

High-Intensity Sports for Posttraumatic Stress Disorder and Depression: Feasibility Study of Ocean Therapy With Veterans of Operation Enduring Freedom and Operation Iraqi Freedom

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MeSH TERMS

- Afghan campaign 2001–
- depression
- Iraq war, 2003–2011
- social participation
- sports
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- veterans health

In this study, we conducted a pretest–posttest investigation of a sports-oriented occupational therapy intervention using surfing in an experiential, skills-based program to support veterans with symptoms of posttraumatic stress disorder (PTSD) in their transition to civilian life. The purpose of this feasibility study was to evaluate the intervention for attendance rates and retention in the program provided in 5 sessions over 5 wk. Fourteen veterans from a specialty postdeployment clinic at a Veterans Affairs hospital were enrolled; 11 completed the study, and 10 attended ≥ 3 sessions. Participants reported clinically meaningful improvement in PTSD symptom severity (PTSD Checklist—Military Version, Wilcoxon signed rank $Z = 2.5$, $p = .01$) and in depressive symptoms (Major Depression Inventory, Wilcoxon signed rank $Z = 2.05$, $p = .04$). The results of this small, uncontrolled study suggest that a sports-oriented occupational therapy intervention has potential as a feasible adjunct intervention for veterans seeking mental health treatment for symptoms of PTSD.

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As thousands of men and women have returned from military service in Iraq and Afghanistan, public concern has increased regarding the mental health impact of their experiences in these conflicts. Extended deployments, higher rates of survival from wounds, and exposure to multiple improvised explosive device (IED) blasts specific to the Iraq and Afghanistan wars have contributed to higher rates of posttraumatic stress disorder (PTSD) in veterans from these wars (Seal et al., 2009; Tanielian & Jaycox, 2008). Recent studies have indicated that one-fifth of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) veterans are diagnosed with PTSD (Seal, Bertenthal, Miner, Sen, & Marmar, 2007), although these findings likely underestimate the true prevalence of veterans with the disorder (Tanielian & Jaycox, 2008).

PTSD and depression frequently co-occur (Gros, Price, Magruder, & Frueh, 2012), and both diagnoses are associated with functional and social disruption, including weakened interpersonal relationships and diminished psychological resilience and self-efficacy (Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009), limited activity engagement and role function (Fontana & Rosenheck, 2010), and increased risk-taking behavior (Adler, Britt, Castro, McGurk, & Bliese, 2011; Wilk et al., 2010). Returning Iraq and Afghanistan veterans have reported specific occupational performance needs in leisure (social relationships), self-care (physical health, driving, sleep), and productivity (transition from servicemember to student; Plach & Sells, 2013).

Some veterans engage in high-risk behavior such as speeding, substance abuse, or aggressive acts to satisfy feelings of “invincibility” or sensations of “adrenaline rush”

(Elbogen et al., 2010; Killgore et al., 2008; Vaughn, 2006, as cited in Thomsen, Stander, McWhorter, Rabenhorst, & Milner, 2011). Thomsen et al. (2011), however, suggested that combat exposure is primarily related to increased risk taking in those military personnel who had engaged in risk-taking behaviors before deployment. Whether PTSD increases risky behavior or whether risky behavior is more likely to be labeled as indicating mental health issues remains unclear (Thomsen et al. 2011).

High-intensity sports such as surfing, snowboarding, and rock climbing may provide a socially acceptable alternative to risk-taking behaviors such as speeding and substance abuse (Diehm & Armatas, 2004; Roberti, 2004). In addition, high-intensity sports may be an attractive treatment alternative for veterans who need support for reengagement in civilian life because such sports reflect the military culture of athleticism and patterns of engagement that involve physical, psychological, and environmental challenges (Morgan et al., 2001). Participants in high-intensity sports describe them as transformative, creating new perspectives, and promoting courage through “balancing the natural state of fear with knowledge based on personal capabilities and technical expertise” (Brymer & Oades, 2009, p. 123). Additionally, high-intensity sports that produce an adrenaline rush and that are more in line with military culture might be beneficial as an adjunct to evidence-based treatments for PTSD such as exposure-based cognitive-behavioral therapies and medication management. No research is currently available, however, that demonstrates the effectiveness or feasibility of high-intensity sports in reducing the symptoms of PTSD in veterans (Lawrence, De Silva, & Henley, 2010), although limited findings in non-clinical populations suggest that high-intensity sports such as surfing may result in elevated mood (Pittsinger, 2010).

