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Pain, Range of Motion, and Psychological Symptoms in a Population With Frozen Shoulder: A Randomized Controlled Dismantling Study of Clinical EFT (Emotional Freedom Techniques)

Dawson Church

National Institute for Integrative Healthcare, Fulton, California

Jerrold Nelms

Western Kentucky University

ABSTRACT

Clinical EFT (emotional freedom techniques) combines fingertip stimulation of acupuncture points (acupressure) with elements drawn from cognitive and exposure therapies. Numerous studies have demonstrated the efficacy of EFT for depression, anxiety, phobias, posttraumatic stress disorder (PTSD), and other psychological conditions. The current study was designed to measure whether acupressure is an active ingredient in EFT, or whether its effects are due to its cognitive and exposure elements, or factors common to all therapies like sympathetic attention and belief in a positive outcome. In this study, 37 participants with “frozen shoulder” consisting of limited range of motion (ROM) and pain were randomized into a wait list, or 1 of 2 treatment groups. ROM, pain, and psychological conditions such as anxiety and depression were assessed before and after a 30-min treatment session, and 30 days later. One treatment group received clinical EFT, while the other received all the elements of EFT but with diaphragmatic breathing (DB) substituted for acupressure. No statistically significant improvement (1 possibility in 20) in any psychological symptom was found in the wait list group. After treatment, participants in the both the EFT and DB groups demonstrated statistically significant improvements in psychological symptoms and pain. Follow-up showed that both groups maintained their gains for pain, with EFT superior to DB, but only the EFT group maintained their gains for psychological symptoms. Statistically large EFT treatment effects were found for anxiety, pain, and depression. ROM changes were not statistically significant for most measures in any of the groups. The EFT group showed a significant association between reductions in psychological distress and pain. The results are consistent with 5 earlier studies showing that acupressure is an active ingredient in EFT treatment and not an inert ingredient or a placebo. The study adds further support to other clinical trials indicating that clinical EFT is an evidence-based and effective treatment for pain and psychological conditions.

SCIENTIFIC ABSTRACT

Clinical EFT (emotional freedom techniques) combines acupoint stimulation with elements of cognitive and exposure therapy. Numerous studies have demonstrated the efficacy of EFT for depression, anxiety, phobias, PTSD, and other psychological conditions. The current study assesses whether acupoint stimulation is an active ingredient or whether

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Dawson Church, National Institute for Integrative Healthcare, Fulton, California; Jerrold Nelms, Western Kentucky University.

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Correspondence concerning this article should be addressed to Dawson Church, National Institute for Integrative Healthcare, 3340 Fulton Road 442, Fulton, CA 95439. E-mail: dawsonchurch@gmail.com

treatment effects are due to nonspecific factors. Thirty-seven participants with “frozen shoulder” consisting of limited range of motion (ROM) and pain were randomized into a wait list, or 1 of 2 treatment groups. ROM, pain, and the breadth and depth of psychological conditions such as anxiety and depression were assessed before and after a 30-min treatment session, and 30 days later. One treatment group received clinical EFT, while the other received an identical cognitive/exposure protocol but with diaphragmatic breathing (DB) substituted for acupoint stimulation. No significant improvement in any psychological symptom was found in the wait list. Participants in both the EFT and DB groups demonstrated significant posttest improvement in psychological symptoms and pain. Follow-up showed that both groups maintained their gains for pain, with EFT superior to DB, but only the EFT group maintained gains for psychological symptoms ($p < .001$). Large EFT treatment effects were found, with a Cohen’s $d = .9$ for anxiety and pain, and $d = 1.1$ for depression. Though EFT showed a greater trend for improved ROM in most dimensions of movement, changes were nonsignificant for most measures in all groups. Reductions in psychological distress were associated with reduced pain as well as with improved ROM. The results are consistent with 5 earlier dismantling studies showing that acupoint stimulation is an active ingredient in EFT treatment. The study adds further support to other clinical trials indicating that clinical EFT is an efficacious evidence-based treatment for pain and psychological conditions.

