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The Case for Using Restorative Natural Environments in Veterans' Rehabilitation Programs

Thanks to the use of modern body armor and continual improvements in field medicine, U.S. military personnel serving in the Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) combat theaters are surviving severe traumatic injuries that, in previous conflicts, might have proved fatal.[1] Many of these traumatic injuries require amputations, and they often are accompanied by mood disorders, posttraumatic stress disorder (PTSD), or traumatic brain injury (TBI).[1] A recent study by the Rand Corporation estimated that approximately 18.5% of U.S. troops (about 300,000 soldiers) exposed to combat in OEF and OIF can be diagnosed with depression or PTSD.[1] Also, the number of troops with TBI secondary to bomb blast exposure and other head trauma may be slightly higher, at 19% (about 320,000 soldiers).[2] And estimates of the prevalence of depression among patients with amputations have ranged from 21% to 45%.[3–8]

Given the complexity of these overlapping and coexisting conditions, some combat veterans may require an interdisciplinary approach to treatment. For example, patients with amputations might need to be treated for mood and anxiety disorders in addition to undergoing orthopedic rehabilitation.[4–6] Thus, when prostheses are prescribed in an effort to return the patient to full independence, treatment for psychiatric symptoms must be included in the interdisciplinary plan.[3,6]

Restorative natural environments, including outdoor gardens and rehabilitation greenhouses, may be effective components of interdisciplinary treatment plans for veterans with multiple medical and psychiatric problems. Understanding and effectively treating the complex health problems faced by combat veterans is a top priority of the VA, and highly innovative research into the needs of these veterans is ongoing.[10] Yet the use of restorative natural environments, which is supported by a modest body of literature, has been underresearched in veteran populations.

In this column, we present some of the data supporting the value of natural environments as therapeutic modalities. We also describe past and current VA horticultural programs, which have made use of restorative natural environments. Finally, we identify ways in which VA research efforts could fill knowledge gaps in the application of restorative natural environments in veterans' rehabilitation settings.

STUDIES OF REHABILITATIVE NATURAL ENVIRONMENTS

The overload and arousal theory of Ulrich and Parsons posits that modern society bombards the central nervous system (CNS) with excessive noise, movement, and complex visual stimuli, which results in sympathetic nervous system overload. Restorative natural settings—which include the pleasant smells, colors, and shapes of plants, in addition to less complex visual stimuli—may reduce CNS arousal and stress.[10–13] Although the appropriate ratio between greenery and man-made environment needed to create a positive therapeutic result with these settings has been debated,[14] current opinion is that the percentage of greenery needs to be greater than the percentage of man-made environment.[15] Most existing studies of the effect of restorative natural settings, however, have examined the effects of viewing natural scenes or indoor plants on the individual, with rare studies actually employing therapeutic gardens or rehabilitation greenhouses.[16]

Sympathetic response and stress

Many studies demonstrate that exposure to actual or simulated scenes of nature can decrease sympathetic response and stress. Parsons and colleagues reported that after a mildly stressful event, study participants who viewed simulated automobile drives through nature-dominated environments had greater stress reduction, as measured by blood pressure and electrodermal activity, than participants who viewed simulated drives through landscapes replete with man-made structures.[10]

In two studies by Pretty and colleagues, participants were exposed to five different types of visuals—pleasant rural scenes, unpleasant rural scenes, pleasant urban scenes, unpleasant urban scenes, or no scenes (control participants)—while they exercised on a treadmill. In the first study, par-

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ticipants who viewed pleasant rural scenes and pleasant urban scenes had significantly greater improvements in self-esteem than did control participants, and both unpleasant rural scenes and unpleasant urban scenes reduced the positive effects of exercise on self-esteem.[11] In the second study, participants who viewed pleasant rural scenes experienced decreases in blood pressure (BP) of nearly 8 mm Hg, control participants and participants who viewed unpleasant rural scenes experienced BP decreases of 2 mm Hg, and participants who viewed unpleasant urban scenes experienced BP increases of 3 mm Hg. In addition, participants who viewed pleasant rural or pleasant urban scenes experienced large improvements in self-esteem compared to control participants.[12]

Similarly, Ulrich and colleagues found that study participants who viewed nature scenes on television had reduced stress, as measured by blood pressure and pulse rate, than participants who viewed urban scenes on television, those who viewed regular television programming, or those who did not view television.[13] Hartig and colleagues found that after undergoing tasks designed to increase psychophysiologic stress, participants who walked in restorative natural settings showed greater improvements with regard to restoration of blood pressure, emotion, and attention compared to participants who walked in an urban setting.[17] Nakamura and Fujii found that study participants who viewed pictures of a natural hedge produced a greater ratio of alpha to beta activity on electroencephalography than participants who viewed a picture of a concrete wall.[18]

Attention span

Attention deficits have been associated with PTSD, TBI, depression, and chronic pain,[19–21] and they may be barriers to cognitive and functional improvement following brain injury.[22,23] Attention restoration theory hypothesizes that natural settings engage involuntary attention, which can spare voluntary attention fatigue and, thus, allow for a more prolonged and higher level of attention.[24] In cases of attention deficit, conserving voluntary attention in a restorative natural setting during rehabilitation sessions may be advantageous to a patient's overall outcome and may contribute to shortened outcome times compared with traditional, nongreen, inpatient rehabilitation settings.[25–27]

