Reductions in Pain, Depression, and Anxiety Symptoms after PTSD Remediation in Veterans

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Abstract

A randomized controlled trial of veterans with clinical levels of PTSD symptoms found significant improvements after EFT (Emotional Freedom Techniques). Although pain, depression, and anxiety were not the primary targets of treatment, significant improvements in these conditions were noted. Subjects ($N = 59$) received 6 sessions of EFT coaching supplementary to primary care. They were assessed using the SA-45, which measures 9 mental health symptom domains, and also has 2 general scales measuring the breadth and depth of psychological distress. Anxiety and depression both reduced significantly, as did the breadth and depth of psychological symptoms. Pain decreased significantly during the intervention period (-41%, $p < .0001$). Subjects were followed at 3 and 6 months, revealing significant relationships between PTSD, depression, and anxiety at several assessment points. At follow-up, pain remained significantly lower than at pretest. The results of this study are consistent with other reports showing that, as PTSD symptoms are reduced, general mental health improves, and pain levels drop. The ability of EFT to produce reliable and long-term gains after relatively brief interventions indicates its utility in reducing the estimated trillion-dollar cost of treating veteran mental health disorders in the coming years.

Keywords: Anxiety, depression, pain, EFT (Emotional Freedom Techniques), veterans.

Introduction

The wars in Iraq and Afghanistan have resulted in the deployment of some 2.4 million US troops. A recent report from the Department of Veterans Affairs indicates that of the 834,463 veterans of these wars treated in VA clinics and hospitals in the first decade of the twenty-first century, 30% were diagnosed with PTSD.[1] Vietnam, the previous major war in which the United States was engaged, resulted in an estimated 479,000 diagnoses of PTSD.[2] Taken together, the scale of the potential cohort requiring treatment appears to be well over one million veterans.

The sequelae of deployment affect the veterans themselves, their families, and their communities. Secondary traumatization was described soon after the Vietnam war ended,[3] and has since been assessed in the children and other family members of veterans. Veteran spouses have been found to be at higher risk for domestic violence.[4] Children and veteran spouses experience elevated levels of violent behavior, as veterans appear to struggle with marital and parenting skills.[5,6] Vietnam veterans are disproportionately represented in the prison population.[7] Combat trauma is also associated with higher levels of substance abuse and homelessness.[8] Elevated suicide risk is associated with poor social integration by post-deployment veterans.[9] If not effectively treated, PTSD has effects that spread beyond those individuals directly affected by the primary traumatic events.[10,11]

PTSD is also associated with increased risk for a variety of physiological and psychological symptoms, including depression, anxiety, and pain. These conditions are not ameliorated by the passage of time. Even 30 years after military service, PTSD is associated with increased disease risk and all-cause mortality.[12,13] Mental health

conditions such as anxiety and depression are frequently co-morbid with PTSD.[14] Veterans with PTSD have higher levels of somatic symptoms, are heavier consumers of medical services, and have poorer health behaviors than those without PTSD.[15,16,17]

Nor are conditions such as depression and anxiety simply psychological problems. They have measurable physiological correlates, both at the level of organic systems, and that of cells and molecules. When compared with the scans of normal subjects, depression sufferers show much faster age-related loss of brain volume, as well as shrinkage of structures in the limbic system.[18] Telomeres, the molecular switches at the ends of chromosomes, have recently emerged as a primary marker of biological (as opposed to chronological) age. Shrinking telomeres indicate accelerated cellular aging. For this reason, investigators parse the discrepancies between the biological and chronological ages of groups of subjects.

