Pain Medicine, 21(11), 2020, 2811–2822
doi: 10.1093/pm/pnaa145
Advance Access Publication Date: 25 May 2020
Preliminary Research Article

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Emotional Awareness and Expression Therapy Achieves Greater Pain Reduction than Cognitive Behavioral Therapy in Older Adults with Chronic Musculoskeletal Pain: A Preliminary Randomized Comparison Trial

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Funding sources: This work was supported by the American Psychoanalytic Association and the US Department of Veterans Affairs (grant number CX001884).

Disclaimer: This content does not represent the views of the US Department of Veterans Affairs or the United States Government.

Conflicts of interest: The authors have no conflicts of interest to declare.

Abstract

Objective. Emotional awareness and expression therapy (EAET) emphasizes the importance of the central nervous system and emotional processing in the etiology and treatment of chronic pain. Prior trials suggest EAET can substantially reduce pain; however, only one has compared EAET with an established alternative, demonstrating some small advantages over cognitive behavioral therapy (CBT) for fibromyalgia. The current trial compared EAET with CBT in older, predominately male, ethnically diverse veterans with chronic musculoskeletal pain. **Design**. Randomized comparison trial. **Setting**. Outpatient clinics at the West Los Angeles VA Medical Center. **Subjects**. Fifty-three veterans (mean age = 73.5 years, 92.4% male) with chronic musculoskeletal pain. **Methods**. Patients were randomized to EAET or CBT, each delivered as one 90-minute individual session and eight 90-minute group sessions. Pain severity (primary outcome), pain interference, anxiety, and other secondary outcomes were assessed at baseline, post-treatment, and three-month follow-up. **Results**. EAET produced significantly lower pain severity than CBT at post-treatment and follow-up; differences were large (partial $\eta^2 = 0.129$ and 0.157, respectively). At post-treatment, 41.7% of EAET patients had >30% pain reduction, one-third had >50%, and 12.5% had >70%. Only one CBT patient achieved at least 30% pain reduction. Secondary outcomes demonstrated small to medium effect size advantages of EAET over CBT, although only post-treatment anxiety reached statistical significance. **Conclusions**. This trial, although preliminary, supports prior research suggesting that EAET may be a treatment of choice for many patients with chronic musculoskeletal pain. Psychotherapy may achieve substantial pain reduction if pain neuroscience principles are emphasized and avoided emotions are processed.

Key Words: Chronic Pain; Cognitive Behavioral Therapy; Emotional Awareness; Emotional Expression; Older Adults; Randomized Clinical Trial

Published by Oxford University Press on behalf of the American Academy of Pain Medicine 2020.
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Introduction

Chronic pain is a substantial health care challenge. The prevalence of chronic pain peaks during late middle age (50–65 years) and older age (65+ years), reaching rates as high as 80% in some populations, such as older military veterans [1–4]. Compared with younger pain patients, older patients have more comorbidities [5] and are more likely to report a "high impact" of chronic pain on their mood and functioning [2, 6], resulting in exposure to more medical investigations and treatments for their pain [5].

Given the recent "opioid crisis" in the United States, pain treatment with opioid analgesics has come under increased scrutiny [7–9], and North American and European guidelines have highlighted psychological treatments as first-line interventions for chronic pain [10–12]. Yet leading psychosocial treatments for pain, such as cognitive behavioral therapy (CBT), mindfulness-based approaches such as mindfulness-based stress reduction (MBSR) and acceptance and commitment therapy (ACT), and complementary/alternative approaches such as acupuncture, demonstrate only modest pain reduction for only a minority of patients, including for older adults [13–17].

In contrast, an innovative psychological treatment, emotional awareness and expression therapy (EAET) [18], has shown medium to large pain reduction for adults with chronic pain [19–22]. The purported greater benefits of EAET than traditional approaches are hypothesized to result from EAET's unique conceptual model and techniques derived from both pain neuroscience [23, 24] and various experiential, exposure-based, and intensive psychodynamic psychotherapies [18, 25, 26]. EAET stresses the brain-based etiology of chronic pain—especially centralized or central sensitization pain—and pain's reversibility by creating powerful change experiences via emotional disclosure, emotional processing of unresolved trauma and psychological conflicts, and increasing motivation to redress problematic relationships [18]. Such changes are believed to act on the brain regions involved in both emotion and pain [27, 28].

All previous studies of EAET have been conducted in middle-aged or younger populations that were predominately female and white [19–22]. Moreover, only one trial has compared EAET with an established alternative treatment, demonstrating superiority over CBT on several pain-related outcomes in patients with fibromyalgia [19]. Furthermore, no controlled studies of EAET have been conducted on the most common chronic pain condition—nonspecific musculoskeletal pain. The current study sought to address these limitations, comparing EAET with CBT for chronic musculoskeletal pain in an older sample of predominately male and racially/ethnically diverse patients.

Methods

Participants and Exclusion Criteria

Participants were recruited from outpatient clinical sites, including comprehensive pain management, primary care, and psychiatry clinics, at the West Los Angeles Veterans Affairs Medical Center (WLA). All participants were veterans age 50 years or older who had had at least three months of musculoskeletal pain, including the following conditions likely to benefit from psychological interventions based on previous research [29]: low back, neck, leg, or pelvic pain; temporomandibular joint disorders; fibromyalgia; tension headaches; or any combination of these conditions.