A community-based, sports-oriented occupational therapy intervention (Ocean Therapy™) uses the high-intensity sport of surfing in an experiential, skills-based treatment specifically adapted for military personnel and veterans seeking mental health services (Reyes, 2013). Consistent with conceptualizations of the transformative nature of engagement in meaningful occupations and the dynamic influence of environment on a person's performance (Clark, Ennevor, & Richardson, 1996; Kielhofner, 2008; Radomski, Davidson, Voydetich, & Erickson, 2009), this intervention combines surfing performance, focused group processing, and social participation to create opportunities for veterans to examine ways in which their individual values, abilities, and experiences can support successful transition to civilian life. We posited that engagement in such a program would mitigate participants' PTSD and depressive symptomatology.

Study Objectives

The purpose of this study was to examine the feasibility of and preliminary findings for using a sports-oriented occupational therapy intervention as part of the complement of services for OEF and OIF veterans experiencing symptoms of PTSD and depression. Specific study questions included the following:

1. Will veterans with PTSD and depressive symptoms consistently attend the program?
2. Will participants in the 5-session, 5-wk community-based occupational therapy intervention report a reduction in PTSD and depressive symptoms?

Method

Research Design

This feasibility study was a pretest–posttest cohort design with five sessions offered on consecutive Saturdays in April and May 2011. The institutional review board of the Veterans Affairs Greater Los Angeles Healthcare System (GLAVA) Healthcare System and the University of Southern California approved all procedures and materials. All participants signed informed consent before entering the study.

Participants

Recruitment fliers requesting participation in the study were distributed by clinic staff of the Veterans Transition Center Post Deployment Clinic (PDC) at the GLAVA to 150 veterans. The PDC is an outpatient clinic serving more than 400 OEF and OIF veterans seeking mental health, primary care, and occupational therapy services. Participants who met inclusion criteria were veterans of OEF, OIF, or both conflicts who were seeking care for mental health concerns at the PDC and who had enrolled to attend the program but had not yet participated in any sessions. Participants were also required to have a physician-reported diagnosis of PTSD, major depressive disorder, or both; to be age ≥ 18 yr; to be cleared by a physician for participation; and to be proficient in spoken English. Non-English-speaking participants were excluded because only English versions of the standardized questionnaires used in the study were available.

Measures

We asked participants to complete a brief self-report questionnaire identifying their military history, VA enrollment history, diagnosis, and treatment history. In addition, we collected data on self-reported measures of motivation, PTSD symptoms, depression symptoms, and daily time use; in this article we report the findings related to PTSD and depression

symptoms. Eleven participants completed both baseline and follow-up questionnaires, and 10 attended three or more therapy sessions.

The PTSD Checklist—Military Version. The PTSD Checklist—Military Version (PCL-M; Weathers, Litz, Herman, Huska, & Keane, 1993) was used to assess PTSD symptomatology. The PCL-M is a 17-item self-report assessment of PTSD symptoms in the categories of intrusion, avoidance, and hyperarousal as described in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association, 1994). The PCL-M specifically asks about symptoms in response to “stressful military experiences” and is used in screening for PTSD and monitoring symptom change during and after treatment (Bliese et al., 2008; Wilkins, Lang, & Norman, 2011).