Recent studies have examined the telomere length of depressed subjects, to determine the association between depression and accelerated cellular aging, and find significant telomere loss.[19,20,21] The mean age of PTSD-positive participants in one of these studies[22] was 30, and by that age the telomeres of those who were depressed indicated a biological age 4.5 years older than non-depressed subjects. Telomere shortening is also associated with increased inflammation, along with premature mortality and a complex of aging-related illnesses including stroke, dementia, cardiac events, and diabetes.[23,24]

While anxiety, depression, and PTSD may be distinct psychological diagnoses, their biological correlates have much in common. Telomere length is compromised in participants subject to high levels of childhood trauma.[23,25] Hoen et al. found that anxiety

was also a predictor of reduced telomere length.[26] Okereke et al. found a 6-year biological difference in age between normal subjects and those suffering from phobic anxiety.[27]

The scale of human suffering, as well as the unsustainable social costs, spurred a wave of research into PTSD in the 1980s, after it was first included in the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed.; *DSM–III*),[28] and a second wave after the first group of symptomatic veterans began returning from the war in Iraq in the early part of the twenty-first century. This drove a search for efficacious therapies and the proliferation of comparative outcome studies. The Institute of Medicine, tasked with identifying empirically supported approaches to treating PTSD, examined the literature and found cognitive processing therapy and exposure therapy to be evidence-based.[29,30]

As well as asking the efficacy question, researchers began to identify pathways in the brain and nervous system that were altered by PTSD.[31] They found that the structures in the midbrain that process fear were physiologically altered over time in patients challenged by affective disorders such as PTSD, depression, and anxiety. Neural plasticity, driven by PTSD symptoms such as flashbacks, nightmares, and intrusive thoughts, appears to rewire the brain to increase the information-carrying capacity of the neural networks responsible for processing the signals of fear.[32] Unlike certain other psychological diagnoses that improve with the passage of time, PTSD has been reported to become more acute.[33,34] While the telomere studies cited above demonstrate comprehensive physiological changes at the level of molecular biology, a striking observation on the organic level is the shrinkage of the parts of the midbrain that process memory and learning, as well as the parts of the prefrontal cortex responsible for

executive functions.[35] One brain researcher refers to the affective states noted in psychological diagnoses such as anxiety and depression as "the hostile takeover of consciousness by emotion."[36]

When the first cohort of post-deployment Iraq veterans began to present for treatment, clinical reports emerged of the efficacy of a relatively new approach called Emotional Freedom Techniques or EFT. A network of practitioners called the Veterans Stress Project was formed and began to gather research data on the method (www.StressProject.org). This led to the publication of two within-subjects pilot studies of veterans with clinical levels of PTSD symptoms. In the first, veterans received six sessions of EFT and were found to be sub-clinical posttest, as well as on follow-up.[37] In the second, veterans and family members received a five-day intensive treatment, with similar positive results.[38] Data from both pilot studies showed a large effect size with a small N ($N = 7$, $N = 11$), indicating a large treatment effect. The success of these early efforts led to a randomized controlled trial, with 59 veterans assigned to either a wait list or six sessions of EFT.[39] After treatment, 86% of veterans were sub-clinical ($p < .0001$). Participant gains were maintained on follow-up. Data from that study continue to be analyzed for further treatment insights.[40,41] The present study examines pain, anxiety, and depression in the sample.

Two other outcome studies of EFT for PTSD are relevant to the current investigation. A team at a National Health Service hospital in Britain compared a group of PTSD-positive patients receiving EFT with a second group receiving eye movement desensitization and reprocessing.[42] They found that both treatments were effective in remediating clinical PTSD in four sessions. They also reported reductions in comorbid

symptoms such as depression (-32%, $p < .006$) and anxiety (-42%, $p < .002$). By comparison, a study cited in the 2007 Institute of Medicine review[29] as "encouraging" examined 24 combat veterans diagnosed with PTSD, a sample size comparable to the 30 subjects in the EFT group in the current study.[43] Participants received 12 sessions of cognitive restructuring and exposure therapy. After treatment, 40% of participants no longer met clinical PTSD criteria; however, half showed no reliable improvement, and co-morbid symptoms such as behavioral avoidance did not improve significantly.

