. This is a tragedy for anyone, especially those veterans that thought they left the war but are still fighting it daily in their minds.

Effective Treatments

Cognitive Behavioral Therapy. Cognitive Behavioral Therapy is described as therapy in which negative thought patterns are challenged to change negative behavior or to improve depression symptoms (Oxford). This style of therapy is highly recommended for the treatment of PTSD.

The VA recommends a structured therapy that borrows heavily from CBT and takes 12 sessions called Cognitive Processing Therapy (USDOVA, 2009). CPT incorporates another popular CBT technique called Prolonged Exposure ((USDOVA, 2009) in which the patient is asked to re-experience the trauma using memory engagement and reframing techniques.

There have been countless studies on the effectiveness of exposure therapy in treating PTSD like the 2007 study published in the Journal of the American Medical Association titled "Cognitive behavioral therapy for posttraumatic stress disorder in women: a randomized controlled trial.". The study looked that the effects of Prolonged Exposure Therapy vs. Present Centered Therapy on 277 female veterans and 7 active-duty personnel with PTSD. The

participants were equally divided into two groups, and each group was treated with one of the two treatment options.

The study found that those participants in the prolonged exposure group had a more substantial reduction in symptoms due to PTSD than the participants in the other group. 41% of the PE group no longer met the criteria for PTSD vs. 27.8% in the PC group. This is a difference of an almost 45% improvement.

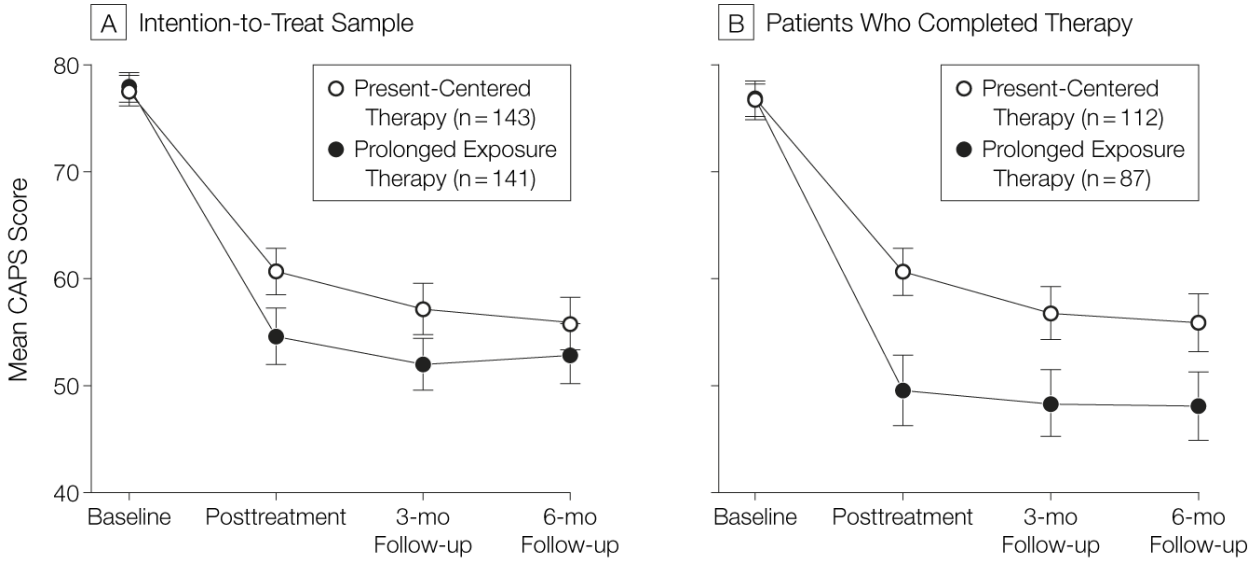


Figure 3 PE vs. PC (Jama, 2007))

In another small study, Trauma Management Therapy which features Exposure therapy found that Vietnam veterans suffering from PTSD (for on average 40 years) had a significant reduction in adverse symptoms and improved quality of life (Beidel, Frueh, Uhde, Wong & Mentrikoski, 2011).

Virtual reality. The acceleration of technology seems to have infiltrated every part of our lives. From the self-checkout machines at the grocery store to up to the minute communication around the world, technological tools are improving the way we live. Mental Health is no exception. Scientists are researching how specific technologies can be used in healthcare and therapy. One of the focuses of this effort is on the treatment of PTSD.

Virtual Reality technology is continuously being developed to be used with PE to increase the efficacy and shorten treatment times for those with PTSD.

