



Published: October 31, 2023

Citation: Fetsch RJ and Grenwelge CH, 2023. Effects of an Agricultural Entrepreneurial Training Program with 40 Military Veteran Beginning Fa] 11(10).

<https://doi.org/10.18103/mra.v11i10.4545>

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DOI

<https://doi.org/10.18103/mra.v11i10.4545>

ISSN: 2375-1924

RESEARCH ARTICLE

Effects of an Agricultural Entrepreneurial Training Program with 40 Military Veteran Beginning Farmers

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ABSTRACT

Military veterans returning from war face challenges when re-entering civilian life. Our aim was to evaluate how effective an agricultural entrepreneurial training program (The Farm and Education Treatment Program) was to equip 90 returning military veterans to become self-employed in food and agriculture and secondarily to support health. While there are several agricultural entrepreneurial training programs available, there are few with the breadth, depth, and empirical outcomes of the present study. Our method used eight measures to assess pretest-posttest differences associated with becoming successfully employed in production agriculture. We assessed pretest-posttest changes before and after returning military veteran beginning farmers participated in our year-long, 188-200-hour Farm and Education Treatment Program. Our program trained two cohorts per year each with 15 participants over three years for a total of 90 participants. Especially during COVID-19 with virtual rather than in-person training, our drop-out rate was high. By the end of the three-year program, 40 military veteran beginning farmers completed the program and provided usable pretest-posttest data for a 44% response rate. Almost 88% ($n = 35/40$) of participants were self-employed in agriculture either full-time (60%) or part-time (28%). When they began, two were full-time farmers/ranchers, one was in agricultural business, and one was a part-time farmer/rancher. Our participants' greatest statistically significant improvements were on the Skills Assessment measure with Farming Skill Level, Crop Skill Level, and Livestock Skill Level subscales, on the Entrepreneurial Self Efficacy Marketing, Innovation, Financial Control, and Total subscales, and on the Independent Living and Working levels. These measures linked well with the overall program goal, intervention, and outcomes because the bulk of the program addressed these variables. There was no change in physical or psychological domains. We concluded that face-to-face, in-person teaching of the program was much preferred and more effective than virtual, remote teaching during COVID-19. Also eight measures with 671 items are far too many. Future researchers are encouraged to expand the training with practical, evidence-based behavioral health strategies that participants can use to improve their behavioral health and quality of life.

Keywords: agriculture, beginning farmer, depression, entrepreneurial, horticultural therapy, mental/behavioral health, military veterans, PTSD, self-employment, and stress

Introduction

Returning from war and re-entering civilian life is a challenge for many military veterans. Especially those veterans who were in combat often report experiencing high stress levels, anxiety, depression, posttraumatic stress disorder (PTSD), and substance abuse.¹

Nearly one in four active duty members showed signs of a mental health condition.² In their study with 18,305 U.S. Army soldiers, Thomas, Wilk, Riviere et al reported incidences of PTSD or depression with seriously functional impairment prevalence rates from 8.5% to 31.1% depending on the reported level of functional impairment. The three primary mental health concerns reported were posttraumatic stress disorder (PTSD), depression, and traumatic brain injury (TBI). The rate of PTSD was 15 times higher than that of civilians. The rate of depression was five times higher. (National Alliance on Mental Illness, n.d.). Retrieved August 7, 2023 from

<https://www.nami.org/Your-Journey/Veterans-Active-Duty#:~:text=The%202014%20JAMA%20Psychiatry%20study%20found%20the%20rate,life%20and%20normal%20functioning%20and%20may%20require%20treatment.>

The problem of what works to improve the physical and mental health of U.S. military veterans returning to civilian life is important because transitioning to civilian life is difficult with many significant associated barriers that affect employment and life satisfaction for this population.^{3,4} Two hundred thousand military veterans return to civilian life each year.⁵ While veterans in general are more likely to experience PTSD than the general population, military personnel who deploy to active war zones are more likely to have PTSD than those who do not. (U.S. Department of Veterans Affairs, n.d.) Retrieved September 20, 2023, from https://www.ptsd.va.gov/understand/common/common_veterans.asp. Of the returning military veterans that experience traumatic events connected to military conflict, an estimated 13%-25% report suffering from PTSD, TBI, and other behavioral health issues.⁶ A physical disability and/or mental health or behavioral disability adds a whole new level of concern to the overall problem of transitioning to civilian life for a military veteran.

