



## Veterans in substance abuse treatment program self-initiate box gardening as a stress reducing therapeutic modality



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### ABSTRACT

**Objectives:** To assess the experiences of a veteran initiated horticultural therapy garden during their 28-day inpatient Substance Abuse Residential Rehabilitation Treatment Program (SARRTP).

**Design:** Retrospective study.

**Setting:** Veterans Affairs Medical Center (VAMC), Salem, Virginia, USA

**Interventions:** Group interviews with veterans from the last SARRTP classes and individual interviews with VAMC greenhouse staff in summer of 2016.

**Outcome measures:** Time spent in garden, frequency of garden visits, types of passive and active garden activities, words describing the veterans' emotional reactions to utilizing the garden.

**Results:** In 3 summer months of 2016, 50 percent of the 56 veterans interviewed visited and interacted with the gardens during their free time. Frequency of visits generally varied from 3 times weekly to 1–2 times a day. Amount of time in the garden varied from 10 min to 2 h. The veterans engaged in active and/or passive gardening activities during their garden visits. The veterans reported feeling “calm”, “serene”, and “refreshed” during garden visitation and after leaving the garden.

**Conclusions:** Although data was secured only at the end of the 2016 growing season, interviews of the inpatient veterans revealed that they used their own initiative and resources to continue the horticulture therapy program for 2 successive growing years after the original pilot project ended in 2014. These non-interventionist, therapeutic garden projects suggest the role of autonomy and patient initiative in recovery programs for veterans attending VAMC treatment programs and they also suggest the value of horticulture therapy as a meaningful evidence-based therapeutic modality for veterans.

### 1. Introduction

Mental illness and substance abuse are major concerns for the American armed forces. At present, about 20 percent of active duty soldiers and 42 percent of reserve unit soldiers require mental health treatment. The consequences of stress reduction are recognized as important in the Veterans Administration (VA) Substance Abuse Rehabilitation Treatment Program (SARRTP), since the majority of veterans from all combat theaters have significant stress from anxiety disorders, mood disorders and trauma- and stress-related disorders such as post-traumatic stress disorder (PTSD).<sup>1</sup> The US Army found that 27 percent of soldiers screened 3–4 months after returning from deployment to Iraq met criteria for alcohol abuse. From 2005 to 2009, drug or alcohol abuse was involved in greater than 45 percent of non-fatal

suicide attempts and 30 percent of the Army's suicide deaths.<sup>2</sup> Moreover, VA records document that drug and alcohol dependence, accompanied by other mental illness such as PTSD and depression, increased by 58 percent, from 63,767 in 2006–100,580 in 2007.<sup>3</sup> Estimated costs of excessive alcohol consumption in the U.S. military are \$1.12 billion per year,<sup>4</sup> with an annual cost of \$425 million for concurrent medical treatment. Also, the impact on military preparedness is substantial with an annual loss of 320,000 work days, 34,400 arrests, inability to deploy 10,400 active-duty military and the separation from military duty of 2200 soldiers.<sup>5</sup>

A growing body of literature supports the reduction of stress through active or passive experience with nature, as in horticulture therapy, by modulation of the central nervous, endocrine and immune systems. This is evidenced indirectly and directly by the reports on the

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reduction of the hypothalamic-pituitary-adrenal (HPA) axis indices of stress such as the reduction of post-surgical pain and length of recovery,<sup>6</sup> blood pressure,<sup>7</sup> electromyographic activity<sup>8</sup> electroencephalographic activity,<sup>9</sup> cortisol levels,<sup>10,11</sup> and improved immunological function.<sup>12–15</sup> Significant stress to veterans and nonveterans occurs with chronic and excessive alcohol consumption, which precipitates increases in cortisol secretion similar to cortisol levels reported in Cushing's syndrome and in post-surgical trauma.<sup>16</sup> Chronic over- production of cortisol may in turn precipitate hippocampal atrophy leading to memory difficulties in chronic combat PTSD<sup>17,18</sup> and periods of dissociation.<sup>19</sup> Moreover, the long term degradative effects of stress with reduction of volume of multiple brain centers such as the hippocampus, caudate nucleus and amygdala precipitate earlier Alzheimer syndrome cognitive dysfunction requiring higher health costs for the veteran until death.<sup>20,21,22</sup>