Two approaches for scoring the PCL-M, which indicate severity of symptoms, are used: (1) cutpoint scores and (2) the symptom-cluster approach. Total scores can range from 17 to 85, with a cutpoint of 50 (Hoge et al., 2008) or 60 (Dunn, Julian, Formolo, Green, & Chicoine, 2011), indicating a clinically significant level of PTSD symptoms. Using the symptom-cluster approach, a clinically significant level of PTSD symptoms is indicated if a servicemember reports at least a moderate degree of bother for one or more intrusion symptoms, at least three avoidance symptoms, and at least two hyperarousal symptoms (Brewin, 2005, as cited in Tanielian & Jaycox, 2008). The PCL-M has been shown to have adequate internal consistency ($r_s = .75-.80$), test-retest reliability ($r = .80$), and convergent validity ($\kappa = .64$) in Vietnam veterans and provides a relatively conservative indication of change in PTSD symptoms (Wilkins et al., 2011).

Major Depression Inventory. The Major Depression Inventory (MDI; Olsen, Jensen, Noerholm, Martiny, & Bech, 2003) is a self-report measure that is used to assess severity of depressive symptoms. Psychometric studies of the MDI in veterans are limited, but studies in psychiatric outpatients have shown acceptable reliability and validity (Cuijpers, Dekker, Noteboom, Smits, & Peen, 2007). Each of the 12 items is scored on a 6-point scale ranging from 0 to 5, with higher scores indicating greater symptoms. A scoring algorithm is provided for determining the level of depressive symptoms according to *DSM-IV* criteria. Using the total score (range = 0–50), respondents can be grouped according to severity of symptoms as none, mild, moderate, and severe (Cuijpers et al., 2007; Forsell, 2005).

Intervention

The Ocean Therapy Components. Ocean Therapy is based on principles of occupational science and occupational

therapy in which participation in meaningful activities within the natural environment (e.g., surfing) is both part of the therapeutic process and a desired outcome (American Occupational Therapy Association, 2008; Gray, 1998; Stoller, Greuel, Cimini, Fowler, & Koomar, 2012). One intention of the intervention is for veterans to develop sufficient skills that they are confident and competent to paddle out, catch a wave, and ride it in to shore. The intervention is also designed to provide a supportive setting in which veterans can reflect on the process and experience of acquiring new skills in a safe but unpredictable environment such as the ocean. For example, examining participants’ responses to situational challenges on the beach, such as getting along with others or dealing with frustration if good waves do not come along, may provide lessons for successful transition to civilian life.

The following sections briefly describe the program structure and the five resiliency themes addressed during the five sessions. In addition, we describe four dimensions of the occupation-based process that link surfing, veterans’ military experiences, and return to civilian life (see Figure 1).

Program Structure. The program comprises five 4-hr sessions occurring weekly for 5 consecutive weeks. The sessions combine the active experience of surfing with focused group processing and collaborative social participation among civilian volunteers and fellow veterans (Cole, 2005; Fazio, 2008). Each group consists of 25–35 participants, including 10–15 veterans, 15–20 volunteers, a safety and logistics coordinator, and an occupational therapist competent in surf instruction, group processing, ocean lifeguarding, and first aid. The occupational therapist coordinates the organization of each session and facilitates the discussion. All group members, including veteran participants, volunteers, and staff, engage in the discussions to enhance group partnership and trust, key elements that support the success of the surf lesson and foster transition skills.

Each 4-hr session consists of a 45-min introductory presentation and two surf lessons, each of which is followed by a time for reflection and group discussion. The introductory presentation sets the framework for the session, describing the mission of the program and the resiliency theme for that week. It also addresses pragmatic concerns such as the schedule for the day, safety information, and introductions. Next, participants engage in a 15-min stretching session to warm up, before moving to the surfboards for 20 min of on-land instruction and practice. Each of the techniques required to successfully paddle out, stand up, and ride a wave in are taught in the first lesson but are specifically strengthened and developed across the five sessions. Additional content in subsequent weeks includes wave selection, ocean currents and conditions, and surfing etiquette.

