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Original Article

A complementary and integrative health group-based program pilot demonstrates positive health outcomes with female Veterans

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ABSTRACT

Introduction: Transforming Health and Resiliency through Integration of Values-based Experiences (THRIVE) is an evidence-based 14-week curriculum-based group medical appointment clinical program. THRIVE is based on principles of integrative medicine, positive psychology, and acceptance and commitment therapy. The goal of this paper is to review findings from a local THRIVE program implementation piloted in the Women's Health outpatient clinics on mental and physical health indicators.

Materials and methods: Pilot data were obtained for 14 THRIVE cohorts of female veterans enrolled from outpatient clinics at the James A. Haley veterans' Hospital in Tampa, FL between 2016 and 2018 ($N = 201$). THRIVE assessments were conducted as part of the THRIVE program, at the first visit (baseline), mid-way, and at the end of the program. Data were collected using self-administered paper-pencil method on standardized scales for physical and mental health (Patient Health Questionnaire, Generalized Anxiety Disorder Questionnaire, Acceptance and Action Questionnaire-II, Satisfaction With Life Scale, and the physical and mental function components of the Short Form Survey). Linear mixed effects models were used to examine change in physical and mental health scales over time while adjusting for age, race (white vs. other), and cohort. In addition, we examined whether the rate of change differed by age or race.

Results: Improvement was seen for most scales across the 3 assessments ($p < 0.05$) with the exception of physical composite score of the Short Form Survey ($p = 0.487$). Participants reported that pain interfering with work significantly decreased from "quite a bit" at baseline to "moderately" by assessment 3 ($p = 0.042$). Older ages had lower baseline scores on the Patient Health Questionnaire and Acceptance and Action Questionnaire than younger ages, but younger ages had a greater rate of improvement over the intervention (p for interaction 0.016 and 0.056, respectively). Whites reported greater improvement in life satisfaction than non-whites (p for interaction 0.043). For physical composite score, whites had higher baseline score, but did not report significant improvement in physical function over the assessment period, while non-whites had lower baseline score, but did report significant improvement in physical function (p for interaction 0.059). Non-white veterans reported more pain interfering with work relative to white veterans (OR 5.9, 95% CI 1.79–19.43, $p = 0.004$).

Conclusions: We found significant improvement on self-reported mental health scales as well as improvement in how much pain interferes with work in a pilot sample of women veterans over the 14-week program.

Introduction

Chronic pain and depression are highly prevalent conditions that negatively impact a wide range of health-risk behaviors and quality of life among veterans.[1,2] The Veterans Health Administration is currently implementing a new approach (*Whole Health Initiative*) to healthcare for all veterans. This approach provides patients with holistic patient-centered proactive care to manage healthcare issues such as pain and mental health impairments as well as to improve general wellness. This approach supports integrating complementary and alternative health practices into innovative medical care delivery, including group medical appointments and values-based conversations with veterans.

Transforming Health and Resiliency through Integration of Values-based Experiences (THRIVE) is a 14-week group medical appointment-based clinical curriculum developed using evidence-based components of integrative medicine, positive psychology, and

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acceptance and commitment therapy. THRIVE group medical appointments are 2-h, weekly sessions focusing on 12-topic areas, with 12–15 veterans per group and 3–5 staff present. Each topic session is facilitated by topic-appropriate staff including peer mentors, physicians, psychologists, social workers, dieticians, nurses, recreational therapists and pharmacists. The 12 topics practiced and shared throughout the THRIVE program are: sleep, nutrition, mental health and pursuit of happiness, finances, stress reduction and movement, environment, healthy relationships, creativity, sexual health, mindfulness and nutrition, spiritual health, and purpose.