In recent years, the transition needs of veterans have become more widely recognized. While some veterans return home with physical wounds, many return with invisible wounds such as post-traumatic stress disorder (PTSD) and other mental health

challenges. The transition out of the military can also lead to or further exacerbate some of these challenges. Roughly one in five veterans return home with PTSD, with the prevalence rate being higher among rural veterans.⁷

A systematic review done by Oster, Morello, Venning, Redpath, and Lawn⁸ concluded that there was a relationship between a veteran's mental, physical, and social wellbeing. As highlighted in a systematic review done by Romaniuk and Kidd,⁹ many veterans experience a loss of identity, purpose, and connection to their community and culture upon reintegration. Many veterans reported that the feeling of loss of identity often had to do with no longer feeling as though they were contributing members to a larger cause.¹⁰ Hayden and Buzzetta¹¹ discussed that veterans gain multiple benefits from working, including coping with mental illness, providing a sense of purpose for individuals who feel they lack one,¹⁰ and overall increased quality of life.¹¹

Over the last several years, the United States Department of Agriculture (USDA) has provided millions of dollars in funding for the design and implementation of programs that teach skills related to agricultural business and production. One of the target populations for many of these grant initiatives has been military veterans. Despite the millions in funding and numerous programs that now exist as a result, we found few results published on their overall impact and effectiveness.

The aim of the present study was to fill a significant gap in the literature on the effect/effectiveness of returning military veterans participating in a one-year Farm and Education Treatment (FEAT) Program at Texas A&M University AgriLife Extension funded by the USDA National Institute of Food and Agriculture and the Compatible Lands Foundation. The FEAT Program's overarching goal was to provide education and experiences that support this population to become successful beginning farmers/ranchers and secondarily to support health.

Literature Review

ENTREPRENEURIAL TRAINING PROGRAMS IN AGRICULTURE

While we found that little research exists on agricultural entrepreneurship programs specifically for veterans, there has been some research on agricultural entrepreneurship and entrepreneurship programs for veterans not focused on agriculture. Dias, Rodrigues, and Ferreira¹² suggested that education and training is needed for young agriculture students to help develop entrepreneurial

skills. This suggestion was based in part on their findings that younger people were less likely to pursue agricultural entrepreneurship and that those who did had fewer skills compared to entrepreneurs in other business areas.

When examining the overall characteristics of veteran entrepreneurs, Heinz, Freeman, Harpaz-Rotem, and Pietrzak¹³ found that those who were self-employed had higher rates of community integration/feelings of connection, they felt a sense of purpose, had more protective/resilience factors and they had a greater need for autonomy compared to their non-entrepreneurial counterparts.

Kerrick, Cumberland, Church-Nally, and Kemelgor¹⁴ evaluated the impact of a community-based entrepreneurial program for veterans that met for 10 weeks at three hours per week for a total of 30 hours. Sixteen individuals completed the program. It incorporated one-on-one peer mentoring and had veterans enrolled alongside civilian peers. Upon completion of the program, veterans reported having higher positive entrepreneurial passion, an increased likelihood to network, and feeling more connected to resources and those in the civilian world.

Cater and Young¹⁵ conducted a study with 68 military veterans who were either considering starting their own businesses or had already done so. While they appear not to have provided an intervention, they reported that 63% of respondents started their own business to “be my own boss.” This study also found that 54% needed assistance with marketing/advertising, 43% needed assistance accessing start-up capital, 40% needed help with business planning, and 34% needed help with bookkeeping.

MENTAL HEALTH BENEFITS OF HORTICULTURE THERAPY

The FEAT Program provided its participants with the skills to gain self-employment in a field that is connected to nature and the growing of living things. While the FEAT Program was an entrepreneurial program and not a horticulture therapy program, a few recent empirical research study results have pointed to the positive benefits of employment and the exposure to nature (i.e. plants and animals) for transitioning military veterans with mental health disorders. Evidence is growing that some horticultural therapy programs improve overall mental health wellness such that military veterans with PTSD benefit both from being their own bosses and from working with plants and

animals. However, empirical articles reporting health benefits in this area are few.

Brown, Besterman-Dahan, Chavez, Njoh, and Smith¹⁶ completed a non-intervention case-study with a peer-support community agriculture program for veterans, called *Growing Veterans*. This case study used interviews, the Veterans RAND-12, the Military to Civilian Questionnaire, and a general satisfaction survey to evaluate the program's effectiveness. Overall, they found that the peer-support model helped the veterans build ties to those in their community and it helped veterans transition back into society. Some of their findings correlate with the findings of Kerrick et al.¹⁴ and the impact of using peer-support/mentoring.

Besterman-Dahan, Chavez, and Njoh¹⁷ evaluated the impact of a community-based farm-to-market program with transitioning veterans. Using interviews, the Veterans RAND-12, and the Military to Civilian Questionnaire, they assessed the impact of the non-intervention program on the overall health and wellbeing of veterans. The results found that overall, the veteran participants had improved mental, emotional, and physical health, including decreases in depression and anxiety.