The following pain conditions were excluded when they were the primary complaint: confirmed hip or knee osteoarthritis, leg pain greater than back pain (to exclude radiculopathy), electromyography-confirmed "tunnel" syndromes (e.g., carpal or tarsal tunnel syndrome), gout, neuralgias, migraine, and cluster headaches. The following nonmusculoskeletal conditions were excluded: autoimmune disease that typically generates pain (e.g., rheumatoid arthritis), cancer pain, sickle cell disease, burn pain, infection associated with pain, and cauda equina syndrome. In addition, the following conditions or circumstances were excluded: severe psychiatric disorder such as schizophrenia or bipolar I disorder not controlled with medications, active suicide or violence risk in the past six months, active severe alcohol or substance use disorder, currently enrolled in another psychological treatment for chronic pain, currently in pain-related litigation or applying for pain-related compensation or compensation increase, unable to fluently read or converse in English, or planning to move from the area in the next six months. Patients were included regardless of prior psychological or medical treatments for their pain. In addition, a member of the study team completed the Mini-Mental State Examination (MMSE) with each potential participant during the screening process. Any potential participant with a score of <26/30 on the MMSE was excluded due to concerns about cognitive impairment.

The WLA Institutional Review Board reviewed and approved this study, and procedures were in accordance with the Helsinki Declaration of the World Medical Association. All patients' written consent was obtained, and recruitment occurred from October 2017 to March 2019, with follow-up assessments completed by August 2019. The trial was registered at ClinicalTrials.gov.

Randomization and Blinding

Before recruitment, an independent team member with no patient contact generated computer randomization sequences in blocks of 16 (1:1 ratio) to create two groups of eight participants for each of the two treatment conditions (EAET or CBT). Once a pool of 16 eligible participants was recruited, each of these participants completed the baseline measures and then was instructed to attend the initial individual session. Participants were randomized and learned of their treatment condition at this individual session.

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Treatments and Therapists

All participants received a single initial 90-minute individual session followed by eight 90-minute sessions in small groups of up to eight patients. All individual sessions were completed within two weeks before the start of the group sessions. Each individual session was completed with the therapist who was assigned to run the subsequent group. One EAET group and one CBT group always began at the same time and ran concurrently to control for any timing, seasonal effects, or holiday breaks. The trial was planned to include only a total of four EAET and four CBT groups, and this was accomplished.

Equipoise between the two treatments was created and maintained in several ways. During recruitment, consenting, and description of the study, both treatments were presented as effective for chronic pain. Both treatments were conducted using treatment manuals and included similar amounts of discussion, experiential exercises, and written homework. Therapists were nested within treatment condition, thereby offering only the treatment they were trained in and committed to. Therapists were licensed clinicians, assisted by trainees: One psychiatrist conducted all four groups of EAET and was joined by a psychology intern for the first two groups, two psychologists conducted CBT (one for the first three groups and the other for the fourth group), and they were joined by a geriatric psychology fellow.

Emotional Awareness and Expression Therapy

The conceptual model for EAET is that stress and unhealthy ways of dealing with emotions cause pain through alterations in brain structure and function; therefore, reducing stress and resolving trauma and psychological conflict by encouraging the disclosure, expression, and processing of avoided emotions and engagement in healthy relational behaviors can affect the brain centers involved in both pain and emotion processing to relieve pain [18]. This trial used the eight-session group EAET manual [30] that had been developed and tested in a prior similar trial [19] with patients who had fibromyalgia. Several adaptations to this manual were made for this study: a) an initial individual treatment session was added, which included obtaining a pain history, presenting the EAET conceptual model, developing a therapeutic alliance with each patient individually [31], and preparing for group therapy; b) manual language was changed from "fibromyalgia" to "chronic pain"; and c) sections on "unhelpful beliefs" and "avoidance of people, places, and things" were replaced with additional practice in "experiencing, expression, and releasing emotions," because the former were core aspects of CBT, and we sought to have maximal differentiation between EAET and CBT. A complete description of each of the nine EAET treatment sessions, including the individual treatment session and all eight group sessions, is presented in Table 1.

Cognitive Behavioral Therapy

The conceptual model for CBT is that pain is chronic, but that pain, functional loss, and emotional distress can be coped with or managed by learning cognitive and behavioral skills. CBT teaches skills including relaxation training, cognitive reappraisal, problem solving, activity pacing, behavioral activation, and sleep hygiene. The US Department of Veterans Affairs (VA) provides national training in CBT for chronic pain through their Evidence-Based Psychotherapy Training Program [32], and the accompanying manual is comprised of 12 one-hour individual sessions [33]. The VA manual was used with minimal adaptations for this trial; the lead CBT interventionist—a geriatric psychologist with 30 years of experience—modified the timing of certain sections to mirror the timing and duration of EAET sessions. In CBT, the initial individual session used interventions from sessions 1 and 2 of the VA manual and included a pain and health history; discussion of medical, behavioral, and other approaches the participant had tried to manage pain and a review of the outcomes of those efforts; and psychoeducation on cognitive and behavioral skills training. Group session 1 used sessions 2 and 3 of the VA manual on treatment orientation. Group sessions 2 and 3 corresponded to sessions 4 and 5 of the VA manual on relaxation training. Group sessions 4–6 covered pleasant activity scheduling, cognitive coping, and distraction, corresponding to sessions 6–9 of the VA manual. Sleep hygiene was covered in group session 7, and the final group session covered review and future planning, sessions 11 and 12 of the VA manual.