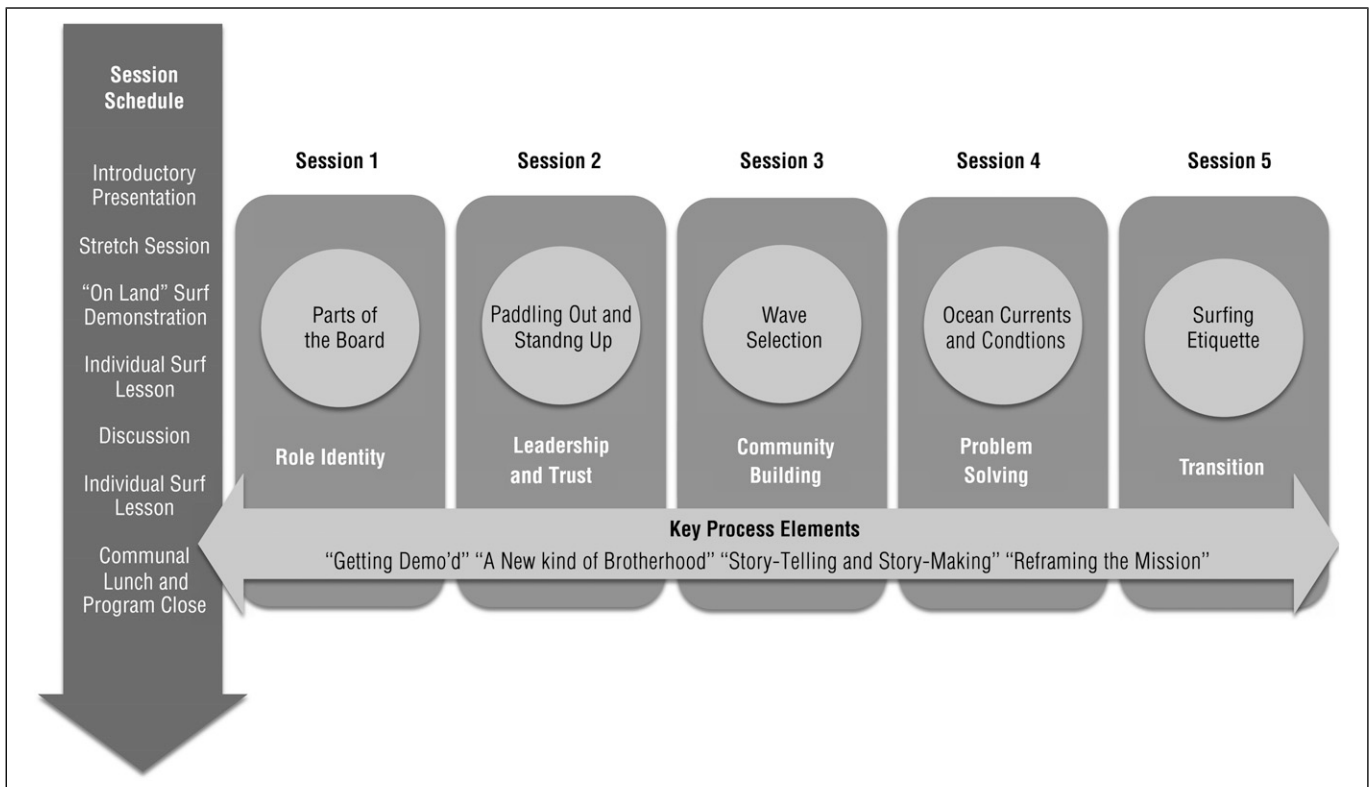


Figure 1. Ocean Therapy™ program components, including the resiliency themes addressed, the surfing skills taught, and the key process elements that evolve and intertwine across the five sessions.

Participants are paired with a surf instructor for each 45-min individual surf lesson. This lesson is followed by 20 min of focused group processing led by the occupational therapist in which participants share the sensations and emotions evoked by the experience of surfing and describe how this experience relates to the resiliency theme being addressed during that particular session. Consecutively, surf instructors reinforce participant experiences by providing candid observations of the participants' accomplishments and challenges during the surf lesson. Participants then identify a surfing skill they can improve, and then work on this skill in the second 45-min surfing lesson. The final portion of the session includes a communal lunch and group discussion in which the occupational therapist helps participants reflect on how the process of learning new surfing skills and experiences while interacting with other veterans and civilians in a somewhat unpredictable environment can be applied to their current life situations.