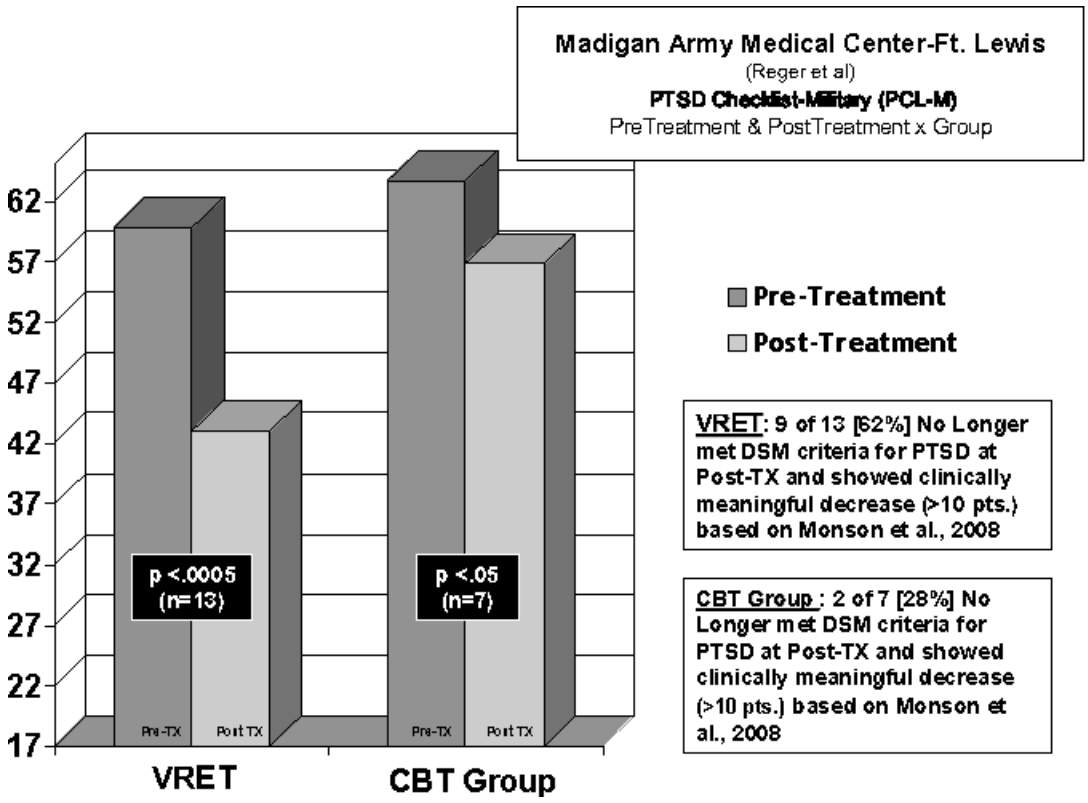


Figure 4 VRET vs. CBT (Rizzo & Shilling, 2017)

In a study evaluating the effect of virtual reality therapy, researchers found that 62% of participants that received virtual reality-based treatment no longer fit the PTSD criteria. This is 34% more than the CBT group with only 28% of the participants no longer meeting the PTSD criteria (Rizzo & Shilling, 2017). A comprehensive evaluation of published studies about Virtual Reality Therapies found there was a significant reduction in PTSD symptoms with the use of Virtual Reality Treatment (Goncalves, Pedrozo, Coutinho, Figueira, Ventura, 2012).

Overview

Bravemind: Virtual Reality Software is an example of virtual reality-based exposure therapy (Rizza & Hartholt, 2005). It is a clinical and interactive tool that is specifically used for treating PTSD among active-duty soldiers and veterans.

Bravemind creates an entirely immersive experience by using:

- Sounds- Directional 3D audio that includes gunfire, explosions, and yelling.
- Sights – VR head-mounted displaying a custom scene.
- Vibrations – To mimic the motions currently on display.
- Smells – That includes gunpowder, diesel fuel, body odor, and burning hair.

This technology allows the clinician to control the pace at which the therapy is administered. Gradually increasing the intensity of the experience to accurately match the patient's current tolerance level.

The basic set up of a bravemind therapy session begins with a clinician learning more about the patient and their experience. Then the clinician sets up a scene in software and asks the

patient to put on the headset, headphones and to carry the gun. The clinician will then ask the patient to describe the event as the clinician continues to customize the experience. They may ask the patient to explain their level of anxiety, giving it a rating between 1-10 throughout the experience. As described by PTSD Clinic Clinical Psychologist Dr. Michael Kramer "the goal is to keep a consistent anxiety level throughout." This process repeatedly done over time should result in a gradual decline of anxiety and other PTSD symptoms.

Benefits of Virtual Reality. Exposure therapy has been proven to be a valid form of treatment for PTSD. However, researchers have found that exposure therapy is often rejected for reasons that include fear of overwhelming negative feelings. In a study of 150 participants, 27% of them refused traditional exposure therapy. When these same participants were offered virtual reality-based exposure therapy, only 3% of rejected the option (Garcia-Palacios, Botella, Hoffman & Fabregat, 2007). That means access to life-saving care to 36 more people with PTSD because of the simple addition of VR.

Bravemind Studies

Bravemind: Virtual Reality Therapy has been the subject of several studies to evaluate its effectiveness in the treatment of PTSD. A short overview of a few of these studies has been included for your evaluation.