The second EFT study relevant to the current study examined PTSD symptoms in six groups of male veterans and spouses attending a week-long healing retreat.[44] Participants ($N = 218$) received EFT for PTSD, and a suite of CAM interventions for resilience-building and stress reduction. Eighty-three percent of the veterans exhibited clinical PTSD scores on pretest, a proportion that dropped to 28% on posttest ($p < .001$). Twenty-nine percent of spouses had clinical PTSD scores on pre-test and 4% on posttest ($p < .001$). Spousal scores were significantly lower than posttest on follow-up.

EFT is based on an earlier method called TFT or Thought Field Therapy. TFT grew out of the observation, in the late 1970s, that the stimulation of acupuncture points could ameliorate certain mental health symptoms.[45] In a series of functional MRI studies, acupuncture has been shown to reduce the arousal of pathways in the brain's limbic system that process the fear response.[46,47,48,49] Trials of acupuncture for PTSD symptoms have found it to be as effective as cognitive therapy.[50,51]

Instead of the insertion of acupuncture needles, EFT and TFT use pressure on the same points (acupressure). Pressure has been used in Oriental Medicine traditionally, in the form of practices such as Shiatsu, and pressure on the points has been demonstrated to

produce effects similar to those observed with needling.[52] The protocols described in *The EFT Manual*[53] involve tapping, rubbing, or pressing a series of acupoints while focusing on fearful situations or traumatic memories. EFT borrows elements from established therapies such as cognitive therapy and exposure therapy but adds the somatic element of acupoint stimulation. Review papers that examine the evidence for EFT's efficacy in treating PTSD suggest that EFT's somatic element enhances its cognitive and exposure elements.[54,55,56]

The physiological mechanisms of action of EFT have been documented in a number of studies and review articles. These demonstrate that EFT affects several of the body's regulatory systems, including the brain and endocrine systems. A triple blind randomized controlled trial examined levels of salivary cortisol in 83 normal participants before and after a 1-hour session of either EFT, talk therapy, or relaxation.[57] It found that cortisol dropped significantly more in the EFT group than in the other two groups. Psychological conditions like anxiety and depression were also reduced significantly more in the EFT group, and the correlation between psychological and physiological changes was also found to be significant.

Cortisol is a "master hormone" that produces a cascade of physiological effects, regulating the activation of body systems such as the circulatory, musculoskeletal, and respiratory systems. It is associated with changes in the autonomic nervous system, particularly the activation of the sympathetic branch, which is upregulated during periods of stress. When stress levels are reduced by successful therapy, both cortisol and sympathetic arousal decline.[55] Studies using EEG to measure the brain states of participants receiving EFT have noted a post-treatment reduction in the frequencies

associated with fear. In one study, brain wave frequencies characteristic of arousal of the limbic system, the midbrain structure which responds to threats, were downregulated after treatment.[58] Others noted similar results.[59,60] These findings are consistent with the cortisol reductions observed after EFT. The body reduces the production of stress hormones like cortisol by downregulating the expression of the genes that code for these hormones. Several studies have noted the downregulation of such stress genes when subjects are taught to evoke calm emotional states.[61,62]

Method

Participants were recruited through referrals by Veterans Administration clinicians, by announcements on social networking sites, and by networking at veterans groups. The study was approved for human subject protection by Copernicus IRB and posted on ClinicalTrials.gov (NCT00743041). The primary inclusion criterion was a score of 50 or more on the PTSD Checklist—Military (PCL-M).[63] The PCL-M is a primary diagnostic tool used by both the VA and with active duty warriors. It contains 17 questions based on the *DSM–IV* diagnostic criteria for PTSD. It has been found to have convergent validity with observer-rated measures such as the CAPS or Clinician-Administered PTSD Scale.[43]

A range of other psychological symptoms were assessed using the Symptom Assessment-45 (SA-45).[64,65] The SA-45 contains 45 questions and measures anxiety, depression, and seven other psychological conditions. It also captures two general measures for the breadth and depth of psychological distress.