Integrative medicine, positive psychology, and acceptance and commitment therapy are evidence-based components that come together in this program to improve health and wellness outcomes. Integrative medicine is an approach that combines traditional and complementary medicine (e.g., yoga, acupuncture, biofeedback) and has been shown to be effective in treating complex medical conditions, such as multiple sclerosis, pain and depression.[3–6] Positive psychology is an effective framework for improving veteran wellness[7] and supporting psychiatric rehabilitation[8] by focusing on positive experiences, flow, values and virtue identification. Acceptance and commitment therapy has been shown to be an effective treatment of complex chronic conditions (e.g. pain, depression) among civilians and veterans.[9–14] The THRIVE curriculum includes didactic instruction, conversation, relationship formation, reflective creative activities and weekly homework in a group medical appointment setting. Group medical appointment is proven to be efficient and effective for delivering care to veteran populations, improving clinical outcomes[15] and decreasing physician workload[16] and health care utilization.[17]

THRIVE's multi-pronged approach leveraging integrative medicine, group medical appointment, positive psychology, and Acceptance and commitment therapy delivers proactive patient-centered whole health care to veterans to help them manage pain, reduce opioid use, and provide suicide prevention services. The goal of this paper is to review findings from a local THRIVE program implementation piloted in the Women's Health Clinic on mental and physical health indicators. In addition, we evaluated whether the program effectiveness differed by age and race.

Methods

Study population

Pilot data were obtained for 14 THRIVE cohorts of veterans enrolled from the Women's Health Clinic at the James A. Haley veterans' Hospital in Tampa, FL between 2016 and 2018 ($N = 201$). Veterans are referred to THRIVE most commonly for chronic pain, anxiety, depression, PTSD/Military sexual trauma, isolation, life transitions, and for those seeking holistic health care. All female veterans referred to the program during the enrollment period were included in the pilot.

Data collection

THRIVE assessments were conducted as part of the THRIVE program at the first visit (baseline), mid-way (assessment 2), and at the end of the program (assessment 3). Data were collected using self-administered paper–pencil method on standardized scales for physical and mental health (described below). Data were entered from the paper scales by staff members into an Excel spreadsheet for data analysis. Demographic data (date of birth, race, and ethnicity) were abstracted from the veterans' health record.

Physical and mental health scales

Depression and anxiety were assessed with the Patient Health Questionnaire (PHQ)-9 and Generalized Anxiety Disorder (GAD)-7 scales, respectively. The PHQ-9 is a validated 9-item self-administered questionnaire to screen and detect for depressive disorders.[18] It also provides a measure of severity with scores in 5-unit increments representing mild to severe depression.[19] The GAD-7 is a validated 7-item questionnaire developed as a screener for generalized anxiety disorder,[20] although it has also been shown to be effective as a screening tool for panic, PTSD, and social anxiety.[21] Similar to the PHQ-9, increasing scores on the GAD-7 reflect increasing severity of anxiety, with an optimal cut point of 10 for identifying individuals with anxiety disorders.[20]

Psychological inflexibility and experiential avoidance were assessed using the Acceptance and Action Questionnaire (AAQ)-II. The AAQ-II is a revised version of the AAQ, which was designed and validated to measure experiential avoidance.[22] The AAQ-II was developed to improve internal consistency and to reflect a measure of psychological inflexibility, with increasing scores representing increased psychological inflexibility.[23]

Life satisfaction was assessed using the Satisfaction with Life Scale (SWLS). The SWLS is a validated measure of global life satisfaction as an indicator for subjective well-being.[24,25] Increasing scores indicate increased life satisfaction, with scores <10 indicating extreme dissatisfaction with life and scores >30 indicating extreme satisfaction.[26]

Finally, the SF-12 Health Survey was used to assess component scores for mental (MCS-12) and physical (PCS-12) functioning. The SF-12 comprises a subset of questions from the larger SF-36 to focus on the physical and mental summary measures.[27] The SF-12 has been validated in a variety of populations.[27,28] Item responses on the SF-12 are weighted and summed to produce the physical and mental component summary scores with increasing scores representing improved functioning.[29] Ignoring missing items on a scale can skew and misclassify the resulting composite score, but excluding surveys missing any items can bias the sample and would discard useful information. Therefore, we imputed missing items for surveys missing fewer than 20% of the items and excluded those missing more. For the PHQ-9, GAD-7, AAQ-II, and SWLS, missing items were imputed as the person-mean of the completed items.[18] Surveys missing more than 2 items for the PHQ-9 ($n = 3$) and GAD-7 ($n = 3$) and more than 1 item for the SWLS ($n = 10$) were excluded. The AAQ-II was introduced after the first two cohorts were recruited and are therefore missing for these participants at all assessments. For the SF-12, we followed the imputation algorithm described by Perneger et al.[30] by replacing missing values with the component-specific (physical or mental) mean population weight for that item.