1. **Virtual Reality Exposure Therapy for Combat-Related Posttraumatic Stress Disorder (Rizzo, Hartholt, Grimani, Leeds & Liewer, 2014)**

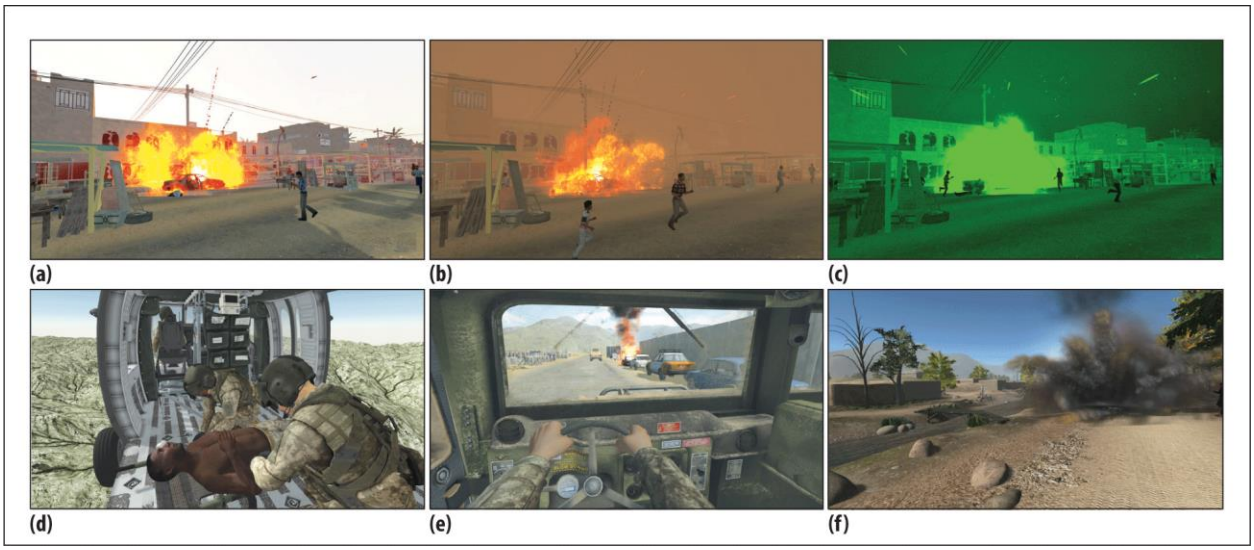


Figure 5 Images from Bravemind (Rizzo et al., 2014)

A comprehensive history of Bravemind technology from its start as the Iraq/Afghanistan VR with four scenes to its current iteration of 14 scenes with enhanced features. An overview of future and goals for the technology.

2. **Clinical Virtual Reality tools to advance the prevention, assessment, and treatment of PTSD (Rizzo & Shilling, 2017)**

This paper details the history and current state of virtual reality therapy in the treatment of PTSD. It outlines the advantages of the adoption of this technology that include, continued affordability (as technology prices drop), increased acceptability by high resistant groups(“macho” veterans), and higher client adherence.

3. **Virtual Reality Exposure for PTSD Due to Military Combat and Terrorist Attacks (Rizzo, Cukor, Gerardi, Alley, Reist, Roy & Difede, 2015)**

Examines and outlines the positive outcome of VR treatments. In addition to presenting an argument for the use of VR exposure therapy for the treatment of PTSD and anxiety disorders.

Figure 6 Current Locations with Bravemind (Rizzo, 2014)

Current Implementations. Bravemind: Virtual Reality Therapy is currently in 60 sites including VA hospitals, Military Hospitals, and University research hospitals. This is a good start but falls extremely short of meeting the current needs of veterans and active duty personnel. The VA alone has 1,243 healthcare locations. Let's assume the 60 sites that currently have Bravemind are all VA facilities (which we know is not entirely correct), that would mean that only 4% of VA facilities offer this vital therapy. When the suicide rate of veterans is more than double that of non-veterans, this offering is incredibly insufficient. The VA must make it a priority to increase the number of sites with Bravemind to be able to significantly impact the number of suicides and symptoms for veterans with PTSD.

Increased Implementation Benefits

Reduced suicide rate. Lowering the rate of suicide among veterans would be the most important benefit of implementing VRET. Cognitive Behavioral Therapy, Cognitive Processing Therapy, and Prolonged Exposure have all been shown to decrease the risk of suicidal behavior in high-risk individuals including veterans. A study of the Air Force Suicide Prevention Program

found that the program reduced the risk of suicide by one-third for air force personnel (2012, p 22).

A controlled trial of cognitive therapy and its effects on suicide attempts found that participants in the cognitive therapy group were 50% less likely than the control group to attempt suicide (Brown, Have, Henriques, Xie, Hollander and Beck, 2005). Virtual reality therapies and their direct impact on suicide prevention are still being studied, but the emerging data are promising.

In a case study of VRET, researchers found that suicidal ideation was significantly reduced when treated with VRET (Nararro-Haro, 2016). Stephen Cotta put it best when he simply stated: “This technology has saved my life.” (Techlectic)

Improved quality of life. Providing Bravemind: Virtual Reality Therapy doesn’t only prevent suicide but gives veterans the tools to combat the overwhelmingly negative symptoms of PTSD. The intense anger and impulses are reduced which allows the veteran to live more peacefully with themselves and loved ones. This improves relationships at home and at work.