The Armed to Farm Program provided internships, workshops, and online course materials to approximately 300 veterans interested in farming 2007-2014.⁷ While they reported that their workshops included 30-50 individuals, they did not report using measures to assess pretest-posttest differences. The qualitative review found that veterans requested business planning, marketing strategies, hands-on training, one-on-one support, and specialty education about their agricultural enterprise area. Incorporating the peer-model, the Armed to Farm program matched participants with a veteran peer and found that having a veteran mentor helped the new participants feel a sense of comradery, and it gave them the ability to share experiences and connect on that level. The program also included internships and hands-on learning opportunities. Hands-on learning allowed participants to gain experience and skills that cannot be taught by sitting in a classroom. To mimic military structure, veterans were required to work in teams during workshops while gaining real world experience from topic experts. This program also required participants to apply for entrance into the program, and they found it helped the program select participants who were truly dedicated and passionate about pursuing agriculture. They also found that incorporating the spouse had a positive impact on future success of the operation.⁷

Stowell, Owens, and Burnett¹ reported the effects of a five-week horticultural therapy program with eight veterans (1.5 hour sessions twice per week for a total of 15 hours). Participants completed the Depression, Anxiety, Stress Scale-21 and the Quality-of-Life Enjoyment and Satisfaction Questionnaire-Short Form (Q-LESQ-SF) at the beginning of the first session and at the end of the 10th session. The authors reported pretest-posttest improvements for depression severity ($p = .01$) and stress ($p = .001$), but no statistically significant pretest-posttest differences in anxiety or quality of life levels. Their attrition rate was 28% drop out.

Kelley, Waliczek, and Le Duc¹⁸ conducted a 6-week (total six-hour) indoor/outdoor greenhouse plant care program. Seventeen student veterans completed the 21-item Depression, Anxiety and Stress Scale (DASS-21) survey in a treatment-control group study. Their pretest-posttest comparisons found that depression and anxiety levels dropped for the eight participants in the treatment group, but stress levels did not decline. For the nine control group participants there was little change in their depression, anxiety and stress levels.

Meore et al.¹⁹ provided an urban garden horticultural therapy program to 20 military veterans with a history of suicide ideation or attempts. The program was 3.5 hours for four weekly sessions for a total of 14 hours. It included a lecture on how a person's emotions and thoughts related to immersing oneself into the natural environment and hands-on activities like trellis making, seed sowing, seedling thinning and transplanting, and harvesting. Results included significant improvements in stress, depressed mood, pain, loneliness, and a decline in suicidal ideation. Effect sizes were in the medium to large range (Cohen's $d > .5$).

MENTAL HEALTH BENEFITS OF EMPLOYMENT AND SELF-EMPLOYMENT

Abraham, Chang, Van, Resnik, and Zivin²⁰ reported positive results for diminished need for mental health resources directly connected to military veterans with mental health concerns gaining substantial employment. Twenty-nine thousand twenty-two Vocational Rehabilitation participants were tracked and assessed at the one-year mark and five-year mark. This study highlights the benefits of employment on life satisfaction with the lowering of outpatient mental health care utilization, primary care visits, and homelessness services visits.

The research literature on the quality-of-life levels of farmers and ranchers with disabilities is

expanding. Jackman, Fetsch, and Collins²¹ found no differences in disability type and McGill Quality of Life (QOL) levels in their study with 398 farmers and ranchers with various disability types. However, they did find differences in Independent Living and Working (ILW) levels by disability type. From highest to lowest ILW levels were people with joint injury, arthritis, orthopedic injury, back injury, cardiovascular disease, other infrequent disabilities, stroke, leg and foot amputation, visual impairment, and spinal paraplegia and quadriplegia.

Fetsch, Jackman, & Collins²² reported that both QOL and ILW levels improved ($p < .001$) with large or larger than typical effect sizes with a group of 191 ranchers and farmers. Fetsch and Turk²³ found that a group of AgrAbility program participants improved more than a no-treatment comparison group on both QOL and ILW levels by amounts that were statistically significant in a 10-year, 27-state study.

In a fourth study, Fetsch & Collins²⁴ reported that a treatment group with 273 AgrAbility farmers and ranchers with disabilities from 14 states improved not only on their overall QOL levels ($p = .000$) with large or larger than typical effect sizes but also on three behavioral health subscales ($p = .000$) with medium effect sizes. These results compared with no significant change in a no-treatment comparison group's overall QOL levels or in their three behavioral health subscale levels. Also, the AgrAbility group score on the ILW improved more ($p < .001$) than did a no-treatment comparison group ($p = .033$).

CURRENT GAP

While a review of the literature highlights the needs of veterans and many aspects that should be considered when designing a program for them as well as factors to consider with agricultural entrepreneurship, little exists on how to effectively combine those components into a cohesive program. Our primary hypothesis was that U.S. military veterans who complete the one-year, three-phase FEAT Program would improve from pretest to posttest on eight measures.

Method

PARTICIPANTS

Participants applied to the FEAT Program. A screening team consisting of two staff members scored each application based on a standardized rubric. Each cohort had 15 possible slots. The total score that participants could achieve on the application was 165. There were ten major scoring categories: 1) prior farming experience; 2) business

management skills; 3) additional programs accessed connected to agriculture; 4) future goals; 5) planning process; 6) access to land; 7) current or future farm/ranch type of production and practices; 8) infrastructure; 9) technical team support; and 10) priorities and time. Then the five-person FEAT Team discussed each score and came to a consensus on a final score for each application.