Pain was assessed using an 11-point Likert scale. Participants were asked to rate their pain in the part of their body that was most painful at the time of assessment. This is referred to as Subjective Units of Distress, or SUD, in which 0 indicates no distress and

10 maximum possible distress.[66] Client-rated SUD is associated with markers of physiological distress, such as heightened arousal of the autonomic nervous system, in particular the sympathetic branch.[67] A high SUD score is associated with physiological symptoms of stress, including vasoconstriction, galvanic skin response, respiration, and heart rate.[68] Participant pain scores were assessed when they applied for the study and, if randomized to the wait list, immediately before beginning their 6 EFT sessions.

EFT was offered to study participants as peer-to-peer coaching, rather than as therapy, to minimize the power differential between practitioner and client, and to support the therapeutic alliance with the participant's primary caregiver. Participants were required to remain under the care of their primary care facility for the duration of the study, with EFT coaching provided supplementary to, and supportive of, treatment as usual. Assessments were completed after the third and sixth session. Follow-up data were gathered at 3 and 6 months. The wait list group showed no improvement over time on any of the measures, while PTSD and other conditions were significantly reduced in the EFT group. Data from both the wait list group and EFT group were combined for the purpose of analysis. Fifty-nine subjects entered the study and were randomized to either the EFT group ($n = 30$) or wait list ($n = 29$). One subject in the EFT group dropped out after 3 sessions, due to a lack of interest in continuing. Four participants in the wait list did not complete the second assessment, and 5 completed the assessment but did not present for their first or subsequent EFT sessions. This attrition resulted in a final sample of 49, and all data analysis was performed on this sample. On all outcome measures, there was no significant difference between the groups at the outset.

EFT was administered in accordance with the protocol described in *The EFT*

Manual.[53] The author is licensed by the Association for Comprehensive Energy Psychology and is certified as a practitioner by EFT founder Gary Craig. All coaches were certified in EFT, completed human subjects' protection training provided by the investigators, and passed the CITI (Collaborative Institutional Training Initiative) research subject protection examination. Participants were assigned to experimental or control group by means of permuted block randomization, with practitioners being provided with lists of 10 blocks each (randomizer.org). In order to make the results of the study as generalizable as possible, the sole exclusion criterion was a score of 4 or higher on two questions on the SA-45 indicating a risk of violence.

Fidelity to the EFT method was checked by means of session notes written by practitioners and reviewed by the investigator. Practitioners and participants created lists of traumatic events. Participants self-rated each emotional event on an 11-point Likert scale as they did for pain. When therapy is successful in producing a lowering of SUD scores, physiological signs of stress reverse.[69] Participants used EFT on each memory till their self-reported number was zero or close to zero, then proceeded with the next memory. Practitioners encouraged participants to use EFT between sessions. Sessions took place in practitioners' offices or by telephone.

Change scores between assessment time points were created for PCL-M total score, and the Anxiety and Depression subscales of the SA-45. The earlier score was subtracted from the later score—for example, the baseline score was subtracted from the 3-week session score, and the 3-week session score was subtracted from the 6-week session score. A negative change score indicates a decrease in symptoms (latter time point less than earlier time point), while a positive change score indicates an increase in symptoms.

Correlations between the three measures were conducted at each time point to determine whether changes on the three measures were associated. In other words, is the amount of change on one symptom correlated with the amount of change on a second symptom?

Results

Change in Anxiety and Depression Over Time

All participants were in the clinical range for both anxiety and depression at intake, with a mean score of 69.74 for depression and 72.99 for anxiety. On the SA-45, a normal score for anxiety is 47 for males and 46 for females; for depression, 49 for males and 47 for females. Scores 60 and above are considered clinical. After six sessions, participants scored 60.04 for depression and 60.28 for anxiety (both $ps < .0001$). Participants maintained these gains at follow-up, with scores of 60.94 for depression and 61.60 for anxiety (both $ps < .0001$) after 6 months. Results for anxiety and depression at all data points appear in Table 1.