Data analysis

Continuous data are presented as the mean ± standard deviation (SD) and categorical data as frequencies and percents. For each scale, linear mixed effects models with an unstructured covariance matrix were used to examine change in physical and mental health scales over time (weeks). In addition, change in the specific item regarding pain from the SF-12, which asked, "During the past 4 weeks, how much did pain interfere with your normal work?" and providing responses on a 5-point Likert scale, was tested in a generalized linear mixed effects model with a multinomial distribution. Linear mixed effects models are used to estimate effects on baseline scores as well as change in scores over the three assessments and can handle unbalanced data where participants do not have an equal number of assessments. Inclusion of fixed and random effects terms in each model was determined on the basis of significance in the model ($p < 0.05$ for main effects and $p < 0.1$ for interactions) and overall model fit according to minimization of the Akaike Information Criterion (AIC). All models included fixed effects for time, age centered to the grand mean, and race (white vs. other). Additional variables tested in the models included cohort and ethnicity. Ethnicity was not found to be significant in any of the models and was therefore not included in any of the final models. Cohort did not have a significant

overall effect in any model but was found to be a confounder of race in many of the models and to improve model fit, so cohort was included as a fixed effect in all models. Time was tested as both linear and quadratic random effects (random slope) in all models but was only significant in the PCS-12 model. Quadratic terms for time were also tested as fixed effects in all models and were found to be significant for PHQ-9 and SWLS and so were included as such in these models. Interaction terms for time with age and race were also tested in each model and found to be significant at $p < 0.1$ for age (PHQ-9, GAD-7, AAQ-II, and the SF-12 pain item) and race (GAD-7, AAQ-II, SWLS, PCS-12, and MCS-12). veterans with only one assessment completed do not contribute to estimates of change in score. Characteristics (age, race, ethnicity, baseline values of physical and mental health indicators) of veterans that completed only one assessment ($N = 57$, 28.4%) were compared to those who completed 2 or more assessments ($N = 144$, 71.6%). All analyses were performed using SAS software, Version 9.4 (SAS Institute Inc., Cary, NC, USA).

Results

Data were collected on 201 female THRIVE participants in 14 cohorts with an average size of 14 (range of 11–19) veterans per cohort. Table 1 displays participant characteristics.

Table 2 displays the mean scores for each scale and the median score from the SF-12 pain interferes with work item. Improvement was seen for most scales across the 3 assessments with the exception of physical functioning.

Table 3 displays the fixed effects results from the mixed effects models for each scale. For depression and satisfaction with life (PHQ-9 and SWLS), the quadratic term for time was also significant. This indicates that the improvement in score was not constant over the assessment period, and that improvement declined as time progressed (Fig. 1, panel A and Fig. 2, panel C, respectively).

Table 1
Baseline participant characteristics.

Characteristic	$N = 201$
Age (years), mean ±SD	51.9 ± 8.8
Race, n (%)	
White	101 (55.5%)
Black	73 (40.1%)
American Indian or Alaska Native	2 (1.1%)
Asian	4 (2.2%)
Native Hawaiian	2 (1.1%)
Ethnicity, *n* (%)	
Not Hispanic or Latino	162 (86.6%)
Hispanic or Latino	25 (13.4%)
Number of assessments, *n* (%)	
1	57 (28.4%)
2	43 (21.4%)
3	101 (50.3%)
Time between baseline and assessment 2 (weeks), mean ±SD	8.0 ±2.5
Time between baseline and assessment 3 (weeks), mean ±SD	14.9 ±2.4

Table 2
Mean scores and physical and mental health scales by assessment.

	Assessment #			*p*-value
Scale	1	2	3	
PHQ-9[a]	12.7 ± 6.3	10.1 ± 5.9	9.1 ± 6.1	<0.001
GAD-7[a]	11.2 ± 5.9	8.6 ± 5.6	8.2 ± 5.9	<0.001
AAQ-II[a]	30.3 ± 10.8	26.9 ± 10.8	26.9 ± 11.5	<0.001
SWLS[a]	15.4 ± 7.3	18.6 ± 8.0	19.2 ± 7.7	<0.001
PCS-12[a]	35.8 ± 9.8	36.6 ± 9.6	36.5 ± 9.9	0.487
MCS-12[a]	34.5 ± 10.2	38.5 ± 11.1	39.4 ± 11.5	<0.001
SF-12 pain interferes with work[b]	4 (2–4)	3 (2–4)	3 (2–4)	0.042

[a] Data presented as mean ±SD, *p*-value from marginal model treating assessment as continuous.
[b] Data presented as median (25th–75th percentile), *p*-value from Friedman test.