Resiliency Themes. Themes of resiliency are used to conceptually frame the intervention (Reyes, 2013). *Resiliency* has been described as a person's ability to apply successful coping strategies in response to stressful life situations to resume usual activity engagement and social relationships (Richardson, 2002). Ahmed (2007) suggested that resiliency in response to traumatic events can be facilitated by enhancing positive beliefs and attitudes and

supporting creative processes. The following five resiliency themes are addressed across 5 wk in the order listed:

1. *Role identity.* Many veterans have reported finding that their military service, skills, or leadership positions do not necessarily translate into civilian life, which can lead to frustration and a diminished sense of purpose (Adler, Possemato, et al., 2011). The content of this module is designed to guide participants in identifying their own positive traits and reflecting on the ways in which these traits are strengthened while learning to surf.
2. *Leadership and trust.* To address this theme, participants make connections between the leadership skills learned in military training and how they can use those skills in civilian life. Participants also consider how these same skills are manifest in learning to surf (e.g., how their instructors led in the water, how trust was built with their instructor).
3. *Community building.* The analogy of the "surfing family" is used to explore ways to build community or "brotherhood" (an important concept in military culture) among civilians. For example, participants reflect on the friendships made while surfing and the way their sense of community strengthened over the 5 wk. Participants also reflect on lessons learned in surfing etiquette and how aspects of surf culture facilitate communication skills such as self-advocacy and conflict resolution.

4. *Problem solving.* Many veterans have reported difficulty navigating what they perceive to be the less disciplined nature of civilian life in contrast with the order and stability to which they were accustomed in the military (Demers, 2011). In addressing this theme, participants are assisted to identify the particular approaches to problem solving they used during the surfing lesson and how those skills can also be used in negotiating daily life challenges. Partnering with their surf instructor to stay calm in a novel environment is an example of a tangible problem-solving skill applicable to assuming the role of college student or new employee.
5. *Transition.* In the last session, participants discuss their surfing progress achieved throughout the five sessions and describe the ways they have begun to use the resiliency themes in their daily lives. Family members or significant others are invited to the session, which is held as a type of graduation.

Key Process Elements. The experiences of the first author (Rogers) over several years engaging veterans with surfing have suggested four key process elements that may enhance the therapeutic experience of this occupational therapy intervention by connecting participants' surfing experiences to their previous military identity and current challenges they face as they transition to civilian life (Kielhofner, 2008).

The first process element is *"getting demo'd": relating surfing culture to military culture*. Concepts used to describe military culture include masculinity, attention to the physical body, discipline, adrenaline, and a mission-centered brotherhood (Greene, Buckman, Dandeker, & Greenberg, 2010). Returning veterans may have difficulty finding a similar culture in civilian life. The surfing culture is defined by many of the same dynamics as military culture: It is a male-dominated sport in which fitness is required to manage in vigorous ocean conditions, and the "mission" of riding a wave can be an intense challenge pairing one's actions with an unpredictable environment (Fuchs & Schomer, 2007). At its core, surfing is a sport associated with feeling a "rush" or adrenaline surge by dropping down the face of the wave (Diehm & Armatas, 2004). As a veteran participant commented, "In combat, you wait and you wait, and then you engage in an intense adrenaline rush fighting for your life. In surfing, you wait and wait; then you engage in a natural adrenaline rush riding a wave." Both surfing and military cultures have created specific languages that have many similarities. Surfers use various terms to define the intense and uncontrollable experiences of the sport, including "wiping out," "blown up," "demo'd" (demolished), and "what a rush." Military personnel use similar phrases to describe the violent, uncontrolled experience of combat.

The second process element is *creating a new kind of brotherhood: integrating surf instructors and veterans in the program*. The designated surf instructors have an extensive background in surfing, surfing instruction, and ocean safety. They come from a variety of professions, social and ethnic backgrounds, and military service appointments. Both program participants and surf instructors have reported developing a sense of kinship or brotherhood with one another over the course of the sessions. Trust is built in the water, where participants rely on the surf instructor to support their skill acquisition and safety in a novel and variable environment. Trust is simultaneously built among participants when they begin to support one another both in the water and on the beach; some eventually make plans to surf together outside of the program. One participant stated, "I never thought I would find another brotherhood like the Marines, but I've seen here that surfers are like brothers. . . . It's like a family." As a sense of belonging or community develops, participants identify with one another and with the sport.