The feelings of loneliness and isolation are replaced with increased feelings of belonging which have been proven to increase the quality of life ratings. Reliance on substances to manage trauma decreases as the trauma is treated in a safe, supported environment. Cotta explains “Not feeling like an outcast. Feel so much more hope.” This can eliminate or significantly diminish SUD improving the adverse physical and mental health effects of the substance use disorder.

Weakening the co-dependency commonly found in those who have PTSD, treatment gives veterans the strength and confidence to increase their independence and reduce nervous or anxious feelings.

Challenges

Cost of implementation. The direct costs of this technology and its application are not explicit. Although we don't know the exact costs of the Bravemind system, we can safely make some assumptions.

The cost of implementation will at the bare minimum include:

- The computer systems, to include multiple monitors, hard drives, and upgrades.
- Salaries and other associated payments required for employee training time.
- Virtual Reality Headsets, headphones, and accessories required for proper implementation.
- Administration and management of the system.

A more comprehensive evaluation of the costs would need to be examined to accurately estimate the size of the impact this challenge may cause. This evaluation would need to include VA professionals and clinicians at the Institute of Creative Technologies.

Training of medical staff. Another challenge to consider is the training of medical personnel on a large scale. Each site that rolls out this treatment will have to be adequately trained. This training if not completed correctly could compromise the integrity and lower the effectiveness of the treatment. A policy of consistent training and evaluations can help reduce the probability of improper execution.

Veteran adoption of treatment. Despite the increased availability of VRET, there is no guarantee that the veterans in need of treatment will seek it out. The VA reports that of those veterans diagnosed with PTSD only 53% of them seek treatment (AP, 2014). This statistic does not include veterans that may be suffering from PTSD that has yet to be diagnosed.

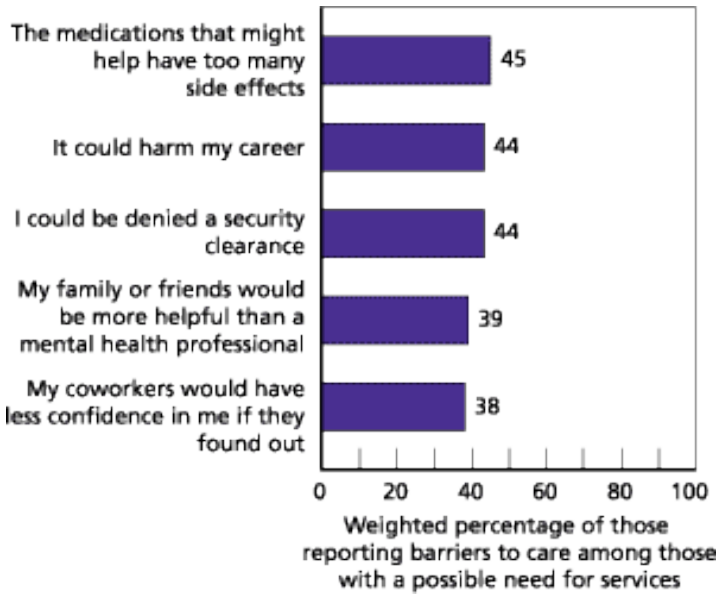


Figure 7 Barriers Graph (Rand, 2008)

Barriers to treatment among veterans may include (USDOVA, 2012):

- Worries about how the treatment may affect their career
- Negative stereotypes and stigmas around mental illness.
- Fear of confronting negative emotions and memories.

Conclusions

The suicide rate for veterans is too high. It is unacceptable that 20 military veterans per day commit suicide mainly in part to untreated Post Traumatic Stress Disorder(PTSD). Cognitive Behavioral Therapy with Virtual Reality Technology dramatically improves outcomes for these veterans. The Department of Veterans Affairs must make Bravemind: Virtual Reality Exposure Therapy available for every veteran with PTSD in its hospitals, clinics, and partners to curb this dangerous trend and reduce veteran suicides.

In 2012, there were 311 deaths from military action and 349 deaths by suicide; this is just for active duty and reserve soldiers. The number more than doubles when it includes military veterans, to an average of 20 per day or 7,403 for the year of 2014.

There is a strong relationship between Post Traumatic Stress Disorder and Substance Use Disorder (SUD). The National Institute on Drug Abuse found that individuals diagnosed with mental disorders, like PTSD, were twice as likely to also suffer from SUD than those without a mental disorder. In a study of 596 Iraq or Afghanistan veterans, 39% of them had positive screenings for probable alcohol abuse and 3% for probable drug abuse.

PTSD symptoms cause a dramatic adverse effect on quality of life. These symptoms include intense anger and impulses, co-dependency, increased feelings of loneliness and isolation, and the inability to relax and manage negative emotions like anxiety and nervousness.