Measures

Participants were assessed for study outcomes at three time points: baseline, post-treatment, and three-month follow-up. Demographics (age, sex, race/ethnicity, marital status, education) were obtained via participant self-report on standardized questionnaires developed for the study. Medical history (presence of psychiatric diagnoses, medical comorbidities, medications, and presence of opiates) was obtained through review of the medical record. All outcome measures were self-report paper-and-pencil questionnaires, which participants completed under the supervision of a study team member other than the primary therapist.

The primary outcome was pain severity score as reported on the four pain severity items of the Brief Pain Inventory (BPI) [34]. These four items assess the worst, least, and average pain during the last week and current pain on a 0–10 scale; the mean of the four items was calculated and analyzed. In addition, the percentages of patients achieving the benchmarks of at least 30% (clinically significant), at least 50% (moderate), and at least

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Table 1. Emotional awareness and expression therapy sessions

Individual Session: Orientation to Model, Alliance Building, and Preparation for Group Therapy
- Therapist introduces the therapy model, which links pain to life stress, avoidance of emotions, and brain changes.
- Patient provides history of pain and other symptoms (e.g., depression, anxiety, fatigue), focusing on how pain has been affected by stress and emotions.
- Patient discusses beliefs/attitudes about pain and this model, and concerns are addressed (e.g., if patient does not recognize that stress or emotions affect pain, they are asked for a specific example of a stressful experience; their stress level, emotions, and pain are monitored while they are talking about the experience to acquaint them with these connections).

Group Session 1: Rationale, Therapy Model, Identifying Stress–Symptom Connections
- Therapist provides further psychoeducation on the therapy model.
- Therapist describes the key task of therapy: attenuating pain through directly addressing stress and experiencing previously avoided emotions.
- Patients share examples of how their pain and other symptoms are affected by stress and emotions.
- Home exercises throughout therapy include reading and completing worksheets on avoidance, stress, and disclosure of emotions.

Group Session 2: Triangle Model, Experiencing Anger and Closeness
- Therapist presents the Triangle Model, which represents intrapsychic dynamic: 1) healthy, adaptive emotions; 2) defenses to avoid experiencing and expressing those emotions; and 3) anxiety and other inhibiting symptoms, including pain, that stem from conflicted activation of adaptive emotions.
- In-session experiential exercises begin, starting with how anger and emotions related to closeness with others (e.g., love, longing) are experienced.

Group Session 3: Conflicted Emotions in Relationships; Experiencing, Expressing, and Releasing (EER) Emotions 1
- Therapist provides psychoeducation on how conflicted emotions, anxiety about emotions, and avoidance of emotions occur frequently in close relationships.
- The key intervention (EER) begins. Patients recall a recent stressful event in a relationship and experience and release all the difficult emotions (e.g., anger, guilt, longing) in the safe context of the group while pain level is constantly monitored.

Group Session 4: Reversing Self-Blame and Guilt; EER 2
- Therapist distinguishes healthy guilt, when one has done wrong, from unhealthy self-blame, which contributes to symptoms.
- In-session exercises focus on reversing self-blame with assertion toward others and forgiveness/compassion toward oneself.
- EER is continued.

Group Session 5: Forgiving Others or Letting Go; EER 4
- Therapist provides psychoeducation on experiences of being violated, hurt, or neglected and releasing emotions that come from these experiences.
- EER is continued.

Group Session 6: Shame; Secrets and Private Experiences; EER 5
- Shame is defined (always maladaptive sense of bad, defective, or unlovable self) and differentiated from healthy guilt.
- In-session exercises focus on intimacy and sharing secrets of which patients are ashamed.
- EER is continued.

Group Session 7: Healthy Communication in Relationships
- The two types of healthy communication (assertion/agency and connection/vulnerability) are discussed. Healthy in vivo communication is distinguished from the intense emotional expression practiced in EER.
- In-session exercises focus on practicing healthy communication in current relationships.

Group Session 8: Review and Planning
- Therapist and patients review all exercises and the progress made.
- Patients describe optimal emotional and interpersonal functioning, which serves as a goal for their continued work.
- Patients develop a written plan for continued exercises to meet their goal.

70% (substantial) mean pain reduction from baseline were calculated as in previous studies [19, 21, 22].

For secondary outcomes, measures from the Patient-Reported Outcomes Institute Measurement System (PROMIS) and National Institutes of Health (NIH) Toolbox were used [35]. Each PROMIS or NIH Toolbox short form contains items with five-level Likert scale responses. Higher scores always indicate a greater amount of the construct. Secondary outcomes included pain interference (eight items; range = 8–40 [36, 37]), depression (eight items; range = 8–40 [38]), anxiety (seven items; range = 7–35 [38]), sleep disturbance (eight items; range = 8–40 [39]), fatigue (seven items; range = 7–35 [40]), and life satisfaction (five items; range = 5–25 [41]). The Satisfaction with Therapy and Therapist Scale–Revised (STTS-R) [42] was used to assess treatment satisfaction at post-treatment only. The STTS-R includes subscales for satisfaction with therapy and therapist (six items each; range = 6–30) analyzed separately, as well as a single global satisfaction item (range = 1–5).

Therapists recorded the number of sessions attended by each participant, which was used to assess treatment adherence. Adverse events were recorded whenever participants made spontaneous reports to their therapist or another member of the research team.

Sample Size Estimation and Data Analysis

For this preliminary trial, we were interested in feasibility and effect size estimation for primary and secondary outcomes in preparation for a subsequent, larger comparison trial. Our a priori plan was to recruit 64 eligible participants in four pools of 16 patients each, and the patients in each pool would receive either EAET or CBT in groups of up to eight patients. We planned four rounds of groups over a total study duration of two years.