Table 3
Fixed effects estimates for mental and physical health scales.

Model	Fixed effects β ±SE, *p*-value[a]	Model	Fixed effects β ±SE, *p*-value[a]
PHQ-9		**SWLS**	
Intercept	14.2 ± 1.7, <0.001	Intercept	12.5 ± 2.0, <0.001
Time (weeks)	−0.21 ± 0.03, <0.001	Time (weeks)	0.51 ± 0.12, <0.001
Age (years)[b]	−0.12 ± 0.05, 0.025	Time^2	−0.02 ± 0.01, 0.040
Other race[c]	0.79 ± 0.93, 0.392	Age (years)[b]	0.01 ± 0.06, 0.890
Age*time	0.009 ± 0.004, 0.016	Other race[c]	0.05 ± 1.2, 0.965
		Race*time	−0.14 ± 0.07, 0.043
GAD-7		**PCS-12**	
Intercept	12.3 ± 1.6, <0.001	Intercept	32.9 ± 2.6, <0.001
Time (weeks)	−0.19 ± 0.03, <0.001	Time (weeks)	−0.04 ± 0.05, 0.446
Age (years)[b]	−0.10 ± 0.05, 0.050	Age (years)[b]	−0.20 ± 0.08, 0.013
Other race[c]	0.85 ± 0.87, 0.330	Other race[c]	−4.8 ±1.5, 0.002
		Race*time	0.16 ± 0.08, 0.059
AAQ-II		**MCS-12**	
Intercept	31.5 ±3.2, <0.001	Intercept	33.1 ± 2.8, <0.001
Time (weeks)	−0.20 ± 0.05, <0.001	Time (weeks)	0.30 ± 0.06, <0.001
Age (years)[b]	−0.18 ± 0.10, 0.076	Age (years)[b]	0.20 ± 0.09, 0.019
Other race[c]	2.7 ±1.8, 0.124	Other race[c]	0.75 ±1.5, 0.624
Age*time	0.01 ± 0.006, 0.056		

[a] All models adjusted for cohort.
[b] Age centered at grand mean.
[c] Referent: White race.

Age

Baseline scores and the rate of change in score varied by age for depression and psychological inflexibility (Fig. 1). For anxiety and physical functioning, increasing age was associated with lower anxiety but also lower baseline physical function scores although this was only of borderline significance (Table 3; $p = 0.050$ and $p = 0.052$, respectively). For the SF-12 pain item, older age was associated with increased pain interfering with work (OR 1.07, 95% CI 1.00, 1.14, $p = 0.053$, data not shown), although this was of borderline statistical significance. For mental functioning, older age was significantly associated with better mental function scores (Table 3; $p = 0.019$).

Race

Improvement in depression, anxiety, psychological inflexibility, and mental function scores over time did not vary by race. For life satisfaction and physical function, race was a significant effect modifier at the $p < 0.1$ level (Fig. 2). Improvement in life satisfaction (panel A) increased faster in whites compared to other races. For physical function (panel B), white veterans had higher baseline physical function, but did not see significant improvement over the assessment period. In contrast, non-white veterans had lower physical function scores at baseline, but had significant improvement in physical function over the assessment period. Non-white veterans reported significantly more pain interfering with work relative to white veterans (OR 5.9, 95% CI 1.79, 19.43, $p = 0.004$, data not shown).