Virtual Reality Software used with Cognitive Behavioral therapy will save lives and reduce veteran suicide rates. In a study of 150 participants, 27% of them refused traditional exposure therapy. When these same participants were offered virtual reality-based exposure therapy only 3% of rejected the option. That means access to life-saving care to 36 more people

with PTSD because of the simple addition of VR. A study of the Air Force Suicide Prevention Program found that the program reduced the risk of suicide by one-third for air force personnel.

A controlled trial of cognitive therapy and its effects on suicide attempts found that participants in the cognitive therapy group were 50% less likely than the control group to attempt suicide. Reliance on substances to manage trauma decreases as the trauma is treated in a safe, supported environment. Cotta explains “Not feeling like an outcast. Feel so much more hope.” This can eliminate or significantly diminish SUD improving the adverse physical and mental health effects of the substance use disorder. Treatment gives veterans the strength and confidence to increase their independence and reduce nervous or anxious feelings.

The direct costs of this technology and its implementation are not explicit. A challenge to the adoption of this technology will begin with the additional resources required to complete a feasibility study. This study will need to include VA medical and financial professionals with the clinicians and professionals at the Institute of Creative Technologies. Another challenge to consider is the training of medical staff on a large scale. Each site that rolls out this treatment will have to be adequately trained. Despite the increased availability of VRET, there is no guarantee that the veterans in need of treatment will seek it out. The VA reports that of those veterans diagnosed with PTSD only 53% of them seek treatment.

Recommendations

Figure 8 Recommended Order of Action

1. Feasibility study to examine the costs of implementation that includes professionals from both the VA and Institute for Creative Technologies.
    a. This study should include cost estimates for different implementation benchmarks based on a percentage of available VA locations.
        i. The estimated cost for implementation in 10% of VA clinics and hospitals.
        ii. The estimated cost for implementation in 30% of VA clinics and hospitals.
        iii. The estimated cost for implementation in 50% of VA clinics and hospitals.
        iv. The estimated cost for implementation in 70% of VA clinics and hospitals.
    b. Secure funding to meet the financial requirements for the implementation based on the study.

2. Create and schedule a training plan for medical professionals, clinicians and other employees that will be working with the system.
    a. Identify professionals at each location that will need to be trained on the software.
    b. Create a database of these professionals to track current training status and alert them if any necessary training is missing.
3. Work with each site to identify current patients that would benefit from this treatment.
    a. Create a plan of action that communicates with each of these patients the new treatment available and the potential benefits of participation.
4. Update VA outreach materials that target those at risk of suicide and suffering from PTSD to include information about Bravemind.
    a. VA hospitals and Clinics
    b. VA Website and internet properties (social media, applications, etc.)
    c. Third-Party VA providers
    d. Military Bases
    e. Commissary and Military Social Clubs
5. For veterans not currently in the VA system, increase awareness of the program, availability and where they can gain access to the treatment.
    a. Media package created by the VA media relations department to be released to contacts from major media companies across the United States about the rollout of the software.

i. Major News Networks

ii. Major Radio Networks

iii. Social Media

iv. Newspapers and Magazines

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Appendix A

Subject Matter Expert One

Kaitlin Olson has a Bachelor of Science in Psychology and an Applied Research Certificate from the University of Wisconsin – Whitewater, where she also studied the psychology of criminology – wrongful convictions with Dr. Elizabeth Olson. She has also interned at the YWCA of Rock County, a domestic violence shelter for women, where she has worked with a wide variety of clients, including those who have PTSD.

Transcript: Interview with Kaitlin Olson

1. Having worked with people with PTSD, what are the biggest challenges facing those that treat this condition?
    a. There are always challenges with treating people with mental illnesses. With PTSD, it is common for patients to belittle their true emotion, or to cover their anxieties. With exposure therapy, patients need to confront their trauma, and most often this is a difficult task. PTSD and other trauma-related disorders are very complex (can be comorbid with other disorders as well), and can take time and intense effort to treat. There are also very high possibilities of relapse.
2. What are some of the most common symptoms of PTSD you encounter when working with patients?
    a. Common symptoms I've encountered with people who have PTSD include severe anxiety of similar environments or reminders of trauma, nightmares, and loss of interest in usual activities and hobbies. PTSD in veterans is often paired with

depression, and it is not uncommon to see substance abuse or other self-damaging behaviors.

3. In your expert opinion, how does trauma (or PTSD) affect the working and personal lives of those with it?
    a. As with any severe psychological disorder, PTSD can very much interfere with the people that suffer from it, as well as their family, friends, etc. Insomnia or nightmares, anxiety, feelings of guilt or loneliness, fear of flashbacks, and hostility and agitation to others are all traits that can negatively impact these lives, whether it leads to substance abuse or problems with interpersonal relationships.
4. Are there any unique or additional issues that soldiers with PTSD must deal with?
    a. We see PTSD commonly in veterans due to the stress of combat. In traumatic events, our mind has two coping scenarios. Mobilization is the use of adrenaline, our fight-or-flight instinct. Immobilization occurs when you've experienced too much stress, and even when the event has passed, one still feels "stuck." In ex-compotators, it isn't uncommon to feel the need to be back in action- if they can't move on, maybe it would help to move back when your adrenaline is in motion. It is also not uncommon for veterans with PTSD to suffer from some sort of substance abuse, or suicidality, etc. It is important to note that while this may seem unique to veterans with PTSD, there is no known significant linkage to symptom differences for veterans, and these symptoms can be similar to those of other illnesses.