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To determine the success of randomization, the two treatment conditions were compared on baseline measures using two-tailed independent-samples *t* tests for continuous variables and chi-square tests for categorical variables. In our tests of treatment effects, we used intent-to-treat analyses of all randomized participants, with the last observation carried forward for patients missing post-treatment or follow-up data. To evaluate within-treatment effects on outcomes, paired-samples *t* tests compared baseline with post-treatment and baseline with follow-up. Within-treatment effect sizes were calculated using the formula d = (post [or follow-up] M – baseline M)/SD of change scores; values of 0.2, 0.5, and 0.8 were considered small, medium, and large, respectively [43]. To evaluate between-treatment effects on outcomes, one-way analyses of covariance (ANCOVA) were used, with the baseline of the outcome measure serving as the covariate. The primary study end point was post-treatment, and the secondary study end point was 3-month follow-up. Standardized effect size differences between EAET and CBT were calculated using the partial eta^2 statistic (percentage of variance accounted for by condition beyond the effects of covariates): values of 0.01, 0.06, and 0.14 were considered small, medium, and large, respectively [43]. The chi-square or Fisher exact test (as appropriate) was used to compare the treatments on the frequency of "responders" at the three levels of pain reduction from baseline. Alpha was set at 0.05, two-tailed.

Results

Figure 1 describes participant flow through the study. Of those screened for inclusion (N = 88), 73% (N = 64) enrolled in the trial, and a total of 53 patients (28 EAET, 25 CBT) were randomized. The primary reason for excluding 35 patients before randomization was lack of interest (N = 24); in addition, five patients had scheduling issues. Three withdrew after discussions with family members, two could not be contacted, and one had health problems unrelated to pain (worsening chronic respiratory disease). No potential participants were excluded due to cognitive impairment or other reasons. Only four patients (14.3%) randomized to EAET and two patients (8.0%) randomized to CBT dropped out during treatment and were not assessed at the primary end point of post-treatment. Another 11 patients (five EAET, six CBT) could not be contacted and were not assessed at the secondary end point of three-month follow-up.

Table 2 presents baseline demographic and clinical characteristics of the full randomized sample and for each treatment separately. Note that this sample was majority nonwhite (54.7%), older (mean age = 73.5 years), predominately male (92.4%) and single/separated/divorced (73.6%), and very likely to have a comorbid psychiatric diagnosis (86.8%). The two treatments did not differ at baseline on any of these or other characteristics (education, MMSE score, number of medical comorbidities, number of medications, or opioid use). Table 2 also shows that session attendance did not differ significantly between treatments, although CBT was attended an average of 0.8 sessions more than EAET. Satisfaction with both treatments and therapists was rated as high and equivalent between EAET and CBT.

Effects of EAET and CBT on Outcomes

Table 3 shows baseline as well as post-treatment and follow-up data (including original, unadjusted data as well as baseline-adjusted means and standard errors) for all outcome variables for both treatments. Within-treatment effect sizes are shown, as are the significance of within-treatment effects. Also shown are standardized effect sizes of the differences between EAET and CBT at post-treatment and follow-up, along with F and *P* values from the ANCOVAs.

On the primary outcome, EAET resulted in significantly lower pain severity at post-treatment and follow-up than CBT. These between-treatment effects were large in magnitude, and slightly larger at follow-up than post-treatment. Within-treatment, EAET had a significant and near-large magnitude reduction in pain severity at post-treatment and a significant, medium/large reduction at follow-up. CBT, in contrast, had a nonsignificant, small reduction in pain severity at post-treatment and no reduction at follow-up.

With respect to secondary outcomes, EAET resulted in significantly lower anxiety at post-treatment compared with CBT, although this medium/large between-treatment effect became small and nonsignificant at follow-up. Within-treatment, EAET had a significant reduction in anxiety at post-treatment, whereas CBT did not. Pain interference was marginally ($P = 0.051$) lower at follow-up after EAET compared with CBT, with a medium effect size. Within-treatment, EAET had significant, medium effect size reductions in pain interference at both time points, whereas CBT had small, nonsignificant reductions. Finally, all other outcomes (depression, sleep disturbance, fatigue, and life satisfaction) did not differ significantly between treatments at either time point, although, for all these variables, between-treatment effects were in the direction of greater benefits for EAET than CBT, with small to medium effect sizes.

Table 4 presents information on responder status for reductions in pain severity in each treatment from baseline to post-treatment and baseline to follow-up. Over 40% of EAET completers showed clinically significant (at least 30%) pain reduction both at post-treatment and follow-up. One-third of EAET completers showed moderate (at least 50%) pain reduction at post-treatment, and more than a quarter at follow-up. Several EAET completers even showed substantial (at least 70%) pain reduction from baseline to post-treatment (N = 3, 12.5%) and follow-up (N = 4, 21.1%). In contrast,