RESEARCH DESIGN

The research design was a pretest-posttest one. Military veteran beginning farmers completed the same eight assessment measures both before and after they completed the educational intervention to evaluate how effective the FEAT Program was with equipping 90 returning military veterans to become self-employed in food and agriculture. We conducted paired or correlated samples *t* tests to assess group mean pretest-posttest differences.

INTERVENTION

The FEAT Program was a one-year, three-phase classroom and in-the-field educational training program. The FEAT Team delivered the program via in-person and online workshops and courses, hands-on experiential training, mentoring, and technical guidance. The project's goal was to educate 90 military veterans to start or expand their own agriculture business through agriculture workshops, online coursework, and hands-on training and to identify which measures captured indications of participants' ability to become self-employed in production agriculture. The details of each phase are listed below.

Phase one training included an introductory one-day workshop. It included entrepreneurship, fundraising, and business opportunities.

Phase two training was a 16-week basic training for 3-5 hours per week that included a two-day, in-person weekend kick-off event. Basic Training built cohesiveness in the cohorts and connected participants to additional program services such as AgrAbility and VetAdvisors who provided coaching in financial management, spousal relationships, healthy living, and managing stress. They helped participants develop their Individualized Education Plan (IEP). Participants updated their IEPs throughout phases two and three. They completed hands-on and online virtual training modules to develop their working business plan with cost projections to complete a training needs analysis and determine the educational focus for the Ag Business Boot Camps, and to develop their Individualized Training Plan that outlined their skill need area strengths and deficits. Completion of a

business plan in phase two was the participants' entry into phase three.

Phase three training included all phase two activities plus online courses in livestock production and/or courses in crop sciences. Participants completed 40 hours of hands-on immersive training during the Ag Business Boot Camp at the FEAT Center (cattle production, vegetable production, specialty crops, small ruminant, etc.) and/or at Mesquite Field Farm (grass-fed beef production, poultry, specialty crops, vegetables, and value-added products). Participants completed an additional 60 hours for a total of 100 hours of hands-on training to further develop their skills with their agriculture production mentors. Depending on the individual's pace for completing the 16-week course in phase two, the average range of total hours for the FEAT intervention was estimated from least time for completion (188 hours) to most (200 hours).

MEASUREMENT INSTRUMENTS

After collecting demographic information with the Texas AgrAbility Pre-Service Questionnaire, the FEAT Team used eight pretest-posttest measures.

The Military to Civilian Questionnaire (M2CQ) is "a 16-item self-report measure of postdeployment community reintegration difficulty" (p. 660).²⁵ M2CQ scores include *M*, *S.E.*, and *N*. All the other measures include *M*, *S.D.*, and *N*. With the M2CQ, the lower the score the better. With all the other measures, the higher the score the better.

The Entrepreneurial Self-Efficacy Scale (ESE) is a 22-item measure designed "to predict the likelihood of an individual being an entrepreneur. ESE refers to the strength of a person's belief that he or she is capable of successfully performing the various roles and tasks of entrepreneurship. It consists of five factors: marketing, innovation, management, risk-taking, and financial control" (p. 295).²⁶ It also provides a total score. We suspect that our sample will score more like the authors' group of Non-Founders.

The Veterans RAND 12-Item Health Survey (VR12) "is a health questionnaire developed from the Veterans Health Study spanning the physical to the psychological domains" (Retrieved from https://www.academia.edu/19384215/Veterans_RAND_12_Item_Health_Survey_VR12_A_White_Paper_Summary.) Pretest and posttest VR12 Physical and Mental scores reported here are *M*, *S.D.*, and *N* and not *t*-scores.

The Work and Meaning Inventory (WAMI) is a 10-item measure designed to produce scores on Meaningful Work, Positive Meaning in Work, Meaning Making through Work, Greater Good Motivations, and Total Meaningful Work scores (p. 7).²⁷ It also provides a Full Meaningful Work score.

The McGill Quality of Life (MQOL) is a 17-item scale with five subscales: 1) Physical well-being, 2) Physical symptoms, 3) Psychological well-being, 4) Existential/Experiential well-being, and 5) Support.^{28,29}

The Independent Living and Working (ILW) Scale is a 6-item measure designed by Carla Wilhite and the National AgrAbility Evaluation Committee at Purdue University to assess a farmer's or rancher's ability to complete tasks in their home and on their farm or ranch. ILW scores reported here are from Fetsch & Collins.²⁴

The Skills Assessment is a 415-item measure of an individual's Farming Skill Level, Crop Skill Level, and Livestock Skill Level by Erin M. Kimbrough who drew skills assessments from three other surveys. There are no authors' norms, validity or reliability rates, or research articles with comparable norms for her Skills Assessment. Previously she used the Skills

Assessment measure one-on-one to advise individuals with their future goal-setting (E. M. Kimbrough, personal communication, August 11, 2020).