5. Have you heard of Virtual Reality Therapy(Bravemind) for treating people with PTSD? If so, do you think this is an effective treatment for those with PTSD?
    a. Yes, VRT has been studied and shown that it is a successful method of treatment for war veterans. It's a version of exposure therapy and uses desensitization to alleviate symptoms of PTSD. Although I believe it could be very useful for those with PTSD. I also believe it would be much more beneficial to have a combination therapy including Cognitive Behavioral Therapy with the VRT.
6. The VA says that about 20 veterans commit suicide every day. Do you think an expanded virtual reality therapy program would be helpful in reducing this number?
    a. This question is hard to answer, as suicidality is very difficult to treat. Reducing general anxiety-like symptoms could very much be helpful in reducing suicide rates in veterans. However, I believe that VRT should be paired with another evidence-based treatment that targets suicidality (CBT or Dialectical Behavior Therapy, for examples), and should not be used alone.
7. Do you believe the use of this technology should be expanded to all of the Veterans Affairs hospitals?
    a. VRT, given the evidence research behind it, shows that it has been helpful for veterans with PTSD. On this fact alone, I think it would definitely be worthwhile to expand the technology used for this therapy.
8. What would be some of the challenges that this type of treatment could cause?
    a. Exposure therapies have been widely studied and have been shown to be very effective. There may be, however, a disconnect between veterans with PTSD and VRT. In order for exposure therapy to be effective, the patient must be able to be

upfront with their trauma/anxieties. Many with PTSD are unable to do so or do not wish to do this. If this is the case, there may be a risk of harm to the patient. However-there are risks to any therapy, and I do believe that by finding the right therapy for each patient, that the benefits will outweigh the disadvantages.

9. Is there anything else you'd like to add about Bravemind: Virtual Reality Therapy or PTSD?
    a. VRT is a very interesting approach to technology and therapy- a scary thought at first- but is the first steps to a new era of helping mentally ill patients.

Subject Matter Expert Two

Dr. Amy Luer Savage is a Psychologist, specializing in Trauma and Substance Use Disorder with over 15 years' experience. With a graduate degree from the University of Wisconsin-Madison and several certificates, Dr. Savage is at the forefront of trauma and SUD treatment. Dr. Savage works both inpatient and outpatient focusing on patients with PTSD.

Appendix B

COVER FEATURE

Virtual Reality Exposure Therapy for Combat-Related Posttraumatic Stress Disorder

Albert Rizzo, Arno Hartholt, Mario Grimani, Andrew Leeds, and Matt Liewer,
USC Institute for Creative Technologies

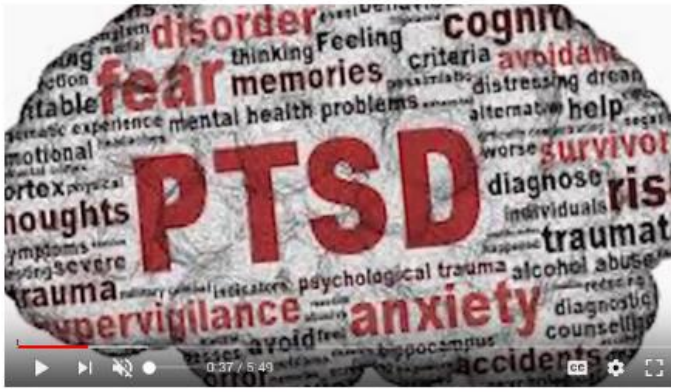
Virtual reality (VR) technology is rapidly evolving to support prolonged exposure (PE) therapy, a proven treatment for combat-related posttraumatic stress disorder. Building on the successful 2007 Virtual Iraq/Afghanistan VRET system, a team of behavioral scientists, software engineers, and virtual artists has created Bravemind, a flexible VR system that offers significantly enhanced PE treatment possibilities.

In the early 1990s, behavioral healthcare professionals began to envision using virtual reality (VR) simulations for clinical intervention, particularly as a means to deliver exposure therapy in treating specific phobias, but were limited by the rudimentary systems then available. Over just two decades, dramatic advances in underlying VR technologies—computational speed, 3D graphics rendering, audiovisual and haptic displays, user interfaces and tracking devices, voice recognition capabilities, intelligent agents, and authoring software—have cost-effective VR systems that run on commodity-level personal computers and provide interactive, immersive experiences and scenarios that open many doors for psychological research and behavioral health applications in the 21st century.