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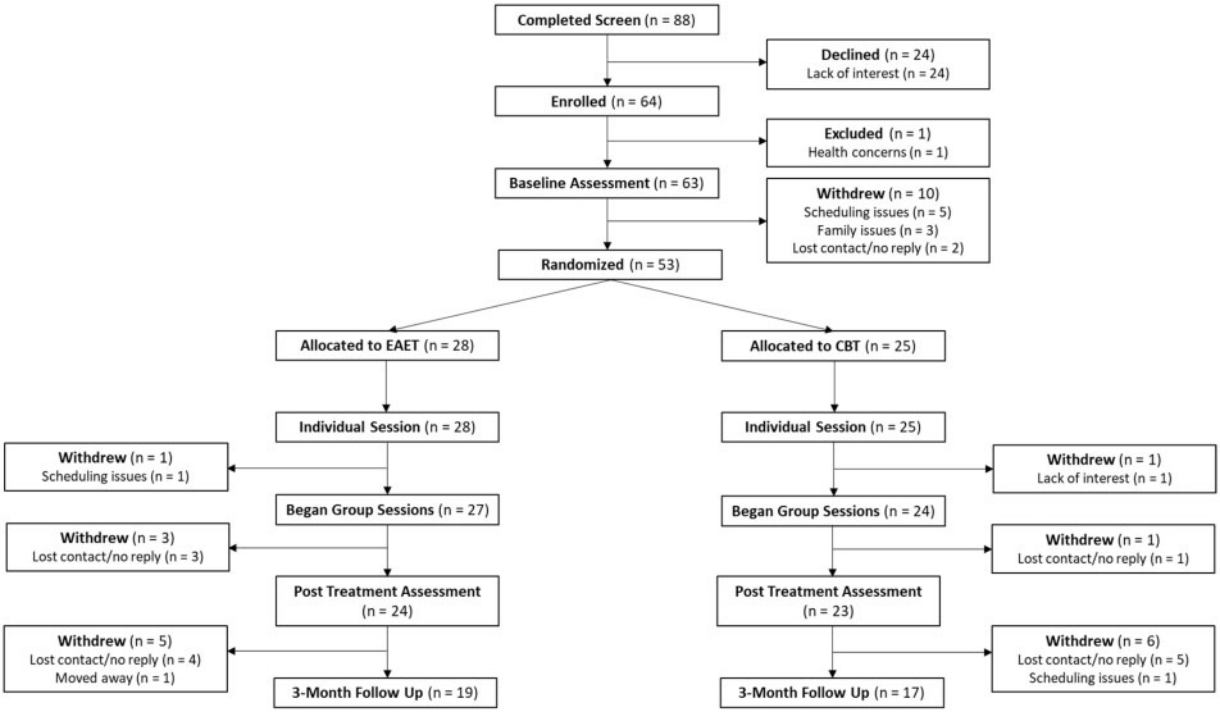

Figure 1. Flow of participants through the clinical trial.

Table 2. Demographic and clinical characteristics

	Total (N = 53)	EAET (N = 28)	CBT (N = 25)	t or χ^2	P Value
Age, M (SD), y	73.5 (9.5)	73.7 (9.6)	73.3 (9.7)	$t = -0.16$	0.87
Sex, No. (%)					
Male	49 (92.4)	26 (92.9)	23 (92.0)	$\chi^2(1) = 0.01$	0.91
Female	4 (7.6)	2 (7.1)	2 (8.0)		
Race/ethnicity, No. (%)					
White	24 (45.3)	14 (50.0)	10 (40.0)	$\chi^2(2) = 1.43$	0.49
African American	21 (39.6)	9 (32.1)	12 (48.0)		
Other	8 (15.1)	5 (17.9)	3 (12.0)		
Marital status, No. (%)					
Married/partnered	14 (26.4)	9 (32.1)	5 (20.0)	$\chi^2(1) = 1.00$	0.32
Divorced/separated	39 (73.6)	19 (67.9)	20 (80.0)		
Never married					
Education, M (SD), y	14.8 (2.7)	14.6 (2.6)	15.1 (2.9)	$t = 0.68$	0.50
Mini-Mental State Examination score, M (SD)	28.4 (1.3)	28.3 (1.6)	28.5 (1.0)	$t = 0.54$	0.59
Patients with psychiatric diagnoses, No. (%)	46 (86.8)	24 (85.7)	22 (88.0)	$\chi^2(1) = 0.06$	0.81
Medical comorbidities, M (SD)	6.0 (2.4)	5.6 (2.5)	6.5 (2.2)	$t = 1.30$	0.20
Medications at baseline, M (SD)	9.4 (4.2)	9.5 (4.8)	9.4 (3.5)	$t = -0.12$	0.91
Patients taking opiates at baseline, No. (%)	8 (15.1)	4 (14.3)	4 (16.0)	$\chi^2(1) = 0.03$	0.86
No. of group sessions attended (out of 8),* M (SD)	5.9 (2.1)	5.6 (2.3)	6.2 (2.0)	$t = 1.14$	0.26
Satisfaction with therapist (STTS-R),* M (SD)	26.7 (3.7)	26.6 (4.2)	26.7 (3.2)	$t = 0.06$	0.95
Satisfaction with therapy (STTS-R),* M (SD)	25.6 (4.4)	25.7 (5.0)	25.5 (3.8)	$t = -0.18$	0.86
Global satisfaction (STTS-R),* M (SD)	1.7 (0.6)	1.8 (0.7)	1.6 (0.6)	$t = -1.35$	0.18

CBT = cognitive behavioral therapy; EAET = emotional awareness and expression therapy; STTS-R = Satisfaction with Therapy and Therapist Scale–Revised.

*Completers only. Total: N = 47; EAET: N = 24; CBT: N = 23.

only one CBT completer (5.4%) showed clinically significant pain reduction from baseline to post-treatment, and none showed moderate or substantial pain reduction. The number of EAET participants achieving clinically significant or moderate pain reduction was significantly greater than in CBT at both post-treatment and follow-up. To examine pain reduction in further detail, Figure 2 shows the changes in pain severity individual participants experienced from baseline to the primary end point of post-treatment.