A prior, 2014 randomized pilot study of veterans attending a 28-day SARRTP population, at the same VA site as the present study, assessed the effect of horticulture therapy (HT) box gardening versus non-horticultural occupational therapy (OT) on cortisol levels, depression, posttraumatic stress disorder symptoms, alcohol cravings, and quality of life. The HT and OT groups spent five hours per week of supervised HT and OT for three weeks. Of the 78 veterans who agreed to participate in the research protocol, 49 (averaging 46.4 years, sd = 11.9) completed the protocol. Primary outcome measures included pre- and post-treatment measures: quality of life (Quality of Life Enjoyment and Satisfaction Questionnaire Short Form (Q-LES-Q-SF); alcohol craving (Alcohol Craving Questionnaire (ACQ-NOW); post-traumatic stress indices (Posttraumatic Stress Disorder Checklist Civilian Version (PCLC); depression (Center for Epidemiologic Studies Depression Scale (CES-D); and, salivary cortisol levels at weeks 1, 2 and 3.<sup>16</sup> Repeated measures revealed that HT performed for five hours per week for three weeks was associated with a 12 percent reduction in salivary cortisol levels from week one to week three. Separate one-way analyses of covariance (ANVOCA) revealed that the cortisol reduction was greater, but not statistically significant (p = 0.43), when compared to the reduction in OT veterans' saliva levels. However, the Q-LES-Q-SF and CES-D showed a trend towards improved quality of life and fewer depressive symptoms in the HT group compared to the OT group.<sup>11</sup> This article reports the observed experiences of inpatient 28-day SARRTP veterans that self-initiated and completed box gardening activities for two successive growing seasons (2015 and 2016) after the original study in 2014.

**2. Methods**

In the summer of 2016, members of the Geriatric Research Group (GRG) at the Veterans Affairs Medical Center (VAMC) in Salem, Virginia, were informed that veterans enrolled in the inpatient 28-day SARRTP had informally continued the box gardening activities for 2 growing seasons after the original pilot project had ended in 2014. The GRG learned of this phenomenon slightly more than 2 months before the end of the second growing season. This afforded minimal time to try

to gather information from the inpatient veterans and greenhouse staff who were participating in the last months of the impromptu horticultural therapy gardening. Information was collected and recorded by the first author in group meetings with the veterans graduating at the end of their 4 week programs in June, July and August of 2016. Each graduating group included a different set of veterans. A total of 56 different members of the SARRTP classes were queried about their experiences with the horticulture activities of the veteran-initiated program. The recorded answers reflect only the input of those veterans that chose to respond to the questions during the end-of-program colloquium with the program director.

The following questions were asked of the last 3 graduating classes at their end-of-meetings: 1) how did the veterans learn about the horticulture box gardening (before entering the 28-day SARRTP or during the program) as there was no formal staff participation? 2) how many SARRTP veterans reported that they utilized the courtyard box gardens and the general garden area? 3) how often did each of these veterans go to the garden? 4) how much time did the veterans spend in the garden while they were engaging in either passive or active activities? The veterans' reflections on how the garden influenced their daily inpatient lives were also recorded in response to the following inquiries: 1) what passive activities did the veterans do in the garden? 2) what active activities did the veterans do in the garden? 3) why were the garden and horticulture activities important to the veterans? 4) how did the veterans feel upon leaving the garden?

To confirm the SARRTP veteran reports about unplanned participation in the gardens, the VA greenhouse workers were approached in additional interviews. These workers consisted of both VA employed greenhouse staff and veterans who had committed to a weekly scheduled "compensated work jobs" in which they were to work approximately 5 days a week to give them structure, purpose and as a transition to the private work force. The research team members wanted to learn the source of gardening materials and tools needed to maintain the SAARTP participants' gardening over two years, as this work was not part of the regular greenhouse workers' duties.

The primary goal of the questions for both the SARRTP veterans and the greenhouse workers was to better understand the experience of the SARRTP veterans responsible for initiating their own therapeutic modality of horticultural therapy which was no longer formally available to them. To the best of our knowledge, this veteran initiated behavior had not been previously described for other Veterans Affairs SARRTP.

**3. Results**

The questions asked of the SARRTP veterans are noted in Tables 1 and 2. As seen in Table 1, 50% (28 of 56) of the SARRTP participants in June, July and August of 2016 stated that they benefited from the veteran initiated and sustained horticulture therapy. The frequency of garden visits was often daily, and lengths of stay varied from a few minutes to approximately 2 h. Several of the SARRTP residents knew

**Table 1**  
Self-initiated therapeutic box gardening by veterans in a substance abuse residential rehabilitation treatment program (self-reported numbers).

Month of data collection	June 2016	July 2016	August 2016	Totals
Total number of vets in program	17	22	17	56
Number of vets interacting with garden	11 (65%)	10 (45%)	7(41%)	56
Frequency of being in gardening area	1–2 times/day –unknown number of vets	Daily–3 vets 3 times/week – 7 vets	1–2 times/day – 6 vets	28 (50%)
Length of stay in gardening area	Approx. 2 h- unknown number of vets	10–30 min – 7 vets More than 30 min – 1 vet	15–20 min – 1 vet	
Source of Information regarding garden	PS1 – unknown number of vets UA2 – unknown number of vets	PS1–8 vets UA2–2 vets	PS1–2 UA2–5	

PS1—from a previous stay (program of training).  
UA2—upon arrival (learned by asking others).

