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Healing Hives

Exploring the Effects of Beekeeping on Veteran Mental Health and Quality of Life

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Valerie Carter
Adam Ingrao
Jessie L. Bennett
Christine Gould

Abstract

Veterans experience higher risks of suicide and mental health disorders due to the traumas of military service, disabilities, and the difficulties of reassimilation into civilian life. Therapeutic interventions using human-animal interactions have shown promising results in reducing many risk factors affecting veterans' quality of life. This quality improvement project sought to consider if veterans participating in a recreational therapy program focused on beekeeping and administered by the Department of Veteran Affairs would experience quality of life improvements using a standardized EQ-5D-5L assessment. Our results indicate significant changes in mobility, anxiety/depression, and overall health for veterans participating in beekeeping as a recreational therapy. Implications for practice and future research are presented.

Valerie Carter is a recreational therapist at the Manchester VA Medical Center, New Hampshire.

Adam Ingrao is an Entomologist and Outreach Specialist at Michigan Food and Farming Systems.

Jessie L. Bennett is an associate professor in the Recreation Management and Policy Department at the University of New Hampshire.

Christine Gould is a Health Science Specialist at the Manchester VA Medical Center, New Hampshire.

Please send correspondence to Valerie Carter, valerie.carter2@va.gov

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Keywords

Anxiety, beekeeping, depression, recreational therapy, veterans

Introduction

The United States (US) is home to over 18 million veterans who are faced with a multitude of challenges when leaving the military (Dept. of Veteran Affairs, 2022). Coming to terms with service-connected disabilities, loss of purpose and camaraderie, survivor guilt, and struggles to reassimilate into civilian life make veterans a higher risk population for mental health disorders and suicide when compared to the general public (Kang et al., 2015; Seal et al., 2009). A systemic review conducted by Bauer et al. (2018) on preventative quality of life interventions to support transitions to civilian life for US veterans has shown positive impacts on transitioning veterans and their families, but interventions were primarily focused on stress and anger management, relationship rebuilding, cognitive training, psychoeducation, and relaxation practices (Bauer et al., 2018). However, veterans are not always accepting of interventions that may be perceived as treatments (Zinzow et al., 2012), which has drawn interest to interventions focused on complementary and alternative treatments, such as human-animal interactions, mindfulness, and yoga. Veterans who have engaged in mindfulness, and yoga practices have found mental health and physical health benefits to help manage their service-connected or non-service-connected disabilities (Binoy et al., 2023; Groessl et al., 2020; Staples et al., 2013).

In addition to traditional mind-body practices, the interaction between veterans and animals has been shown to reduce the impact of social isolation, support healing with post-traumatic stress disorder (PTSD), reduce suicidal ideation, improve quality of life, social and communication skills, and contribute to a sense of purpose (Fonseca et al., 2022; Krause-Parello et al., 2021; Wortman et al., 2018). Fonseka et al. (2022) completed a meta-analysis of studies looking at the impact of working with animals (dogs, horses, and seals) on PTSD, anxiety, depression, resilience, well-being, and quality of life for veterans. Short-term results included lower scores on the PTSD checklist and depression scales and promising results in mental health scales and quality of life. Veterans who participated in a 4-week program working with seals showed decreases in self-reported PTSD symptoms and decreases in the PTSD Checklist for DSM-5 (PCL-5) assessments (Wortman et al., 2018). In addition, studies on the effect of human-animal interaction on veteran social isolation have shown that animals can play an important role in positive biopsychosocial outcomes (Krause-Parello et al., 2021).

In the last decade, there has been tremendous popularity within the veteran community around beekeeping as a human-animal interaction that provides opportunities for hobby farming, small business ownership, continued national service, and perceived personal wellness benefits (Grondin, 2021; GuideStar, 2023; Stiffler, 2024). Surprisingly, as far back as 1919, the US Government recommended beekeeping as a vocation for transitioning veterans. As a vocational education program, beekeeping was a way to help veterans cope with disability, health, and return to vocation after returning from World War I (Campion, 2019). Modern programs, like Michigan Food and Farming Systems' Heroes to Hives program, have trained thousands of veterans and their family members in the science of beekeeping, and simultaneously integrated

wellness practices focused on mindfulness, gratitude, and human-animal connection in their training (Heroes to Hives, n.d.). Heroes to Hives evaluations of participants have consistently shown anecdotal evidence of positive health outcomes such as reduced stress, PTSD symptoms, loneliness, depression, and suicidal ideation for which veterans attribute to the interaction with their bees and reconnection with nature (Casey & Householder, 2022).