More specifically, the spike over the last 10 years in the number of US service personnel returning from battlegrounds in Afghanistan and Iraq with traumatic injuries has driven an intense focus on marshaling computer technology to enhance, expand, and extend clinical care methodologies. The US Department of Defense (DoD) and Department of Veterans Affairs (VA) have responded to this urgency with substantial funding to foster innovations in behavioral healthcare technology for purposes of treatment as well as to reduce "barriers to care."[1] This support is evident most dramatically in the resources now devoted to research on traumatic brain injury, posttraumatic stress disorder (PTSD), and comorbid health conditions, with a special focus on clinical VR technology that can help assess, treat, and optimally prevent PTSD.

COMBAT-RELATED PTSD

The physical, emotional, cognitive, and psychological demands military personnel face in combat create enormous stress for even the best prepared. The particular challenges characterizing the ground wars in Iraq and Afghanistan



Fighting PTSD with Virtual Reality UCF Patient Interview

838 views 8 0 SHARE

Skip Rizzo
Published on Aug 9, 2016

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This is an excellent piece produced by Techlectic in April 2016, on the Virtual Reality PTSD treatment work being done at the University of Central Florida by Deborah Beidel's group using the USC ICT BRAVEMIND Virtual Reality Exposure Therapy system. It has a great

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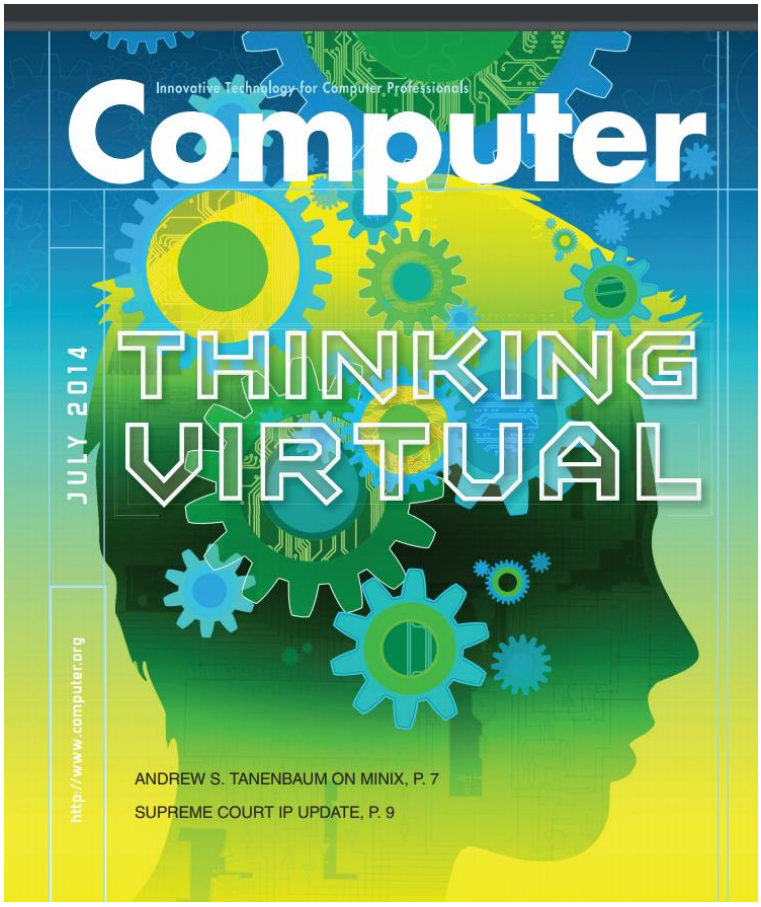
Appendix C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PTSD: A Growing Epidemic

Feature
PTSD

Winter 2009 Table of Contents

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Years of war in Afghanistan and Iraq have brought post-traumatic stress disorder (PTSD) among military personnel to the attention of the American people as never before. But PTSD is also found among survivors of natural disasters, victims of crime, and many others who have experienced traumatic events.

Post-traumatic stress disorder (PTSD) may develop after a terrifying ordeal involving physical harm or the threat of physical harm. You don't have to be physically hurt to get PTSD. You can get it after you see others—a friend, a family member, even a stranger—harmed or threatened.

War veterans brought PTSD to public attention. But PTSD can stem from traumatic incidents, such as mugging, rape, torture, being kidnapped or held captive, child abuse, car accidents, train wrecks, plane crashes, bombings, or natural disasters such as floods or earthquakes. The majority of people exposed to such events experience some symptoms of distress (sleep problems, jumpiness). Most fully recover in a few weeks or months. PTSD is currently the subject of many research studies that are funded by the National Institute of Mental Health (NIMH) at the National Institutes of Health (NIH).

People with PTSD may become emotionally numb, especially in relation to people with whom they used to be close. They may lose interest in things they used to enjoy. They may startle easily or be irritable, become aggressive, and may have trouble falling asleep and staying asleep. They avoid situations that remind them of the original incident, and often find anniversaries of the incident to be very difficult.