**Table 2**

Reasons for self-initiated treatment with participation in a garden environment by veterans in a substance abuse treatment program (self-reported quotes).

What do you do there? (passive)	Read It's a place to gather my thoughts Sit and relax Look at the garden Tan Look at the plants Take shoes off and become one with the garden Secret garden (avoid hospital stimuli)
What do you do there? (active)	Check vegetables Pull weeds Water Plants Harvest Vegetables Dig in the dirt Remove parasites on the plants
Why is it important to you?	Quiet and safe A safe haven It takes my mind off things Privacy Not busy Fresh air Family visiting area, can talk It is like home
How did being in the garden make your feel?	Calm Serene Refreshed It's better now than it was in 2014!

about the horticulture therapy from previous inpatient SARRTP admissions, while others learned of the therapy garden upon arrival.

The veterans engaged in active and/or passive activities when they went into the courtyard gardens (Table 2). Passive activities (not involved in direct plant care) included reading, looking at the plants, sitting and relaxing, tanning, and reducing stress by avoiding hospital stimuli. The passive garden participants expressed appreciation of the quiet, safe, and stress-reducing feelings associated with viewing or sitting in the garden. Active tasks included watering the plants, monitoring the growth of the vegetables, pulling weeds, and harvesting vegetables. Many of the veterans attended their plants daily to remove any parasitic insects that were eating their plants and to harvest any ripe vegetables.

Several veterans stated that the courtyard garden was important to them because it provided a “safe haven”, that is, a private area where there were no formal SARRTP activities or interactions with other veterans except with those engaged in active or passive gardening activities. The veterans especially enjoyed harvesting their vegetables from the box gardens and eating them with their meals or as snacks. One veteran expressed the desire to be able to cook the squash that he had grown. When asked how they felt during their time in the garden, the veterans' responses included feeling “calm”, “serene”, and “refreshed”. Some of the veterans who were there previously during the pilot study in 2014 commented that their self-initiated project was “better than it (the box garden area and activities) was in 2014”.

In face and phone interviews with the third author, VA greenhouse workers confirmed this informal gardening participation of the SARRTP veterans who approached them for assistance. Those persons most frequently contacted were the greenhouse staff/volunteers who worked in the garden after normal clinical hours Monday through Friday and on the weekends during their activities to maintain the plants and carry on daily horticulture activities. As reported, the SARRTP veterans requested some supplies and tools to restart the box gardens that had left unused since the 2014 pilot project. Once the project had started and the greenhouse staff members saw that all their materials were being used in a productive and therapeutic way, the informal help from the greenhouse staff continued unabated for the 2

growing seasons.

The staff members contacted agreed that they had willingly assisted the SARRTP veterans. They noted that the persistence and pleasure that the SARRTP veterans demonstrated in achieving their gardening objectives continued to rally informal staff cooperation with the veterans during evenings and on weekends when formal SARRTP activities were not in session. Staff members who assisted the veterans universally agreed that the box gardening was remarkably therapeutic, as assessed by the veterans' behavior and interpersonal communication with one another and with VA staff members. Thus, some of the VAMC greenhouse staff continued to informally provide full support in order to continue the box garden horticultural therapy during the growing seasons of 2015 and 2016.

#### 4. Discussion

The original plan of the GRG was to follow up the 2014 pilot project with a larger box gardening program the following year in the spring of 2015. However, due to a variety of logistical problems, this did not happen. Hence, the research team did not expect any box gardening to continue for the inpatient 28-day SARRTP. The research team was entirely caught off guard shortly before the end of the 2016 growing season when they heard about the under-the-radar box gardening and horticultural activities. This initiated the plan to investigate the veterans' horticulture experience before the second growing season ended in 2016.

Despite this lack of data for the 2 growing seasons, the garden involvement of one-half of the SARRTP participants, two years after completion of the research pilot study ended, was a noteworthy patient statement about US veterans' perceptions of the value of horticultural therapy. What motivated the SARRTP veterans' efforts to continue box gardening on their own when no horticulture therapy garden was provided during the 28-day inpatient program? After the 28-day SARRTP box gardening program ended in 2014<sup>1</sup> the veterans who participated in the original IRB-approved pilot study were so enthusiastic that they spread the word about SARRTP horticultural therapy among their veteran cohorts in the tristate Salem, Virginia VAMC catchment area following their discharge. Some of the original box gardening program participants returned to the 28-day SARRTP the following spring of 2015 and or 2016. They initiated daily horticultural activities without the knowledge of or aid from the GRG or the horticulture administrative staff. Those veterans who know about horticulture therapy successfully taught other veterans the horticultural skills needed to continue growing flowers, vegetables and other plants in the box gardens and in the garden area (ground gardens, large and small pots with flowers and a moss garden). These veterans also set up a communication links with those VA Horticulture Department personnel, work therapy and green house volunteers willing to assist in supplying materials and expertise regarding the horticulture garden projects.