The third process element is *storytelling and story-making: making sense of experience in ways that create connections with others*. Surf instructors have described the emergence of storytelling in the water as veterans begin to recount aspects of their injury and service in the military. This concept of storytelling is common in surf culture; surfers often spend time in the lineup waiting for waves, "talking story" about past surf adventures, or discussing personal issues at home or at work (Ford & Brown, 2006). Veterans have reported a similar experience while on deployment, during which much of their time is spent waiting or recovering from combat, and storytelling emerges as a way to process traumatic events (Adler, Castro, & McGurk, 2009). The use of narrative as a therapeutic tool in processing traumatic events is well documented; narrative functions to re-create a new life history or build an understanding and acceptance of illness or injury (Carless & Douglas, 2008; Mattingly, 1998). In one discussion session, a veteran shared, "I've never shared this openly, but my drinking is affecting my daily life. I don't go outside. Now I look forward to surfing." During the program, storytelling merges into storymaking (Clark et al., 1996), in which participants and surf instructors extend their life stories by "riding waves" in the present, providing the content for future narratives.

The fourth process element is *reframing the mission: promoting competence and self-efficacy*. Veterans, who are trained to be effective in an environment in which actions are guided by orders and interactions are governed by rank, may experience disrupted self-efficacy when faced with unstructured and unpredictable civilian environments

(Pietrzak et al., 2009). For example, when enrolling in a class on a college campus, directions or procedures may be unclear; the order of actions may not be clearly defined; and the behaviors of other students and staff may appear erratic. Individuals with a high sense of self-efficacy believe in their capability to successfully perform the tasks required to accomplish life goals (Benight & Bandura, 2004). In acquiring surfing skills and witnessing their personal achievement in a novel but supportive environment, program participants are able to renew their belief in their ability to achieve goals and obtain a productive role in civilian life (Kielhofner, 2008). With direction from an occupational therapist, the intervention may support self-efficacy by creating opportunities for autonomy and self-reflection and by fostering trust between participants and instructors. One veteran stated, “I didn’t think I would stand up [on the board], and I did. I wonder what else I can do?”

Data Collection

Study data were collected at the GLAVA before the first session and after the final session. Participants completed the forms in approximately 45 min, and no data points were missing for participants who completed the post-intervention data forms; however, completion of background information varied among participants. All identifying information was removed.

Data Analysis

Demographics are reported for all 14 participants, but only the 11 participants with complete data are included in the analyses (Table 1). Demographic information gathered by self-report questionnaire included gender, ethnicity, vocational status, comorbidities, time enrolled at the VA, and number of mental health therapies currently used.

In addition to attendance rates, outcomes evaluated included the change in the proportion of participants whose symptom severity was in a clinically subthreshold range (PCL–M scores of <50; MDI scores of <26) before and after treatment. We also reported the change in the proportion of participants with individual PTSD symptom cluster scores in a clinically subthreshold range. Medians, interquartile ranges, and nonparametric statistics are reported because the sample was small and distributions were non-normal. Comparisons of pre- and posttest PCL–M and MDI scores were made using the percentile bootstrap method on the difference scores. The percentile bootstrap method enables the construction of accurate confidence intervals and good control over Type I error probability with small samples (Wilcox, 2012). Cochran’s *Q* was used

Table 1. Demographic Characteristics and Medical History of Veteran Participants

Variable	<i>n</i>	%
Gender (male)	13	93
Age		
<24 yr	3	21
24–30 yr	10	72
>30 yr	1	7
Ethnic background		
African-American	4	29
White	4	29
Hispanic	4	29
Other	2	14
Vocational status		
No vocation	3	21
College student	5	36
College student and worker	2	14
No response	4	29
Physician-reported diagnosis		
PTSD	11	79
Depression	1	7
Both	2	14
No. of comorbidities ^a		
≤1	7	50
>1	3	21
No response	4	29
Time enrolled at VA		
<1 yr	3	21
1–3 yr	4	29
>3 yr	1	7
No response	6	43
No. of therapies for PTSD and depression ^b		
≤1	3	21
>1	6	43
No response	5	36

Note. PTSD = posttraumatic stress disorder; VA = Veterans Affairs. Percentages in each category may not add to 100 due to rounding.