Currently, there is no peer-reviewed research investigating the impact of beekeeping on veteran quality of life. Anecdotal evidence is pervasive in the beekeeping industry amongst veterans, but no evidence-based research exists on the topic making implementation of practices for healthcare professionals difficult. To better understand how veteran quality of life is impacted by beekeeping as a recreational therapy intervention we conducted a one-year project with veterans receiving recreational therapy services at the Manchester VA Medical Center (VAMC) in New Hampshire (NH).

Methods

During the beekeeping season of 2022 (May-September), a quality improvement project was conducted at the Manchester VAMC. This project was reviewed and approved as a Quality Improvement Project by the Manchester VAMC Associate Chief of Staff for Research. This pilot project was conducted to determine the outcomes of The Honey bee Initiative for Veterans Empowerment and Support (HIVES) program in relation to the veterans' quality of life.

Participants

Participants were all patients at the Manchester VAMC who had been referred to the Recreational Therapy Department for outpatient services from a provider on their physical medicine or mental health treatment team. An intake assessment was completed by a Recreational Therapist and a Recreational Therapy (RT) treatment plan was developed. Veterans were enrolled in the HIVES program if their RT goals were aligned with the goals of the HIVES program and they were medically cleared for participation in beekeeping. Program goals of the HIVES program were:

- Learn/improve skills for beekeeping.
- Improve quality of life and overall wellness by using skills learned.
- Increase self-esteem through building leisure/recreation skills and competence.
- Utilize beekeeping as a way to connect with other communities, such as beekeepers, and use common interests to increase social connections.
- Decrease feelings of isolation by connecting with other veterans with shared interests.
- Increase coping skills for stress, anxiety, and depression through program participation.

Data Collection and Instrumentation

Participants completed paper pre- and post-surveys for every session of the HIVES program they attended. A Health Science Specialist or Recreational Therapist administered the pre- and post-session surveys. Veterans placed their completed surveys in a manila envelope, which was clearly labeled "before" or "after." In addition, basic demographics and medical history was extracted from the participant's VA electronic medical record. The pre- and post-session surveys consisted of the standard-

ized EQ-5D-5L assessment (EuroQol Research Foundation, 2019) to gather data on the veteran's quality of life. The EQ-5D-5L is a valid generic instrument in various patient groups across six countries, with improved reliability over the 3L version (Janssen et.al., 2013). This measure uses a six-item scale that includes one question each for five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression (EuroQol Research Foundation, 2019). Each dimension asks the participant to indicate their level of problem within this dimension: no problems, slight problems, moderate problems, severe problems, and extreme problems. Higher numbers indicate more problems within that dimension or total quality of life. The sixth question on the EQ-5D-5L asks the participant to indicate their current overall health on a 0-100 vertical visual analog scale (VAS). The VAS scale endpoints are labeled 'The best health you can imagine' at the 100 end and 'The worst health you can imagine' at the zero end. Higher numbers indicate better perception of health status (EuroQol Research Foundation, 2019). Completion of the surveys were voluntary, and not required for participation in the HIVES program, however, all participants did complete the pre- and post-session surveys.

Data Analysis

Data were analyzed using IBM SPSS Statistics (Version 26). Descriptive statistics of mean, standard deviation, and frequencies were calculated for all the variables and demographic data. A paired-samples t-test was used to determine significant changes from pre- to post- session surveys for program participants' total EQ-5D-5L score, VAS score, and all five dimensions of the EQ-5D-5L (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression). Any missing data were addressed by mean replacement outlined by the EQ-5D-5L scale recommendations (EuroQol Research Foundation, 2019).

Intervention

Fifteen, 120-minute HIVES sessions were facilitated over a 16-week period (May 27, 2022–September 8, 2022) and sessions were dependent on good weather (> 55 and < 90 degrees F and no precipitation). Each session was facilitated by a recreational therapist and volunteer expert beekeeper. An additional recreational therapist or intern was in attendance to assist veterans who needed additional support or accommodations. Mind and body practices were facilitated by a recreational therapist who is a 200 hr. certified yoga instructor (Table 1).