Several studies support this hypothesis. Hartig and colleagues found that, 40 minutes after completing a task that required focused attention, study participants who walked in a wilderness park reported improved mood and decreased errors in proofreading compared to participants who walked in an urban setting or listened to music and read magazines in a windowless room.[28] Stark found that, for pregnant women in their third trimester, spending two hours each week on nature activities improved concentration and reduced errors in various tests.[29] Cimprich and colleagues found that two hours of exposure to a natural environment per week improved women's capacity to direct their attention 19 days after breast cancer surgery.[30] Tennessen and Cimprich found improved performance on attention measures for students looking out a window at natural scenes compared with students looking out a window at man-made landscapes.[31] Moreover, Laumann and colleagues reported that, when viewing a video with nature scenes, study participants experienced reduced autonomic arousal and improvements in attention and performance on orienting tasks.[32]

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Pain

Although data supporting the role of natural environments in modulating pain is sparse, some studies do appear in medical literature. Ulrich found that, among patients recovering from cholecystectomy, those whose hospital room window had a natural view required fewer high-potency analgesics and had shorter hospital stays compared with patients whose window faced a brick wall.[33] In a randomized, controlled study of patients undergoing bronchoscopy, patients who looked at murals of nature sights and listened to tapes of nature sounds experienced significant reductions in pain, but not anxiety, compared to control patients.[34] Walch and colleagues reported that patients exposed to high sunlight rooms after cervical and lumbar surgery had less perceived stress, utilized fewer analgesic medications, and had lower costs for pain

medications than control patients—and there was a strong trend toward reduced pain in the former patients (P = .58).[35] Park found that, among patients recovering from thyroidectomy, appendectomy, and hemorrhoidectomy surgeries, those whose hospital rooms contained flowers experienced shortened postoperative hospitalization and reduced analgesic use, pain, anxiety, and fatigue compared to those whose rooms contained no flowers.[36]

HORTICULTURAL THERAPY IN THE VA

During World War I, the high number of returning wounded soldiers and the growing population of veterans who required long-term care fostered the use of horticultural therapy, largely for occupational and recreational therapy, in the United States.[7] This trend continued in 1934, when President Franklin D. Roosevelt dedicated a new, 445-acre veterans hospital complex—now called the Salem VA Medical Center (SVAMC)—in Salem, VA. The facility began as an exclusively psychiatric hospital that included 472 beds and a farm with cattle, hogs, and crops; patients were expected to manage the livestock and grow and harvest the crops as part of their psychiatric rehabilitation.[8]

During World War II, horticultural therapy was applied more broadly in VA facilities. As the need for restorative natural therapy exceeded the capabilities of the VA hospital staffs, large numbers of garden club members volunteered to assist the VA occupational therapists.[37] In 1955, the first U.S. master's degree in horticultural therapy was earned by Genevieve Jones, an occupational therapist at the Edward Hines, Jr. VA Hospital, Hines, IL.[38] Although the use of horticultural therapy in veterans' hospitals is reported to have reduced the length of inpatient stays,[7] quantitative evidence for this report is difficult to find in the medical literature.

Today, several VA hospitals—including the Miami VA Healthcare System, Miami, FL; the Coatesville VA Medical Center, Coatesville, PA; and the Lyons campus of the VA New Jersey Health Care System—have horticultural therapy programs. Although the SVAMC no longer includes a working farm, it retains a large restorative natural environment program called the Compensated Work Therapy Program. This program allows many veterans to work in a protected environment consisting of greenhouses, gardens, and decorative shrubbery on the facility's 223-acre campus.

THE NEED FOR QUANTITATIVE ANALYSIS AMONG VETERANS

Despite the long history of horticultural therapy in the VA, to the best of our knowledge, there are no controlled clinical trials demonstrating the effects of restorative natural settings in veterans' rehabilitation. Based on the results of a literature search involving 81 web sites (available from the authors upon request), we found little or no quantitative data regarding the use of restorative natural environments in VA hospitals for patients with PTSD, TBI, amputations, or chronic pain. Furthermore, there are no VA rehabilitation studies employing indoor plants or views of nature.

As noted earlier, there is literature—although it may be limited—supporting the utilization of plants and pictures of nature in restoring attention, reducing stress, decreasing pain, and shortening postsurgical hospitalization. These benefits are important components in the treatment of patients undergoing amputation and those with chronic pain, PTSD, or TBI. The few descriptive case studies that have been published have not included control patients to delineate the benefits of the restorative natural setting over traditional rehabilitation settings, and they have not provided the impetus for larger, controlled clinical studies.

A quantitative analysis of the benefits of restorative natural settings for veterans is long overdue. Initiating studies regarding the use of therapeutic gardens or greenhouses may help to expand the limited clinical evidence supporting natural restorative environments. There is a pressing need for innovative studies investigating this treatment modality for OEF and OIF veterans with physical or psychiatric problems. ●

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