The Farm and Ranch Business Health Assessment (FRBHA) is a 173-item measure that the funding entity required us to use. According to its authors it has no published reliability or validity rates and no published norms (V. Ackerman, G. Matteson, & J. Perez, personal communication, December 17, 2020). Because there were so many problems with the FRBHA, we ran no analyses with it.

Results

DEMOGRAPHICS

Our sample included 85% males ($n = 34/40$). Regarding work status before participating in FEAT, 35% ($n = 14/40$) were part-time farmers or ranchers with primary income from off-farm or ranch jobs, 5% were full-time farmers or ranchers, one was a part-time farmer or rancher with primary income from the farm or ranch, another reported that their occupation was agricultural business, and 55% ($n = 22/40$) reported "other" occupation. (See Table 1.)

Table 1. Demographic Information from 40 Military Veteran Beginning Farmer FEAT Participants.

Characteristics	Total n	%
Education Level		
High school graduate/GED	2	5
Some college/Technical school	8	20
College graduate or more	29	72.5
Missing	1	2.5
Ethnicity		
White	26	65
Black	5	12.5
Hispanic/Latino	7	17.5
Other	1	2.5
Missing	1	2.5
Total Household Income		
\$30,000 or less	14	35
\$30,001-\$60,000	0	0
\$60,001-\$120,000	16	40
\$120,001-\$180,000	2	5
\$180,001-\$240,000	2	5
Wish not to disclose	5	12.5
Missing	1	2.5
Number Days Worked Off Farm/Ranch		
None	8	20
1-49 days	1	2.5
50-99 days	2	5
100-199 days	2	5
200 days or more	24	60
Missing	3	7.5

Characteristics	Total n	%
Veteran		
Veteran	36	90
Non-Veteran	4	10
Missing	0	0
4-H or FFA		
4-H	3	7.5
FFA	7	17.5
Both	1	2.5
Neither	27	67.5
Missing	2	5

PTSD was the primary disability reported by 15% of participants. Five percent reported traumatic brain injury as their primary disability, another five percent reported hearing impairment, and 73% did not report a primary disability. Only 52.5% ($n = 21/40$) reported their disability rating. Of the 21, 32.5% ($n = 13/21$) reported having a 100% disability rating and 7.5% ($n = 3/21$) reported having a 70% disability rating.

Seventy-three percent of participants were college graduates or more. One out of five participants had some college or technical school.

Regarding race or ethnic background, 65% reported being white, 18% reported being Hispanic or Latino, and 13% reported being black.

Regarding total household income from all sources before taxes, during the last calendar year, 40% reported \$60,001-\$120,000, 35% reported \$30,000 or less, and 13% wished not to disclose.

Our sample included military veterans with and without disabilities who completed the application to the FEAT Program and were selected to attend based on the scoring rubric process. Selected participants to the program were interested in starting or expanding their agriculture enterprises. Participants completed the program using a cohort model. The FEAT Program served two cohorts per year for a total of six cohorts each with 15 participants over the three-year grant period. Our FEAT sample consisted of 36 military veterans (90%) and four spouses of military veterans (non-veterans). The average age was 48.9 years with an age range of 31 to 61 years. Regarding marital status, 82.5% ($n = 33/40$) were married, 10% ($n = 4/40$) were never married, and 7.5% ($n = 3/40$) did not report marital status.

Regarding the number of days that participants worked off the farm or ranch, 60% reported 200 days or more. Regarding whether a participant was a 4-H or FFA member, 67.5% were not involved in

either, 17.5% were in FFA, 7.5% were in 4-H, and 2.5% were in both.

Regarding year of injury or diagnosis, 5% ($n = 2/40$) were 1990 and 1991, 10% were 2006 and 2007, 17.5% were 2011-2015, 5% were in 2018, 2.5% was in 2022, and 60% were missing.

Our 188-200 hour FEAT Program was much longer than the 6-hour program by Kelley, Waliczek, and Le Duc,¹⁸ the 14-hour program by Meore et al.,¹⁹ the 15-hour program of Stowell, Owens and Burnett,¹ and the 30-hour program of Kerrick, Cumberland, Church-Nally, and Kemelgor.¹⁴

While our aim was to train 90 returning military veterans to become self-employed in food and agriculture, especially during COVID-19 with virtual rather than in-person, face-to-face training, our drop-out rate was high. After three years 40 out of 90 completed the FEAT Program and provided us with usable pretest-posttest data for a 44.4% response rate.

Of the 40 FEAT participants who completed the FEAT Program, the authors found that two to five months after completing the program 87.5% ($n = 35/40$) were self-employed in agriculture either full-time (60%, $n = 24/40$) or part-time (27.5%, $n = 11/40$). Five percent ($n = 2/40$) were not self-employed in agriculture. Another five percent ($n = 2/40$) were missing and 2.5% ($n = 1/40$) was deceased. When they began the FEAT Program, five percent ($n = 2/40$) were full-time farmers/ranchers, 2.5% was in agricultural business, and 2.5% was employed part-time farmer/rancher with primary income from farm/ranch. (See Table 1.)