^aSelf-reported comorbid diagnoses included traumatic brain injury, substance use disorder, attention deficit hyperactivity disorder, and anxiety disorder.

^bSelf-reported therapies for PTSD and depression included medication management, cognitive-behavioral therapy, and cognitive processing therapy.

to compare differences in PTSD symptom severity by the symptom-cluster approach. Wilcoxon signed rank test was used for the pretest–posttest comparison of individual clusters.

All analyses were conducted using two-sided alternatives, and *p* values less than .05 were considered significant. Effect sizes were calculated for the primary outcomes; effect size is a standardized indicator of the magnitude of the difference between groups from pre- to postintervention. Accepted criteria for interpreting effect size estimates are <.30 = small effect size, .30–.80 = moderate effect size, >.80 = large effect size. All analyses were conducted using Stata/SE 11.0 for Mac (StataCorp LP, College Station, TX).

Results

Fourteen participants completed baseline data collection questionnaires, and 11 completed postintervention data questionnaires. Ten participants (71%) identified as non-White and were between age 24 and 30 yr. Most were not currently employed or were college students. The sample included 1 Hispanic, female participant. Six (43%) veterans reported receiving multiple treatments for PTSD, depression, or both, and 3 (21%) reported having more than one comorbid condition (5 participants [36%] did not provide responses for one or both of these two items; see Table 1). Participants were from all branches of the military; the majority had been deployed in Iraq, had had at least two deployments, and had been discharged less than 5 yr. All but 1 participant reported having been in the ocean at any time previously, but only 8 reported being able to swim; only 1 had surfed before. Of the 3 participants who did not complete the follow-up, 1 sustained a shoulder injury (not related to the intervention), and 2 attended only the initial session.

Participation records indicated that 10 participants completed three or more sessions. Four participants (29%) completed all five sessions, 2 (14%) completed four sessions, and 4 (29%) completed three sessions.

Internal consistency for the clinical symptom assessments was good: Cronbach's α for the PCL-M was .89 and for the MDI, .91. Median PCL-M scores decreased from 55 to 34; median of differences was 18.18, $p \leq .0005$. The number of participants with a clinically subthreshold level of PTSD symptoms by the symptom-cluster approach was significantly higher after the intervention (Cochran Q exact $p = .0313$). Before intervention, 1 of the 11 participants (9%) reported a clinically subthreshold level of PTSD symptoms, and at posttreatment 8 participants (73%) reported symptoms in this range. For each of the symptom clusters, participants reported reductions in avoidance (Wilcoxon $z = 2.633$, $p = .0085$) and hyperarousal (Wilcoxon $z = 2.571$, $p = .0101$) but no change in intrusion symptoms (Wilcoxon $z = 2.263$, $p = .0635$).

Median scores on the MDI decreased from 33 to 14; median of differences was 11.31, $p = .028$. At pretreatment, 4 (36%) of the 11 participants could be considered to have severe depression, whereas posttreatment only 2 participants (18%) reported subthreshold levels of depression. For both PTSD and depression symptoms, the effect sizes were moderate to large (PCL-M $d = 0.77$, MDI $d = 0.61$).

Discussion

The results of this feasibility study indicate that the veteran participants with PTSD reliably attended program sessions,

with 73% completing at least three of the five sessions. Attendance rates and retention in the study were encouraging, because the participants had to arrange their own transportation to travel more than 20 miles to attend. Mental health intervention attendance rates among veterans tend to be low, between 38% and 55% (Erbes, Curry, & Leskela, 2009; Harpaz-Rotem & Rosenheck, 2011), and current no-show rates at the GLAVA PDC are reported to be approximately 50%. In addition, the veterans who attended three or more sessions completed the study measures in a reasonable amount of time and with limited missing elements, suggesting that data collection was practical and acceptable to the participants. This study built on the infrastructure of an existing program and capitalized on existing volunteer resources, location accessibility, and surf instructors, representing a potential model for collaboration between the Veterans Health Administration and community organizations.