Discussion

Positive psychology, Acceptance and commitment therapy, and integrative medicine in group medical appointments have demonstrated positive psychological and physical effects on individuals managing mental health and pain management, specifically in military populations. This study evaluated the effects of a curriculum combining these approaches to care in a sample of female veterans. This curriculum and its delivery in a group medical appointment is a novel comprehensive approach to introducing self-care and wellness

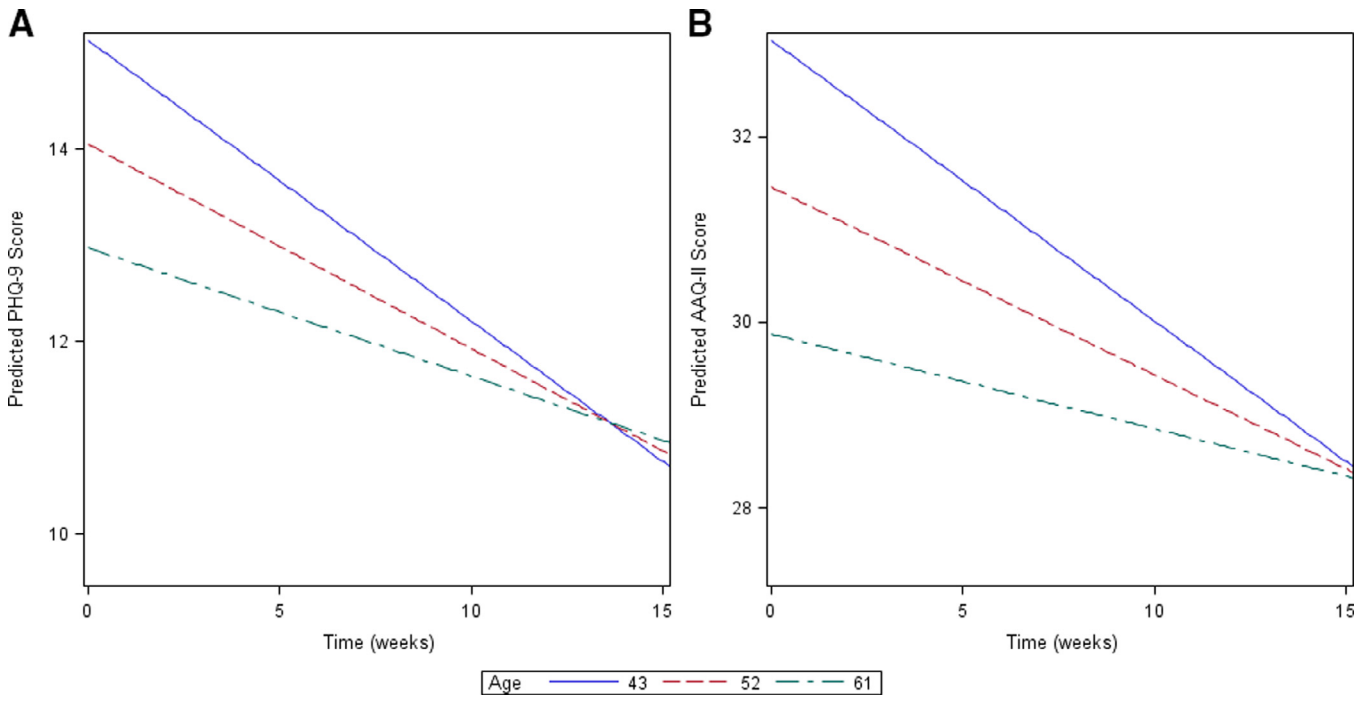

Fig. 1. PHQ-9, and AAQ-II predicted scores over time by age. Predicted values calculated for Whites in the last cohort.