Correlations Between Symptom Changes Over Time

Change in symptoms after three treatment sessions was highly correlated for all three symptoms, indicating that the amount of change in one symptom was comparable to the amount of change in the other symptoms. The correlation between anxiety and both depression and PCL-M was significant after six treatment sessions; however, the correlation between depression and PCL-M was not significant at this point. The intercorrelations between the three variables were significant at the 3-month follow-up. At the 6-month follow-up only the relationship between the anxiety and depression change score was significant. There was no relationship between change on the PCL-M and either anxiety or depression. The strength of the relationship between changes on

anxiety and depression was stronger after six treatment sessions and at both follow-up assessments, while the relationship between depression and the PCL-M was strongest after three treatment sessions. The results are shown in Table 2.

Change in Pain Over Time

    Statistical approach. Linear mixed-effects models were conducted on pain ratings with patient-specific intercepts modeled over time periods (pre-test, after three sessions, after six sessions, 3-month follow-up, 6-month follow-up). Time between sequential assessments was controlled for in the model to adjust for the possible effect of time due to the intervention delay in wait list group. Group, and the interaction between group and time period, was also included in the model, to identify any changes in outcome due to the delayed intervention in the wait list group.

    Results. There was a statistically significant main effect for time ($p < .0005$). Participants' pain ratings decreased during the treatment intervention period with pretest ratings higher than both the three- and six-treatment session ratings. In addition, the three-treatment session rating was also significantly lower than the six-treatment session rating, indicating steady improvement during the intervention period. There was a nonsignificant increase in pain ratings at the 3-month follow-up. Pain ratings decreased somewhat at the 6-month follow-up, with ratings significantly lower than the pretest pain ratings. In addition, there was a statistically significant main effect for group, $F(1, 169) = 7.72, p = .0061$. The wait list group had higher pain ratings overall ($M \pm SE$: wait list, 4.19 ± 0.36; EFT, 2.86 ± 0.31). The results are shown in Table 3.

    These results are both clinically and statistically significant. A decrease in PTSD symptoms was significantly associated with a decrease in pain and, at several points in

time, a decrease in anxiety and depression. No adverse events were reported.

Discussion

Decreasing PTSD symptoms is desirable in and of itself, for the reasons noted in the introduction. If at the same time, a matrix of co-occurring psychological and physiological symptoms can be positively affected, patients receive an array of benefits that can improve both their overall well-being and the well-being of their families.

The parsimony of treatment time frames required to obtain these benefits is noteworthy. Six 1-hour sessions is a very limited commitment of time for a PTSD treatment program. Other EFT research described in the literature review shows veterans and spouses tolerating such courses of treatment well, with few or no dropouts. By comparison, a study of veterans with PTSD receiving conventional treatment at VA facilities found that only a minority completed a recommended 1-year treatment program.[70]

The delivery of EFT is flexible. It can be administered by personnel with a limited amount of training and as telehealth supplementary to standard care. Hartung and Stein found that EFT remediated PTSD symptoms when delivered by telephone.[40] Telephone delivery was significantly less efficacious than office visits; nevertheless, 67% of veterans were subclinical on the PCL-M after six telephone sessions ($p < .05$).

The current study had a number of limitations. An important limitation was the lack of an active control group, such as cognitive or exposure therapy. A second limitation was the assessment of PTSD, anxiety, and depression symptoms solely via participant self-report. A score of 50 or more on the PCL-M is regarded as indicative of PTSD rather than definitive, while scores of 60 or more on the SA-45 are considered clinical. While

the PCL-M and SA-45 have convergent validity with observer-rated measures, the absence of these makes it impossible to make categorical diagnoses of these psychological conditions. A third limitation was the delivery of EFT as coaching rather than therapy. Another analysis examining the data from the Veterans Stress Project found that participants coached by licensed mental health professionals demonstrated significantly larger symptom reductions than those receiving EFT from life coaches.[41] The hypothesis in that analysis is that the array of therapeutic tools used by experienced therapists is more effective than the peer-to-peer client-assessed approach typical of life coaching.