Keywords: range of motion, emotional freedom techniques, pain, depression, anxiety

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The association between emotional trauma and disease has been documented in a number of studies. The Adverse Childhood Experiences (ACE) Study examined the health outcomes of 17,421 patients at Kaiser Permanente hospitals (Felitti et al., 1998). Emotional events in childhood were associated with all the primary causes of adult mortality, including bone fractures, cancer, heart disease, hypertension, depression, smoking, suicide, and diabetes. Many other studies have found associations between psychological distress and physiological deterioration (e.g., Belanoff, Kalehzan, Sund, Fleming Ficek, & Schatzberg, 2001; Ford & Erlinger, 2004). Time was not “the great healer” of childhood trauma; the median age of participants in the ACE Study was 57; the traumatic events that led to disease had occurred half a century earlier. Some diagnoses such as PTSD even tend to increase in severity over time, as neural plasticity—the brain’s ability to rapidly add new synaptic connections in often-used neural circuits—reinforces prior conditioning (Vasterling & Brewin, 2005).

Gene sequencing has permitted an examination of the epigenetic effects of emotional trauma at the level of molecular biology. The association has been demonstrated in both directions, with traumatic events promoting unfavorable changes in gene expression, as well as psychological rehabilitation promoting favorable changes (Yount, 2013). Emotional trauma is an epigenetic influence associated with pervasive changes in gene expression (Autry & Monteggia, 2009; Mill & Petronis, 2007). It has been proposed that the remediation of psychological symptoms through psychotherapy should be considered an epigenetic intervention (Feinstein & Church, 2010).

Mental health may not simply correlate with disease, but predict it. Several studies have examined apparently healthy patients with high levels of depression, hostility, and anxiety. They found elevated levels of markers for cardiovascular disease, prior to the presentation of symptoms (Boyle, Jackson, & Suarez, 2007; Rugulies, 2002; Suarez, 2004). The authors of the ACE Study compared the health care system’s focus on treating disease in adults to a fire brigade directing their water at the smoke, rather than at the originating fire. They recommended that health care be refocused on treating the emotional traumas that they believe are the source of many illnesses (Felitti et al., 1998).

Chronic pain and functional limitation have been linked to psychological conditions such as anxiety and depression in a number of studies (Lenze et al., 2001). A form of functional limitation that affects an estimated two percent of adults is referred to as “frozen shoulder” (Dias, Cutts, & Masoud, 2005). Frozen shoulder is charac-

terized by limited ROM and pain. A long-term study of frozen shoulder found that 40% of patients had persistent loss of ROM (Binder, Bulgen, Hazleman, & Roberts, 1984). Another long-term study of frozen shoulder found that frozen shoulders retained ROM limitations, and remained symptomatic, many years after the onset of symptoms (Shaffer, Tibone, & Kerlan, 1992). Seven years after examination, half of the subjects in this study still had limited ROM, pain, or both. These limitations resulted in functional limitations in tasks such as dressing and sports, with 60% having persistent ROM problems. An earlier study found an average duration of 30.1 month for frozen shoulder (Reeves, 1975). One study found that patient outcomes from an active treatment protocol were worse than supervised neglect (Diercks & Stevens, 2004). A more recent review states: “Patients usually recover, but they may never regain their full range of movement” (Dias et al., 2005).

Limited ROM may be attributable to a wide variety of sources other than frozen shoulder. Among these are tendonitis, breast surgery, bone fractures, and diabetes (Zuckerman & Rokito, 2011). While frozen shoulder is a qualitative diagnosis according to a consensus statement by the American Shoulder and Elbow Surgeons Association (Zuckerman & Rokito, 2011), ROM is a physiological limitation that can be quantified using noninvasive techniques. This makes changes readily measurable whatever the etiology of the condition. Unlike biological conditions that require laboratory tests, extended time frames, invasive procedures, or longitudinal outcome measures, limited ROM is apparent to both observer and participant. This makes ROM a measure uniquely accessible to investigators as a biological response to psychological change.

EFT

EFT is an evidence-based practice, with more than 100 randomized controlled trials, outcome studies, and review papers published in peer-reviewed journals listed in the online research bibliography (Research.EFTuniverse.com). A systematic review by Church, Feinstein, Palmer-Hoffman, Stein, and Tranguch (2014) concluded that it meets the criteria of the American Psychological Association’s Division 12 Task Force on Empirically Validated Treatments for a number of psychological conditions, including anxiety, depression, phobias, and PTSD. It has also produced improvement in physical conditions such as fibromyalgia (Brattberg, 2008), psoriasis (Hodge & Jurgens, 2011), tension headaches (Bougea et al., 2013), pain (Church, 2014), traumatic brain injury (Church & Brooks, 2014), and seizure disorders

(Swingle, 2010). In service evaluations performed by the United Kingdom National Health Service, EFT produced an improvement in general physical functioning as well as mental health (Boath, Stewart, & Carryer, 2013; Stewart, Boath, Carryer, Walton, & Hill, 2013; Stewart, Boath, Carryer, Walton, Hill, Phillips, et al., 2013). EFT's efficacy in such a wide range of conditions is usually attributed to the technique's ability to reduce stress, which is a component of many emotional and physical disorders (Church, 2013a; Lane, 2009).