Based on direct experience and veteran's community (tristate veterans support and treatment groups) stories from veterans that had participated in a 2014 pilot project examining the benefits of horticulture and craft occupation therapy, veterans attending the SARRTP during the 2015 and 2016 growing seasons demonstrated by their self-initiated horticulture therapy that they perceived horticultural activities as a meaningful stress reduction treatment modality. They felt the outdoor activities were worthy of the effort that they mustered to start and continue the gardens without any formal help from the SARRTP program, research group or Medical Center administration. We posit that the indirect index of perceived stress reduction was revealed by the sustained effort of starting and continuing the gardens and by the fact that 50 percent of the 56 veterans interviewed visited and interacted with the gardens during their free time. Moreover, they continued to visit the gardens to engage in passive or active garden activities from 3 times weekly to once or twice a day on their own volition.

For approximately the past two decades some policy makers have advocated that patients should have a stronger voice in decisions about their healthcare and that health care services need to be more congruent with patients' needs and preferences. Studies show that the greater the patient participation in their health care program, the better their treatment experiences and outcomes.<sup>23</sup> The serendipitous findings of this study underlie the research supporting increased patient engagement in their health care program. Choosing freely to engage in gardening activities, the veterans demonstrated commitment and perseverance in following through. By heeding and encouraging such self-determined positive behavior, medical staff may tailor therapeutic interventions that result in patients accomplishing greater engagement, confidence and skills in managing their own physical and mental health.<sup>24</sup> Notably, the World Health Organization has emphasized the importance of patient empowerment (PE) as a key component of a patient-centered approach to healthcare. PE is defined as “the set of self-determined behaviors based on patients' individual needs for developing autonomy and competence with their disease”.<sup>25</sup> The veterans of the 28-day SARRTP used the antecedent 2014 horticulture study to provide information about how to manage their successive self-initiated gardens, resulting in 50 percent of the veterans returning to the garden. This self-directed behavior demonstrates a remarkable level of auto-compliance to their horticulture therapy program.<sup>26</sup> The events support the insight of others about the positive role of PE across different types of chronic diseases.

There is appreciable evidence in the Literature supporting the biological benefits of nature in reducing the biological indices of stress.<sup>6–15</sup> Stress is a biological response to perceived internal or external dangers that can have deleterious effects on the human organism if allowed to continue longer than for brief periods of time.<sup>18</sup> The veterans in the 28-day substance abuse program are subject to multiple stressors including substance withdrawal, alcohol and illicit drug craving, depression, anxiety, PTSD, insomnia, nightmares, and other biological and psychosocial stressors (2015).<sup>11</sup> The veterans at the Salem VAMC in Salem, Virginia have demonstrated their preferences for horticulture therapy to reduce stress which adds confirmation to the study results of the pilot study in 2014 of the 12 percent reduction in salivary cortisol levels from week one to week three and the trend towards improving quality of life (Q-LES-Q-SF) and fewer depressive symptoms (Q-LES-Q-SF).<sup>11</sup> Given the relatively low cost of horticulture and simplicity of providing the necessary exposure to gardens and nature, these treatment modalities appear to be both effective and practical for veterans needing care from severe physiologic and psychological problems.

In summary, the growing body of literature demonstrating improved quality of life and reduced biological stress indices such as the stabilization of neuroendocrine and immunological markers underlies the role of horticultural therapy as a valuable complementary treatment modality for veterans attending inpatient substance abuse programs. The two years of autonomous, non-interventionist, horticulture therapy garden projects by 50 percent of the Salem VAMC SARRTP veterans strongly support the role of autonomy and self-discovery in recovery programs for veterans attending VAMC treatment programs. Moreover, the ardently pursued horticulture garden project is a powerful statement by the veterans as to what they think is important and effective for them in addressing the multiple stressors that are interfering with their quality of life to the degree that they seek medical assistance from the Veterans Affairs Healthcare System. Given that there is an existing evidence-based foundation for the effectiveness of horticulture therapy, the authors suggest that horticulture therapy programs with some autonomy and self-discovery become a standard OT treatment option for all inpatient and outpatient veterans seeking care from the Veterans Affairs Healthcare System. We are encouraged by both the VA's Health Services Research and Development Service and the National Institute of Health's National Center as they are promoting research in complementary and alternative medicine. We suggest continued research funding horticulture therapy studies with biomarker and other hard

data markers of effectiveness which are recognized by allopathic and other traditional researchers.

## Conflict of interest

The authors report no conflict of interest. The report findings do not represent the views of the Department of Veterans Affairs or the United States Government. This material is the result of work supported with resources and the use of facilities at the Salem, Virginia VA Medical Center.

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