Sessions were structured to develop the veterans' knowledge and skills in beekeeping, utilize mindfulness in a unique experience, gain hands-on experience in the beehives, and build community among the members of the group. Veterans would meet at the apiary and each veteran was welcomed to the group and provided the opportunity to complete the pre-session survey. This was followed by a review of the previous session and goals for the day. The mind and body practice was facilitated prior to the veterans donning bee suits and gloves (Table 1). There were six types of mind and body practices, listed in Table 1, that were facilitated by the recreational therapist. The practice that was selected was based on the observation of the group, identified needs of the participants shared during check-ins, and the goals for the day, and was facilitated for five to 10 minutes outside of the apiary, before moving into the apiary.

Table 1
HIVES Mind and Body Practice Descriptions

Practice	Description
Diaphragmatic Breathing	A deep breathing exercise that helps to calm the mind and body by focusing on the breath and utilizing the diaphragm during the practice.
Yoga for Beekeepers	Utilizing a sequence of Asanas that focus on the arms, shoulder and back, this practice helps the beekeeper to prepare physically and mentally for the beekeeping session.
Five Senses Mindfulness	Practicing mindfulness and calming the mind and body. Being aware of all of the senses and the experience that the beekeeper is having can help them to feel grounded when entering the hives.
Bee Breathing	Bhramari Pranayama is the practice of focusing on the breath using an exhalation that resembles the typical sound of a bee. This can help to relieve tension, anxiety, anger, and calm an agitated mind.
Beehive Guided Imagery	A guided imagery practice that takes the beekeepers through the experience in the hives, this can help them to prepare for going into the hives and reduce anxiety around any uncertainties.
Beehive Five Senses	A guided five senses practice to prepare for going into the hives can help the beekeeper to be more aware of their experience and more mindful of their five senses when in the hives.

Next, veterans were guided through hive inspections and honey bee care by the recreational therapist and volunteer beekeeper. Education was provided at the hives based on what was observed and the goals for the day. Upon completion of the hive inspection, veterans and staff/volunteers gathered outside of the apiary to take off the bee suits, debrief, document hive observations, and complete the post-session survey.

Results

There were nine program participants in the HIVES program. All nine participants were military veterans from the Army (five), Marine Corps (three), and Navy (one). Six identified as males and three identified as females. Veterans were all residents of New Hampshire and ranged in age from 37–63 years (M = 47.2). Veterans in the HIVES program were referred to RT services for anxiety, anger, chronic pain, depression, dysthymia, and/or PTSD. The participants attended an average of five sessions (range 2-9).

Participants showed significant negative changes in mobility ($t(45)$ = -2.197, p = 0.033), and significant positive changes in anxiety/depression ($t(45)$ = 6.582, p <

0.001), and VAS ($t(45) = -4.233$, $p < 0.001$). Self-care was approaching a positive significant change ($t(45) = -1.946$, $p = 0.058$). However, usual activities ($t(45) = -0.628$, $p = 0.533$), pain/discomfort ($t(45) = 1.401$, $p = 0.168$), and total score ($t(45) = 1.518$, $p = 0.136$) did not have significant changes (Table 2).

Table 2

Comparison of Pre- and Post- Session Scores on Quality of Life for Veterans in the HIVES Program

Outcome	Pre-Session		Post-Session					
	M	*SD*	*M*	*SD*	*df*	*t*	*p*	% Change
Mobility	2.00	1.135	2.15	1.154	45	-2.197	0.033*	7.5%
Self Care	1.11	0.315	1.22	0.467	45	-1.946	0.058	9.9%
Usual Activity	2.07	1.083	2.11	1.159	45	-0.628	0.533	1.9%
Pain/Discomfort	2.74	1.255	2.63	1.199	45	1.401	0.168	4%
Anxiety/Depression	2.65	1.197	1.83	0.851	45	6.582	0.000*	30.9%
Total	10.57	3.874	10.09	3.966	45	1.518	0.136	4.5%
VAS	68.24	13.842	74.89	12.385	45	-4.233	0.000*	9.8%

Discussion

The dynamic nature of recreational therapy offers researchers, clinicians, and patients the opportunity to explore wellness across disciplines and address health challenges in novel ways. The findings of this pilot project indicate that veterans participating in a therapeutic beekeeping program offered through the VA are experiencing reductions in feelings of anxiety and depression, as well as increases in positive feelings regarding overall health. To our knowledge, our research is the first to establish that beekeeping can be successfully used as a therapeutic intervention for veterans. Previous work has shown that veterans using beekeeping as a serious leisure showed positive changes in community support and identity, which led to increased connection to community, new skills, a second career and a deeper understanding of self and surroundings (Brenner, 2022). These findings suggest that veterans could use beekeeping as a therapeutic modality to positively impact their mental health, and as a way to pair mind and body practices with an enjoyable leisure activity.