EFT is a manualized method, with most published studies applying the technique with fidelity to *The EFT Manual* (Church, 2013b; Craig & Fowlie, 1995). EFT combines elements of two other evidence-based psychotherapeutic techniques, exposure therapy and cognitive therapy, with acupoint stimulation in the form of pressure or percussion with the fingertips. While vividly recalling a traumatic event, clients are instructed to tap or apply light pressure on 12 acupuncture points with their fingertips (acupoint tapping). Vivid recall of the event is facilitated by a "setup statement" that includes a summary of the event (exposure) set within a cognitive frame of self-acceptance. While each acupoint is tapped, the client repeats an emotion-laden "reminder phrase" designed to facilitate psychological exposure by focusing on the event. Before and after tapping, the client rates the emotional intensity of the event on an 11-point Likert scale (Wolpe, 1958). Studies and clinical reports note rapid reductions in distress after tapping (Church, 2013a; Mollon, 2007; Schulz, 2009). The manualized, evidence-based form of the method is defined as "clinical EFT" (Church, 2013b).

The method is generally considered safe, with few accounts of abreactions or emotional flooding (Flint, Lammers, & Mitnick, 2005; Schulz, 2009). These benefits extend even to highly traumatized populations, such as war veterans with PTSD (Church et al., 2013), Rwandan genocide orphans (Stone, Leyden, & Fellows, 2009), and Haitian earthquake survivors (Gurret, Caufour, Palmer-Hoffman, & Church, 2012). A recent critical survey of EFT and similar methods surveying therapists through listservs such as acceptance and commitment therapy, the Society for the Science of Clinical Psychology, and the Association of Behavioral and Cognitive Therapies, found 42% employing these techniques (Gaudiano, Brown, & Miller, 2012).

The Physiological Mechanisms of Action of EFT

The physiological mechanisms of action of EFT have been explored in a number of studies, which show reductions of stress hormones such as cortisol and regulation of the autonomic nervous system. In a randomized controlled trial with 83 normal participants, cortisol levels were measured before and after a single 1-hr therapy session (Church, Yount, & Brooks, 2012). One group received a supportive interview from a licensed mental health provider, a second group received EFT from a life coach, and a third group simply rested. Symptoms of psychological conditions such as anxiety and depression declined by more than twice as much in the EFT group as in the other two groups, while significant reductions in cortisol were found. Cortisol changes were significantly correlated with reductions in psychological symptoms, as both psychological and physiological markers responded to the intervention.

The same research team then probed the molecular changes underlying the synthesis of stress hormones such as cortisol. In a pilot study of veterans with PTSD receiving 10 EFT sessions, they examined the expression of stress-related regulatory genes (Church, Yount, Rachlin, Fox, & Nelms, in press). They found that interleukins, a suite of genes that regulates the inflammation response, decreased significantly in expression, while genes associated with immunity were upregulated. There was a significant association between the decrease in partici-

pant psychological symptoms and beneficial changes in gene expression, demonstrating EFT's utility as an epigenetic intervention.

Acupoint tapping has been evaluated in several studies using the electroencephalograph (EEG) to record brain waves. Swingle, Pulos, and Swingle (2004) used the EEG to compare the brain wave frequencies of auto accident victims with PTSD before and after they learned EFT, and observed increased regulation of several brain regions, including the sensory motor cortex, the right prefrontal cortex, and the occipital area. Lambrou, Pratt, and Chevalier (2003) used acupoint tapping with claustrophobics, comparing them with a non-claustrophobic group, and found an increase in theta EEG frequencies associated with relaxation after treatment, with reductions in anxiety symptoms that persisted on follow-up. Swingle (2010) found EFT to be beneficial in the treatment of seizure disorders. Similar regulation of the autonomic nervous system and the fear response has been found in fMRI studies using acupuncture rather than acupoint tapping (Fang et al., 2009; Hui et al., 2005; Napadow et al., 2007).