Although this study was not intended to evaluate effectiveness, results suggest that a community-based, sports-oriented occupational therapy intervention in conjunction with usual care may have promise for the treatment of veterans with PTSD and depression who have an interest in high-intensity sports. Participant reports of PTSD symptom severity were significantly lower after the 5-wk study period. Median PTSD symptom (PCL-M) scores were lower by 21 points, and the median score was in the clinically subthreshold range. Monnelly, Ciraulo, Knapp, and Keane (2003) reported improvements in PCL-M scores of 10 points in veterans and 14 points in active-duty soldiers, suggesting that participants likely experienced a meaningful improvement in PTSD symptoms during the study period. Participants also reported statistically significant reductions in depressive symptom severity over the study period. In a review of behavioral interventions for veterans with combat-related PTSD in the VA, Goodson et al. (2011) found a within-group effect size of $d = 0.43$ across all 24 studies reviewed. This finding is comparable with the effect size found for participants in this study.

This was a feasibility study of an occupational therapy-based sports intervention for veterans with symptoms of PTSD and depression and, as such, it did not specifically attempt to address the mechanisms by which such a program might effect change. A potential explanation for the improvement in PTSD and depression symptoms reported by the participants in this study may be that programs like Ocean Therapy provide opportunities for successful performance in goal-directed activities and in doing so create a renewed sense of self-efficacy in a noncombat environment (Kielhofner, 2008; Stoller et al., 2012).

The transition of combat veterans from military culture to civilian life creates a complex treatment population for whom traditional avenues of treatment may need to be supplemented with complementary types of intervention. In Ocean Therapy, the action of surfing creates a vehicle for the delivery of the resiliency themes in a way that reflects veterans' preferences and past experiences and reinforces narrative processes and social connections through peer-to-peer interactions (Adler et al., 2009; Hoge, 2011). By combining the active experience of sports skill acquisition with opportunities for reflecting on the experience of acquiring those skills in a group setting, occupation-based programs such as the one examined in this study may act as a catalyst for veterans to construct an alternative narrative of their life experiences.

Implications for Occupational Therapy Practice

This study has the following implications for occupational therapy practice:

- A complementary sports-oriented treatment program may be incorporated as a part of an occupational therapy practitioner's treatment plan for veterans with symptoms of PTSD, depression, or both who are experiencing challenges with transition to civilian life or engaging in high-risk behaviors.
- Surfing and other high-intensity sports may be a socially acceptable occupation for veterans with symptoms of PTSD and depression.
- Complementary intervention approaches that include high-intensity sports may support veterans' transition to civilian life roles.
- Further study of the effectiveness of high-intensity sports is required to support their use in occupational therapy practice with these clients.

Study Limitations

This study has several important limitations that influence the interpretation of the findings. The lack of a comparison group means that the improvements in PTSD and depression symptoms may not be attributable solely to participation in the intervention. The small sample size limits the generalizability of the results and did not permit control for a range of possible confounders in the analyses. The measures of PTSD and depression relied on self-report, and the MDI has only limited published reliability and validity for veterans. The participants were heterogeneous in their comorbid conditions, and about half were receiving more than one treatment for PTSD, including

medications. It is not known how these concurrent treatments may have influenced this study's outcomes. Finally, the treating occupational therapist was also the research coordinator for the study, and it is unclear to what extent social desirability on the part of participants may have influenced responses to outcome measures.

Future Research

The findings from this uncontrolled feasibility study suggest that community-based, sports-oriented occupational therapy interventions show promise and merit further investigation. Clearly, such programs are accessible only to veterans who live near the ocean. In the future, examination of the effectiveness of other sports-based interventions, such as rock climbing, may be warranted. Adapting such programs to enable veterans with cognitive and physical disabilities to participate should also be evaluated. ▲

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