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Table 3. Baseline, post-treatment, and follow-up data for all outcomes for both treatments, and within-treatment and between-treatment effect sizes and analyses

Outcome Variable Time Point	EAET (N = 28)	EAET D-Within	CBT (N = 25)	CBT D-Within	EAET vs CBT		
					Partial η^2	F Value	*P* Value
Pain severity, M (SD)							
Baseline	6.04 (1.97)		5.64 (1.80)				
Post-treatment	4.59 (2.42)	−0.76***	5.40 (1.78)	−0.26			
Adjusted post-treatment	4.43 (0.29)		5.57 (0.30)		0.129	7.43	0.009
Follow-up (3-mo)	4.53 (2.37)	−0.70**	5.65 (1.61)	0.01			
Adjusted follow-up	4.40 (0.31)		5.79 (0.33)		0.157	9.34	0.004
Pain interference							
Baseline	28.79 (9.38)		29.20 (7.75)				
Post-treatment	24.89 (9.30)	−0.45*	27.64 (6.82)	−0.20			
Adjusted post-treatment	24.99 (1.35)		27.53 (1.42)		0.033	1.68	0.200
Follow-up (3-mo)	23.71 (9.66)	−0.54**	28.04 (7.61)	−0.17			
Adjusted follow-up	23.82 (1.41)		27.92 (1.49)		0.074	4.01	0.051
Depression							
Baseline	22.25 (8.93)		22.84 (6.44)				
Post-treatment	19.46 (6.86)	−0.38†	22.48 (8.14)	−0.05			
Adjusted post-treatment	19.62 (1.17)		22.31 (1.24)		0.047	2.48	0.121
Follow-up (3-mo)	19.82 (7.50)	−0.26	23.04 (7.23)	0.03			
Adjusted follow-up	19.94 (1.25)		22.90 (1.32)		0.051	2.66	0.109
Anxiety							
Baseline	21.57 (6.86)		23.28 (5.92)				
Post-treatment	18.29 (5.31)	−0.50*	22.36 (6.22)	−0.20			
Adjusted post-treatment	18.70 (0.90)		21.90 (0.96)		0.105	5.84	0.019
Follow-up (3-mo)	18.96 (6.08)	−0.34†	21.60 (7.40)	−0.34			
Adjusted follow-up	19.39 (1.12)		21.13 (1.18)		0.022	1.13	0.292
Sleep disturbance							
Baseline	25.39 (9.23)		25.80 (8.10)				
Post-treatment	23.75 (8.05)	−0.21	24.76 (8.45)	−0.14			
Adjusted post-treatment	23.86 (1.25)		24.64 (1.32)		0.004	0.18	0.672
Follow-up (3-mo)	24.04 (9.22)	−0.17	25.92 (7.85)	0.01			
Adjusted follow-up	24.14 (1.36)		25.80 (1.44)		0.014	0.70	0.406
Fatigue							
Baseline	22.39 (5.58)		22.40 (3.61)				
Post-treatment	21.14 (4.91)	−0.22	21.36 (5.31)	−0.19			
Adjusted post-treatment	21.14 (0.90)		21.36 (0.95)		0.001	0.03	0.871
Follow-up (3-mo)	22.57 (5.23)	0.04	22.16 (4.65)	−0.05			
Adjusted follow-up	22.57 (0.81)		22.16 (0.86)		0.002	0.12	0.728
Life satisfaction							
Baseline	13.43 (4.71)		13.88 (4.11)				
Post-treatment	15.07 (3.95)	0.32	13.84 (4.90)	−0.01			
Adjusted post-treatment	15.18 (0.73)		13.72 (0.77)		0.037	1.91	0.174
Follow-up (3-mo)	14.43 (4.39)	0.19	13.92 (4.21)	0.01			
Adjusted follow-up	14.51 (0.57)		13.82 (0.79)		0.008	0.40	0.529

All values at post-treatment and three-month follow-up include "last observation carried forward" substitution for missing patients. Adjusted values are mean and standard error adjusted for the baseline level of the outcome variable. "D-Within" refers to the effect size within each treatment, calculated as (post [follow-up] M − baseline M)/SD of the difference scores. A larger η^2 indicates a larger advantage of EAET over CBT. For life satisfaction, higher scores indicate better life satisfaction. For all other measures, lower scores indicate better health status.

CBT = cognitive behavioral therapy; EAET = emotional awareness and expression therapy.

†$P < 0.10$; *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

Patients' spontaneous reports of adverse events were rare and mostly involved brief exacerbations of symptoms, such as increases in pain or sleep problems, that did not last longer than a few days.