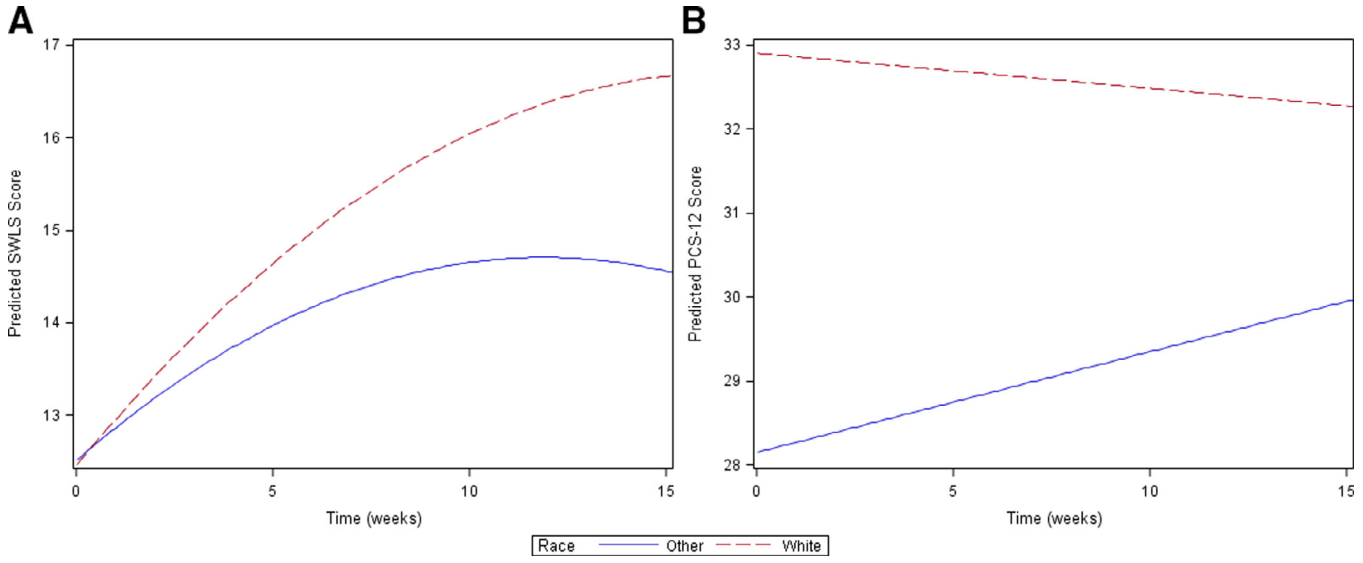

Fig. 2. SWLS and PCS-12 predicted scores over time by race. Predicted values calculated for mean age in the last cohort.

management leveraging complementary and integrative health modalities using positive psychology, Acceptance and commitment therapy, and integrative medicine.

Our findings suggest that the THRIVE program is effective at improving self-reported mental health (depression, anxiety, psychological inflexibility, and experiential avoidance), life satisfaction, and how much pain interferes with work. In this small sample of female veterans, overall physical function as reported on the physical component of the SF-12 improved only in non-whites. Improvement on the PHQ-9 and AAQ-II significantly improved for all ages, but the rate of change was higher in younger ages compared to older. Younger ages also had higher baseline scores, indicating higher depression, psychological inflexibility and experiential avoidance at the start, but also greater improvement as a result of the intervention. For some models, there was significant effect modification by either age or race, indicating the importance of accounting for potential differences in response to interventions by these factors.

While we were able to identify an improvement in a single item on pain in the SF-12, future research should include valid pain measures to determine the impact of the intervention on pain reduction. Recommended pain measures for future evaluations could include the Defense and veterans Pain Rating Scale[31] or the Pain Numeric Rating Scale (NRS),[32] which includes an 11-point scale to measure "usual" pain intensity over the last week and 4 pain functionality (past month) items. The Pain Outcomes Questionnaire- Short Form VA[33] is another option specific to a veteran population that includes 19-items that assess pain-related domains, including pain intensity, interference with activities and mobility, negative affect, vitality, pain-related fear; and improbable pain-related symptoms.

Though our findings indicate a significant improvement for THRIVE program participants, findings should be reviewed with acknowledgment of the following limitations: limited sample size which doesn't reflect male veterans; absence of a control group; lack of a robust pain measure; and limited data on participant characteristics, such as demographics, co-morbidities, or concurrent treatments (e.g. mental health counseling, psychotropic medications, physical therapy).

Conclusions

This is the first report of an evaluation of an evidence-based program integrating integrative medicine, Positive Psychology, and Acceptance and commitment therapy in a group medical appointment setting. We found significant improvement on self-reported mental health scales (PHQ-9, GAD-7, AAQ-II, SWLS), and on the mental component of the SF-12), as well as improvement in how much pain interferes with work in a pilot sample of women veterans over the 14-week program. More robust evaluation of the program is warranted, but these results provide preliminary evidence that a Whole Health approach has the potential to make significant improvements in reducing chronic pain and depression among US veterans.

Declaration of Competing Interest

None.

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