Our participants' greatest improvements were on the Skills Assessment, the Entrepreneurial Self Efficacy, and the Independent Living and Working measures. Herein ILW levels improved ($p=.012$) while in previous studies with larger samples of farmers and ranchers, ILW levels improved

($p=.000$).^{24,22} We also found trends on the MQOL. Participants' average group mean scores improved somewhat from pretest to posttest but not by amounts that were statistically significant on the Single Item, Physical Symptoms, Psychological Well Being, Support, and MQOL Total Score, but not on the Physical Well Being and Existential Well Being

subscales. In previous studies with larger samples of farmers and ranchers, MQOL Total mean scores improved by amounts that were statistically significant ($p<.001$) and were large or larger than typical.^{24,22} Finally, we found no statistically significant changes on the M2CQ, VR12, WAMI, and FRBHA. (See Table 2.)

Table 2. Comparison of FEAT Group Pretest and Posttest (*M, SD, N*) with Authors' Norms.

Measure	Pretest	Posttest	<i>t</i>	<i>D</i>	T Test	Norms
M2CQ	0.98; 0.14; 39	1.08; 0.15; 39	(38) = 0.63	0.10	$p=.535$	<i>M</i> = 1.36; <i>S.E.</i> = 0.05
ESE						
Marketing	2.52 0.95; 40	3.30; 0.72; 40	(39) = 3.98	0.63	$p<.001$	3.56; 0.76; 58
Innovation	2.97; 0.89; 39	3.55; 0.78; 39	(38) = 3.30	0.53	$p=.002$	3.70; 0.72; 58
Financial Control	2.79; 1.02; 40	3.32; 0.93; 40	(39) = 3.25	0.51	$p=.002$	3.51; 0.86; 58
Total	3.13; 0.68; 39	3.52; 0.71; 39	(38) = 2.99	0.48	$p=.005$	3.74; 0.47; 58
VR12						
WAMI						
Total Meaningful Work	36.0; 10.0; 39	35.5; 10.1; 39	(38) = 0.23	0.04	$p=.816$	37.54; 8.84; 370
MQOL						
Single Item Scale	6.20; 2.25; 30	6.63; 2.37; 30	(29) = 1.28	0.23	$p=.210$	5.45; 2.07; 255 7.11; 2.14; 255
Physical Well Being	6.38; 2.28; 32	6.00; 2.48; 32	(31) = 0.92	0.16	$p=.363$	5.15; 2.14; 249 6.59; 2.26; 249
Physical Symptoms	5.62; 2.74; 34	5.99; 3.32; 34	(33) = 0.74	0.13	$p=.465$	4.59; 2.27; 265 6.25; 2.71; 265
Psychological Well Being	7.08; 2.68; 39	7.17; 2.70; 39	(38) = 0.24	0.04	$p=.811$	5.71; 2.48; 270 7.30; 2.18; 270
Existential Well Being	7.18; 2.07; 39	7.16; 1.96; 39	(38) = 0.07	0.01	$p=.942$	6.13; 2.00; 271 7.40; 1.76; 271
Support	6.76; 2.09; 39	6.79; 2.03; 39	(38) = 0.12	0.02	$p=.909$	6.20; 2.20; 269 7.46; 2.01; 269
MQOL Total Score	6.16; 1.94; 28	6.34; 1.92; 28	(27) = 0.75	0.14	$p=.460$	5.53; 1.65; 240 6.98; 1.75; 240
ILW	16.97; 11.12; 36	21.33; 7.54; 36	(35) = 2.65	0.44	$p=.012$	17.41; 5.38; 239 22.25; 5.70; 239
SA						
Farming Skill Level	215.68; 54.87; 25	333.48; 64.10; 25	(24) = 8.32	1.67	$p<.001$	N.A.
Crop Skill Level	153.62; 56.54; 21	266.95; 90.71; 21	(20) = 6.11	1.33	$p<.001$	N.A.
Livestock Skill Level	148.57; 55.65; 21	233.57; 81.32; 21	(20) = 6.38	1.39	$p<.001$	N.A.

The 415-item SA has three major subscales—Farming Skill Level, Crop Skill Level, and Livestock Skill Level. Paired or correlated samples *t* tests indicated that on all three of the SA major subscales the posttest mean scores were statistically

significantly higher on average ($p<.001$) than pretest mean scores, and the mean score improvements ranged from $d=1.33$ to 1.66 which were much larger than typical using Cohen's guidelines.³⁰

In addition, the SA has 22 minor subscales. FEAT participants improved from pretest to posttest by an amount that was significantly higher ($p < .001$) on average on 21 of 22 SA minor subscales.³¹ On the Horses subscale participants' improvement was medium or typical ($p = .004$) using Cohen's guidelines.³⁰ On the other 24 subscales, FEAT participants' pretest to posttest average mean score improvements were much larger than typical using Cohen's guidelines.³⁰ The bulk of the FEAT education included information related to the SA dependent variables.