Discussion

This clinical trial found that EAET resulted in significantly lower pain severity at both post-treatment and three-month follow-up than standard CBT in this older, predominately male, ethnically diverse sample of military veterans. It is noteworthy that EAET had substantially more patients than CBT achieving clinically significant (at least 30%) or moderate (at least 50%) pain reduction, and a handful of EAET patients actually had substantial pain reduction (at least 70%). Furthermore, small to medium magnitude benefits favoring EAET were found on all other outcome measures at both time points, although

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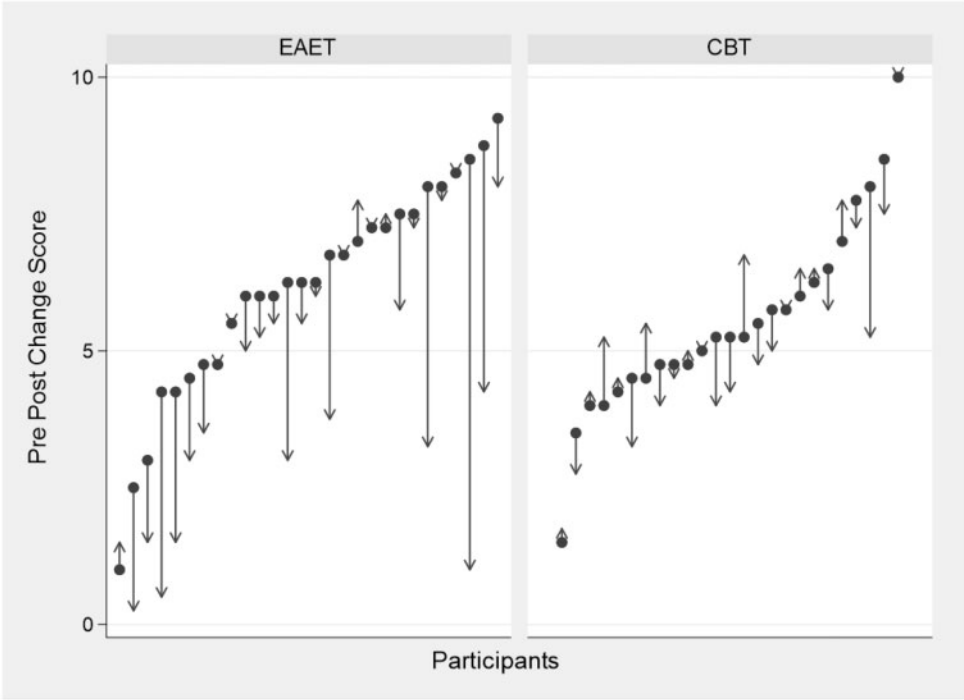

Figure 2. Individual participants' changes in mean pain severity from baseline to post-treatment by treatment condition: emotional awareness and expression therapy (EAET) or cognitive-behavioral therapy (CBT).

Table 4. Pain severity responder rates from baseline to post-treatment and follow-up

Pain Reduction Level	EAET No. (%)	CBT No. (%)	χ^2	*P* Value
Clinically significant (at least 30%)				
Baseline to post-treatment	10 (41.7)	1 (5.4)	$\chi^2(1) = 9.12$	0.003
Baseline to follow-up	8 (42.1)	0 (0.0)	$\chi^2(1) = 9.20$*	0.003
Moderate (at least 50%)				
Baseline to post-treatment	8 (33.3)	0 (0.0)	$\chi^2(1) = 9.24$*	0.004
Baseline to follow-up	5 (26.3)	0 (0.0)	$\chi^2(1) = 5.20$*	0.047
Substantial (at least 70%)				
Baseline to post-treatment	3 (12.5)	0 (0.0)	$\chi^2(1) = 3.07$*	0.234
Baseline to follow-up	4 (21.1)	0 (0.0)	$\chi^2(1) = 4.03$*	0.106

Denominators used for percentage calculations are derived from complete case analysis. Baseline to post-treatment: EAET: N = 24; CBT: N = 23. Baseline to follow-up: EAET: N = 19; CBT: N = 17.

CBT = cognitive behavioral therapy; EAET = emotional awareness and expression therapy.

*Fisher exact test used.

the limited sample size of this preliminary trial precluded sufficient statistical power to detect differences in most of these analyses.

These findings are consistent with prior clinical trials demonstrating that EAET and similar treatments such as intensive short-term dynamic psychotherapy can produce medium to large reductions in pain severity [19–22, 44–46]. One prior trial compared EAET with a bona fide alternative therapy—CBT for symptom management—as well as to a credible active control condition—fibromyalgia education—among patients with fibromyalgia. Lumley et al. [19] found that group-based EAET was superior to education on most outcome measures, and, although not different from CBT on the primary outcome of overall pain severity, EAET led to lower widespread pain and greater rates of 50% pain reduction at six-month follow-up compared with CBT. The superiority of a specific pain treatment over a legitimate alternative therapy—especially CBT, which is considered the gold standard—is quite rare. However, these two trials, along with excellent response rates in other trials [21, 22], suggest that EAET might indeed be more effective than CBT in reducing some indices of chronic pain.

One might question the limited efficacy found in the CBT groups in this trial. However, this trial used the standard CBT that has long been conducted in the VA system, and it was provided by psychologists skilled in this approach. Patients from both treatments provided equivalent

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high ratings of treatment and therapist satisfaction, and patients in CBT actually attended slightly *more* sessions (0.8 session) than EAET patients; thus, CBT was not lacking in engagement or participation. Importantly, the finding that CBT in this trial was associated with only small reductions in pain interference and pain is consistent with results of meta-analyses showing similar small effects of CBT on outcomes in adults [13] and older adults [14] and in a study of military veterans [32].

The conceptual model for EAET asserts that several key change processes, derived from research on pain neuroscience and psychotherapy, are needed for psychological treatments to achieve substantial pain reduction [18, 30, 47, 48]. The first step is to help patients shift their attribution of pain from damaged peripheral tissues and nociception to brain and emotional causes. To accomplish this, the EAET therapist educates patients about the role of the brain, stress, and emotions in pain. Then, a therapeutic alliance is built around changing ways of dealing with stress and emotions to reduce or even eliminate pain. Prior research indicates that the degree to which patients adopt the belief that "changing my stress and emotions will make my pain go away" is a strong predictor of greater pain reduction for patients undergoing EAET [49].