Despite these limitations, a clinically important finding of this study is the potential of EFT to reduce depression and anxiety symptoms during the course of PTSD treatment. The burden of depression on society is huge, with the World Health Organization estimating that it will be the world's single biggest health problem other than cardiac disease by 2020.[71] The risk of suicide among depressed patients is twenty times that of the general population, and depression is significantly correlated with other causes of mortality, such as cardiac events.[72] Remediating anxiety and depression as a side-effect of efficacious PTSD treatment represents a social and economic bonus.[73,74]

The ability of EFT to reduce pain is also noteworthy. In a study of 216 healthcare workers, such as nurses, psychotherapists, alternative medicine practitioners, doctors, and chiropractors, Church and Brooks found that a 20-minute EFT treatment for pain reduced participant symptoms significantly (-68%, $p < .001$).[75]

This matrix of psychophysiological risks, including depression, anxiety, pain, and PTSD, carries a high price to society in dollars as well as other social impacts. The

lifetime cost of treating a single case of PTSD is estimated at $1,400,000.[76] When

multiplied by the size of the population of veterans returning from Iraq and Afghanistan

with PTSD, in addition to the existing cohort of Vietnam veterans, and adding in the cost

of treating anxiety and depression, the cost to society exceeds $1 trillion. EFT and other

alternative medicine interventions have the potential to lower this cost substantially if

implemented on a widespread basis.

    This study adds support to the findings of others that a wide range of psychological

symptoms can be remediated using EFT, that the benefits of effective PTSD treatment

extend to other psychological conditions, as well as physiological problems such as pain,

and that successful treatment has both individual and societal benefits.

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Table 1. *PCL-M, Anxiety, and Depression – Time Main Effects, Mean (Standard Error), for Both EFT and Posttest SOC/WL Combined*

Variable	Pretest[a] M (SE)	3 sessions[b] M (SE)	6 sessions M (SE)	3-month M (SE)	6-month M (SE)	$F(4, 171)$	p
PCL-M Total	64.40 (2.1)	47.38 (2.0)	37.31 (2.0)	36.70 (2.5)	36.34 (2.3)	64.00	<.0001
Anx	72.99 (1.6)	66.67 (1.5)	60.28 (1.5)	62.94 (1.9)	61.60 (1.8)	25.01	<.0001
Dep	69.74 (1.2)	64.33 (1.1)	60.04 (1.1)	61.74 (1.4)	60.94 (1.3)	22.63	<.0001

Note. SOC/WL = standard of care wait list; EFT = Emotional Freedom Techniques; PCL-M = PTSD-Checklist Military; Anx = anxiety; Dep = depression.

[a]Pretest > 3-session assessment, $p < .005$; Pretest > 6-session assessment, $p < .0001$; Pretest> 3-month assessment, $p < .0022$; Pretest > 6-month assessment, $p < .0016$.

[b]3-session assessment > 6-session assessment, $p < .0011$; 3-session assessment > 3-month assessment, $p = .0015$ PCL-M only; 3-session assessment > 6-month assessment, $p < .0009$ PCL-M only.

Table 2. *Pearson Correlations (r) Between PCL-M, Anxiety and Depression Change Scores at Each Assessment*

Time point	PCL-M-Anxiety	PCL-M-Depression	Anxiety-Depression
3-sessions	0.351*	0.454***	0.373**
6-sessions	0.367**	0.252	0.468***
3-month follow-up	0.378*	0.367*	0.566***
6-month follow-up	0.221	0.245	0.564***

*$p < .05$; **$p < .01$; ***$p < .001$.

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Table 3. *Pain Time Main Effects – Means (Standard Errors) for Both EFT and Post-intervention WL Combined*

Pre-test	3 sessions	6 sessions	3-month	6-month	$F(4, 169)$	Sig.
4.78 (0.44)	3.74 (0.38)	2.82 (0.38)	3.36 (0.54)	2.94 (0.50)	5.32	.0005

Note. Pretest > 3-session assessment, p = .0186; Pretest > 6-session assessment, p < .0001; Pretest > 6-month assessment
3-session assessment < 6-session assessment, p = .029. WL = wait list.