The Farming Skill Level major subscale has eight minor subscales (Fertility Soil and Pasture Management, Farm Design and Management, Marketing, Manage Farm Labor Resources, Farm Business Management, Pursue Education and Professional Development, Review and Re Plan Whole Farm, and Nourishing Family and Community Relations). Paired or correlated samples *t* tests on all eight of these minor subscales with our 40 FEAT participants indicated that average group scores improved from pretest to posttest by amounts that were statistically significantly higher ($p < .001$). FEAT participants' pretest to posttest average mean score improvements were much larger than typical using Cohen's guidelines.³⁰

The Crop Skill Level major subscale also has eight minor subscales (Bed and Field Preparation, Plant Care and Culture, Weed Management, Pest and Disease Management, Greenhouse Management, Irrigation, Harvest, and Post Harvest). Likewise on all eight of its minor subscales, paired or correlated samples *t* tests on FEAT participants' average group scores improved by amounts that were statistically significantly higher ($p < .001$). The pretest to posttest average mean scores again were much larger than typical using Cohen's guidelines.³⁰

The Livestock Skill Level major subscale of the SA has six minor subscales (Livestock Production, Cattle, Hog, Sheep/Goat, Poultry, and Horses). Paired or correlated samples *t* tests on five out of six of these minor subscales indicated that FEAT participants' average group scores improved by amounts that were statistically significantly higher ($p < .001$). However, on the Horses minor subscale our FEAT participants' mean group score improved from 20.36 to 27.27. This difference was also statistically significantly better ($p = .004$), but not as large as we found on the other 24 of 25 SA subscales ($p < .001$). The Horses subscale was the only one out of 25 SA subscales that did not improve by an amount that was much larger than typical.

Participants also improved on the ESE Marketing subscale by statistically significant amounts ($p < .001$), the ESE Innovation subscale ($p = .002$), the ESE Financial Control subscale ($p = .002$), and the ESE Total scale ($p = .005$). All four were medium or typical using Cohen's guidelines,³⁰ $d = 0.63, 0.53, 0.51,$ and 0.48 .

A paired or correlated samples *t* test indicated that the M2CQ posttest mean score (1.08) was higher, that is worse than the pretest mean score (0.98), $t(38) = -0.63, p = .535, d = .10$. The difference is not statistically significant and is small or smaller than typical using Cohen's guidelines.^{30,31}

Discussion

Where the links were strong among the overall aim, the measures, the interventions, and the outcomes, we saw positive results as on the SA, ESE, and ILW, because the majority of the training program focused on the variables measured by these surveys. Where the links were weak, we saw no improvements on the M2CQ, VR12, and WAMI, because the program included no teaching on mental or behavioral health education.

Almost 88% of those who completed the FEAT Program were self-employed in food and agriculture by July 31, 2023. The FEAT Team trained participants in agricultural skills and business management, but not enough in physical and behavioral health.

Significant improvements were self-reported in participants' farming skill, crop skill, and livestock skill levels, in ESE marketing, innovation, financial control, and total score, and in the ILW. However, improvements were not found in the VR12 physical and psychological domains, M2CQ postdeployment community reintegration difficulty, nor on the WAMI and meaningful work surveys.

The FEAT Team noticed that our military veterans were reticent to share their feelings. Especially in rural settings like those from where our sample grew up, boys and men are often scripted culturally not to disclose their feelings. The military prepares men and women to do the task at hand and not to deal with feelings. Especially those in combat who experience fear, anger, trauma, and terror learn to survive in battle. To survive they project strength and invulnerability. They keep their feelings and their vulnerability to themselves. When they deploy and return home, their partners often say, "He came home a different person." Unlike programs that included information on depression and emotions and saw declines in depression, anxiety or stress,^{18,19} the FEAT Program did not teach military

veterans how to deal with pent up emotions or how to overcome their isolation with peer support.^{7,14,16} Consequently we saw no improvement in psychological well-being.

Since there were no improvements on the M2CQ nor on the VR12 but there were small but not statistically significant trends in improved quality-of-life levels on four of six MQOL subscales on the posttest, it is recommended that future researchers who replicate the FEAT Program consider expanding it with an additional 10-15 hours of training. They might include practical, evidence-based behavioral health strategies that military veteran beginning farmers can use to recognize signs of high stress, anger, depression, and suicidal thinking, to reach out to trusted, safe persons and share their feelings and relearn to trust others, to learn about the psycho-biology of the stress response cycle, to manage their stress and depression, to practice cognitive reframing, and to enhance their resilience and quality of life with education like the eight dimensions of wellness by the Substance Abuse and Mental Health Services Administration (SAMHSA) (cf. chrome-extension://efaidnbmninnibpcjpcglclefindmkaj/https://store.samhsa.gov/sites/default/files/d7/priv/sma16-4958.pdf. We expect that this change may result in improved pretest-posttest differences on the MQOL and ILW as reported in previous studies.^{24,22}

The authors recognize that this study had limitations. Our retention rate of those who completed the program and provided usable pretest-posttest data was low (44.4%, $n=40/90$). Considerable amounts of post-test data were missing. Our retention rates were better with those cohorts before and after COVID-19 when we provided in-person, hands-on training rather than virtual training. In future FEAT Programs, we can do a better job with screening to include those military veteran beginning farmers with the tenacity, persistence, dedication, and time to devote at least four hours per week for a year to be successful at completing the program. We expect that this will increase the completion rate.