Fast Facts

- PTSD affects about 7.7 million American adults.
- PTSD can occur at any age.
- Women are more likely to develop PTSD than men, and there is some evidence that the potential for the disorder may run in families.
- PTSD is often accompanied by depression, substance abuse, or other anxiety disorders.
- Members of the military exposed to war/combat and other groups at high risk for trauma exposure are at risk for developing PTSD .
- Among veterans returning from the current wars in Iraq and Afghanistan, PTSD and mild to moderate traumatic brain injury (TBI) are often linked and their symptoms may overlap. Blast waves from explosions can cause TBI, rattling the brain inside the skull.

PTSD symptoms seem to be worse if they were triggered deliberately by another person, as in a mugging or rape. Most PTSD sufferers repeatedly relive the trauma in their thoughts during the day and in nightmares when they sleep. These are called flashbacks. Flashbacks may consist of images, sounds, smells, or feelings. They are often triggered by ordinary

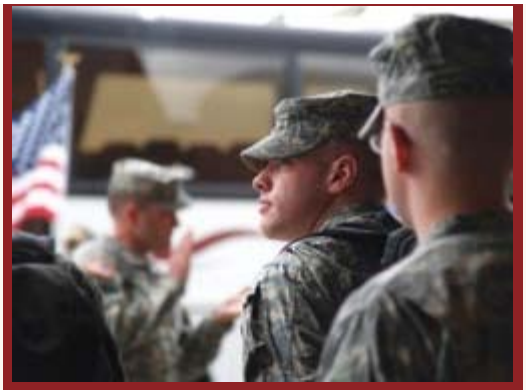

Photo: iStock

occurrences, such as a door slamming, a car backfiring, or being in a place that looks like where the trauma took place. A person having a flashback is likely to feel the emotions and physical feelings that occurred when the incident happened despite no longer being in danger.

Not every traumatized person develops full-blown or even minor PTSD. Symptoms usually begin within three months of the incident, but occasionally may only emerge years later. They must last more than a month to be considered PTSD. The condition varies from person to person. Some people recover within months, while others have symptoms for much longer. In some people, the condition becomes chronic.

PTSD and the Military

Today, hundreds of thousands of service men and women and recent military veterans have seen combat. Many have been shot at, seen their buddies killed, or witnessed death up close. These are types of events that can lead to PTSD.

The U.S. Department of Veterans Affairs estimates that PTSD afflicts:

- Almost 31 percent of Vietnam veterans
- As many as 10 percent of Gulf War (Desert Storm) veterans
- 11 percent of veterans of the war in Afghanistan
- 20 percent of Iraqi war veterans

To Find Out More

- MedlinePlus medlineplus.gov
- National Institute of Mental Health (NIMH) www.nimh.nih.gov
- National Center for PTSD (U.S. Dept. of Veterans Affairs) www.ncptsd.va.gov/
- MedlinePlus Go Local (for PTSD treatment centers near you) www.nlm.nih.gov/medlineplus/golocal
- National Institute of Neurological Disorders and Stroke www.ninds.nih.gov

Neuroscience and PTSD Treatments

Dr. Barbara Rothbaum believes current research is leading to better treatment of PTSD and may one day help to prevent it. Rothbaum is Professor in Psychiatry and Director of the Trauma and Anxiety Recovery Program at the Emory University School of Medicine. She notes that the Institute of Medicine recently reported that only exposure treatment, a type of therapy in which PTSD patients confront their traumatic memories through talking, has sufficient evidence to recommend it.

With funding from NIMH, she is studying how D-cycloserine, an antibiotic, affects how Iraq war veterans experience fear. "We know how fear is turned on and off, where in the brain it occurs, and what drugs facilitate or inhibit it," she says. "D-cycloserine has been shown to reduce fear and make exposure therapy go faster."

Also with NIMH support, Dr. Rothbaum is beginning to look at ways to change traumatic memories before they are consolidated in the brain, and perhaps prevent PTSD altogether. Her new study will focus on intervening to help rape victims in the emergency room.

"I do think there are things we can do in the immediate aftermath of a trauma that can help," she says.

"I was raped when I was 25 years old. For a long time, I spoke about the rape as though it was something that happened to someone else. I was very aware that it had happened to me, but there was just no feeling. Then I started having flashbacks. They kind of came over me like a splash of water. I would be terrified. Suddenly, I was reliving the rape. Every instant was startling. I wasn't aware of anything around me. I was in a bubble, just kind of floating. And it was scary. Having a flashback can wring you out.

Photo: iStock

"The rape happened the week before Thanksgiving, and I can't believe the anxiety and fear I feel every year around the anniversary date. It's as though I've seen a werewolf. I can't relax, can't sleep, don't want to be with anyone. I wonder whether I'll ever be free of this terrible problem."

—A PTSD patient (Source: NIMH)

Questions to Ask Your Health Care Professional

- How do I know I have PTSD?
- Can I be cured?
- What treatments are available?
- What should I do if I feel I might hurt myself?
- Are there things that can make my PTSD symptoms worse?
- If I have had a blow to the head, is there a chance that I could have PTSD or even mild traumatic brain injury? How can I tell?

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Winter 2009 Issue: Volume 4 Number 1 Pages 10 - 14