It is important to note the negative impact of the HIVES program on the veterans' mobility scores as a result of beekeeping activities. Although reductions in mobility may be a direct result of the physical nature of beekeeping, this would need to be explored more to determine if there were other circumstances that might have impacted mobility. It should be noted that beekeepers using traditional Langstroth style hives (the industry standard in the US and the hives used in this study) are required to lift boxes up to 40 lbs and bend their knees and backs as they work through a hive. During the sessions, participants were offered the opportunity to take breaks, use chairs, and have another participant assist them when moving hive boxes. However, a significant change in mobility was still experienced which indicates that additional adaptations may be needed. This would include adaptations such as a hive lifter, having additional chairs and benches available, or using different hive styles, like the Slovenian AZ hive

or top bar hives, which may mitigate reductions in mobility in future research by limiting lifting requirements (Berens et al., 2023).

Mind and body practices are used by many individuals for emotional and physical well-being, and veterans had found similar experiences to the general population. Yoga has been shown to improve hyper-arousal symptoms of PTSD and sleep quality (Marchand et al., 2022; Staples et al., 2013), quality of life (Staples et al., 2013), create a calmer mental state, increase positivity and emotional well-being (Hurst et al., 2018), and decrease anxiety and daytime dysfunction (Nelson et al., 2014). Mindfulness practices have been found to improve psychological symptoms and quality of life (Goldberg et al., 2020), and increase behavioral activation, decrease PTSD and depression (Marchand et al., 2022). This pilot project indicated that pairing mind and body practices with beekeeping could have similar effects. In fact, Herrmann et al. (2020), found that 30% of veterans engage in mindfulness practices for reducing stress, PTSD, depression, and improving sleep, and that 43% of the veterans surveyed were interested in using mindfulness in conjunction with an enjoyable activity. By pairing a mindfulness practice with beekeeping, healthcare professionals may find increased participation in therapeutic beekeeping programs by tapping into demographics already familiar with the benefits of mindfulness practices.

Limitations and Future Research

This quality improvement project had a small sample size and was completed with veterans from only one location, therefore the results are not generalizable. Having data from multiple locations, with a larger sample would allow for more generalizability in the future. Clinical change from pre-session to post-session surveys were noted in the fields of anxiety/depression, VAS, and mobility. Research will need to be conducted to determine the factors that impact the changes, and if there are any demographics that have greater outcomes from this intervention.

Future research should examine outcomes of the HIVES program compared to outcomes of other mindfulness programs offered to veterans, such as the VA CALM program (an adapted Mindfulness-Based Stress Reduction Program), and community-based veteran beekeeping programs without mind-body practices embedded into the program. This will help determine the impact of interaction with bees, mind/body practices, and combined programs on the quality of life of the participants in future programs, including veterans and non-veteran populations.

Additionally studies on the impact of beekeeping programs as part of cognitive behavior therapy (CBT), dialectical behavior therapy (DBT), or residential treatment programs will also be valuable. Veterans and non-veterans may be able to use beekeeping as a way to develop vocational, communication, teamwork, leadership, and problem-solving skills, due to the structure and nature of the intervention. However, based on results on mobility and self-care, it is important that the correct adaptive equipment is used to allow for safe and continued engagement in these programs.

Our future research will focus on developing a detailed study protocol that will include collecting medical history to explore potential additional variables involving a broader veteran audience to include non-VA clients and developing training tools, standard operating procedures, and assessments for healthcare professionals to implement therapeutic beekeeping programs into their own practice. This work is being

funded by the US Department of Agriculture's North Central Region Sustainable Agriculture Research and Education Professional Development grant program.

Implications for Recreational Therapists

Beekeeping as a recreational therapy intervention can allow veterans to explore complementary and alternative therapy options that may support broad improvements in their quality of life. This allows veterans to not only engage in a new hobby or small business opportunity, but also gain a sense of purpose, and provide service back to their community by caring for pollinators as part of our food system. However, it is also important to understand that many veterans have limited access to beekeeping due to lack of knowledge, access to bees, or financial means to acquire them. By providing beekeeping as an intervention to this community we remove these barriers and open new therapeutic avenues to support the quality of life of our nation's heroes.

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