The FEAT Team contacted almost all of the 50 participants who dropped out. When we inquired as to why people did not complete the program, we learned that there were a number of reasons. "I am moving." "I got what I wanted when I completed my business plan in phase two." "I had health issues and COVID-19." "Virtual webinars don't give me the face-to-face relationship that I need." "It involves more time than I can take on." "There were too many surveys to fill out, especially the last one

[FRBHA]." Some participants got what they wanted from phases 1 and 2 and decided that farming was not for them. Others said they did not need the hands-on experiences in phase 3.

A number of our participants complained about "survey fatigue" and refused to complete some of their posttests. Eight assessment measures with 671 items and 1,317 variables for participants to fill out twice on both the pretest and posttest were too many.

Although we were required by the funding entity to use the FRBHA, we do not recommend its use as a measure of pretest-posttest differences because of its length, complexity, invasive financial questions, inconsistent, confusing item structure, and the fact that one cannot aggregate its 173 items into subscales. We had more complaints from participants about the FRBHA than about anything else. It is inappropriate for use in studies like this with beginning farmers. Future researchers might use the FRBHA instead as a self-assessment tool one-on-one with farmers who have been farming 5-10 or more years every two or three years to monitor trends. Furthermore, according to its authors, the FRBHA had no scoring instructions, no published reliability or validity rates, and no published norms for comparison purposes (V. Ackerman, G. Matteson, & J. Perez, personal communication, December 17, 2020). Instead, with beginning farmers, future researchers might consider using the Business Health Assessment available from

<https://casfs.ucsc.edu/education/bfrdp/index.html>.

For all these reasons we did not analyze FRBHA pretest-posttest changes.

The FEAT Program did well at improving agricultural and business-related knowledge and skills. It did not do well with improving participants' physical or behavioral health. It might benefit beginning farmer military veterans even more by incorporating a 10-15 hour segment with evidence-based behavioral health and quality of life components.

Conclusion

Many military veterans face significant challenges as they return from war and re-enter civilian life. While the USDA has invested millions of dollars to fund the design and implementation of skill-building programs for military veteran beginning farmers, we found only four that reported empirical results. Their interventions ranged in length from four to 10 weekly sessions for totals of six- to 30-hour trainings with eight to 20 military veterans that resulted in

decreases in depression, stress, anxiety, pain, loneliness, and suicidal ideation levels.

The present Farm and Education Treatment Program was much longer with 188-200 hours of training and hands-on experience over a full year. Our aim was to train military veterans to become self-employed in food and agriculture. Five months afterwards, 87.5% of our 40 military veteran beginning farmers were employed either full-or part-time in agriculture. They reported statistically significant pretest-posttest improvements in Farming Skill Level ($p<.001$), Crop Skill Level ($p<.001$), Livestock Skill Level ($p<.001$), Independent Living and Working Level ($p=.012$), and Entrepreneurial Self-Efficacy Marketing ($p<.001$), Innovation ($p=.002$), Financial Control ($p=.002$), and Total ($p=.005$). They also improved on the McGill Quality of Life Physical Symptoms, Psychological Well Being, Support, and Total Score, but not by amounts that were statistically significant. Our sample did not improve on the M2CQ, VR12, WAMI, or FRBHA measures. We recommend that future researchers who use the FEAT Program consider expanding it with 10-15 hours of behavioral health training.

Acknowledgments

The authors gratefully acknowledge Erin M.

Kimbrough for motivating and facilitating the FEAT Team to provide the FEAT Program to 90 military veteran beginning farmers over three years in six cohorts with COVID-19, Emily R. H. Ullrich for entering and proofing the data for analyses, Joe Knott for his financial support for empirical program evaluation, Faye McGuire for coaxing reluctant military veteran beginning farmers to complete and return their pretest-posttest data and for writing a literature review, and Rick Peterson for selecting the eight measures used in this study.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

The U.S. Department of Defense Readiness and Environmental Protection Integration (REPI) program, the U.S. Department of Agriculture - National Institute of Food and Agriculture, and the Compatible Lands Foundation funded this "Fort Hood Veterans` Farming Education and Training (FEAT) Initiative" evaluation research under Special Project proposal number 2019-01837, Accession Number 1019960.

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