Once a therapeutic alliance is established, EAET employs specific techniques of emotional awareness, emotional disclosure, and healthy expression of adaptive emotions, which are hypothesized to change stress and emotions and reduce pain via improving ineffective emotion regulation and normalizing activity in brain regions affecting pain [18]. These techniques have been found to reduce pain for patients with chronic musculoskeletal pain, whether these skills are learned via writing exercises [50, 51] or through psychotherapy [19–22].

Third, EAET, as performed in this study, links emotional awareness, emotional disclosure, and healthy expression of emotions tightly to pain reduction [30]. In contrast, CBT for chronic pain includes less focus on pain reduction and more focus on coping with pain, reducing distress related to pain, and peripheral topics such as sleep hygiene [33]. In our study, EAET produced its greatest effects relative to CBT on pain severity. Thus, closely examining the relationship between emotions and pain may be key to achieving substantial pain reduction through psychotherapy.

Our study is also the first clinical trial of EAET or related treatments to focus on an older, predominately male, and multiracial/multi-ethnic sample. Whereas erstwhile theory claimed that older adults were less receptive to psychotherapy than younger adults [52] and current clinical lore suggests that psychotherapy with older adults should be slow and limited to modest goals [53], our results challenge these notions. Indeed, recent evidence suggests that older adults generally have healthier emotion regulation patterns than younger adults [54]; thus, older patients may be even more able to incorporate the emotion-focused techniques of EAET than younger adults. Studies testing EAET across the lifespan are needed in future work and should include older patients with mild cognitive impairment, given that all patients in our sample were cognitively intact. Finally, prior clinical trials of EAET included mostly female participants. Despite conventional wisdom that men may be less emotionally focused than women, the positive effects of EAET in our sample, which was almost 93% male, suggest that EAET is also effective for men.

The conventional biomedical model of chronic pain management, as well as many psychological and behavioral treatments, either presume pathology in the peripheral tissues and peripheral nervous system or remain agnostic about pain's etiology. In contrast, our findings support a central nervous system model of chronic pain and the view that psychotherapy can actually reduce pain, if specific therapy factors involving pain attributions and emotions are addressed. Functional magnetic resonance imaging (fMRI) research indicates that chronic musculoskeletal pain is associated with activated brain regions involved in emotional experience (e.g., amygdala) and cortical processing of emotion (e.g., medial prefrontal cortex [mPFC]) [55, 56]. In a landmark longitudinal fMRI study, the strength of connectivity between the mPFC and ventral striatum, a brain region associated with motivation and reward, was the greatest predictor of transition from subacute back pain (defined as ongoing pain four to 16 weeks after an injury) to chronic back pain one year later [57]. These neuroscience findings, together with our clinical trial data, indicate that the central nervous system rather than peripheral tissues and the peripheral nervous system, is the key factor in the development—and treatment—of most chronic pain conditions.

Numerous behavioral studies also demonstrate that many patients with chronic pain have difficulties with stress and emotions, including an inability to identify or describe their emotions [27, 58], ambivalence over experiencing and expressing emotions [59, 60], greater self-conscious emotions (e.g., shame, guilt) [61], and, in particular, problems with the regulation of anger [62–66]. Psychological theory also describes how chronic pain can result from defenses against painful feelings [26]. Thus, the literature indicates that emotions and chronic pain are deeply intertwined. Future studies of EAET that include assessment of neurobiological and behavioral predictors and mediators of response can shed further light on an emotion-focused model of chronic pain.

The limitations of our study include the relatively small sample size that lacked sensitivity to detect treatment effects that were of medium or smaller magnitude, which was the case with most secondary outcomes. A larger sample would also allow examination of treatment predictors and moderators; in particular, future studies should test the hypothesis that the presence of unresolved trauma or psychological conflict would predict even

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better outcomes for EAET than comparator therapies. This study also does not assess mechanisms or processes of change, which is needed to fully understand how a treatment works. Behavioral outcomes, such as medication use and physical functioning, would be ideal to include in future trials. The trial also would have been strengthened by recording the sessions to evaluate treatment fidelity and competence in delivery. Finally, most patients missed a few sessions of both treatments, due largely to scheduling challenges and group treatment (which precluded rescheduling), and attrition by three-month follow-up was greater than desired.

Conclusions

Despite the relatively small sample size in this trial, EAET showed an effect on pain that was large in magnitude, yielding lower pain intensity than CBT at post-treatment and follow-up, with significantly more participants achieving the important benchmarks of at least 30% and 50% pain reduction. EAET yielded small to medium effect size benefits on all other variables, although other than for anxiety, the effects were nonsignificant. These effects were found in an older, predominately male, and racially/ethnically diverse sample of veterans with chronic musculoskeletal pain. This study, along with others that found strong benefits of EAET [20–22], including one demonstrating superiority to CBT for fibromyalgia [19], suggests that EAET for chronic centralized pain might be a preferred treatment for many patients. The current results lend support to previous recommendations [29, 47, 48] for a paradigm shift in chronic pain treatment away from a model of pathology in the peripheral tissues and peripheral nervous system toward a primary focus on brain and emotional processes, particularly when other treatments have not achieved adequate pain reduction.

Acknowledgments

The authors wish to acknowledge the many individuals who made substantial contributions to this study, including the study therapists (Megan Taylor-Ford, Jessica Alva, and Caitlin Sorenson) and the veterans who participated in this study.

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