Dismantling and Partial Dismantling Studies

One of the criticisms of EFT has been that because it uses elements of proven efficacious therapies, its effects might be due solely to these, and that acupoint tapping makes no contribution to its success (Bakker, 2014). This is the so-called "purple hat" fallacy: a practitioner might employ a therapeutic method of demonstrated efficacy while wearing a purple hat and then attribute the success of treatment to the hat (Rosen & Davison, 2003). For this reason, dismantling studies that separate acupoint stimulation from the cognitive and exposure portions of the protocol have been recommended (Baker, Carrington, & Putilin, 2009).

Five studies have attempted to determine whether tapping is an active ingredient in the outcomes reported in clinical studies of EFT. The earliest was performed by Waite and Holder (2003), who compared three tapping variants (EFT points, sham points, and a doll) to a nontapping group. Participants in all three tapping groups showed significant improvements, while the nontapping group did not, and the investigators concluded that EFT owed its efficacy to distraction and desensitization. However, others have reinterpreted the findings of this study as supporting EFT, since the investigators inadvertently engaged fingertip tapping points in the three groups that improved significantly (Baker, Carrington & Putilin, 2009; Pasahow, 2010). Waite and Holder (2003) also failed to use valid and reliable assessments, or the manualized form of the method, instead introducing novel variants to the protocol. All these factors make the study difficult to interpret. Its departure from established research norms, and ambiguous results, make it an outlier when compared with the remainder of the EFT research literature.

A second attempt to isolate the ingredients of EFT protocols was a study by Fox (2013). In a randomized controlled trial with university students that utilized the exposure component of EFT, an active control of mindful breathing was substituted for tapping. The control protocol

was identical to the EFT condition with the exception that utilization of acupoint tapping and the self-acceptance statements characteristic of EFT . . . were not used. Instead, participants were asked to simply observe how the emotion felt in their body. . . . (p. 19)

This study found that on most measures the tapping group showed significantly better results than the control group.

In a third dismantling study, EFT was compared to a control protocol which included tapping on a sham location on the body, as well as the exposure component of EFT (Reynolds, 2015). Participants were 126 school teachers at risk for burnout. They were assessed

using the Maslach Burnout Inventory (Maslach, Jackson, & Leiter, 1996), which has three scales: Emotional Exhaustion, Depersonalization, and Personal Accomplishment. To reduce the possibility of cross-contamination between the two groups, the study did not randomize participants within a single population. Instead, to minimize contact between experimental and control participants, the two samples were drawn from different school districts with similar demographic profiles in the same county.

To ensure that the cognitive and exposure portions of both protocols were similar, both the EFT and control group received identical lists of troubling situations and cognitions that might contribute to burnout, and were instructed to focus on them mentally while utilizing the procedure. Instead of the setup statement and prescribed acupoints of EFT, members of the control group were instructed to tap with an open right hand on the forearm of their left hand. The position of the hand doing the tapping is important since there are acupoints at the tips of each finger; thus this study controlled for the stimulation of those points by tapping with the undersides of the fingers instead of the fingertips, in contrast to the Waite and Holder (2003) study which unintentionally used fingertip points.

The results of the Reynolds (2015) study showed that on all three indicators of burnout measured, EFT was superior to the sham tapping employed in the control group. Like the Fox (2013) study, these results indicate that acupoint tapping is an active ingredient in the therapeutic results obtained from EFT. The fourth dismantling study used a convenience sample of 56 university students randomized into an EFT group and a control group which used an identical protocol but with sham tapping points (Rogers & Sears, 2015). A stress inventory was administered before and after a single tapping session, and the group that had tapped on actual acupuncture points exhibited a significantly greater reduction in stress ($p < .0001$). However, this study failed to use a validated assessment, and one of the investigators delivered both treatments.

While the authors of Wells, Polglase, Andrews, Carrington, and Baker, (2003) did not explicitly characterize theirs as a dismantling study, they nonetheless used an identical cognitive-exposure protocol in the control group, but with DB substituted for acupoint tapping, stating that “The deep-breathing condition was designed to parallel as closely as possible the EFT condition” (p. 950). This study may therefore also be regarded as a dismantling study, with the single caveat that while DB participants used the reminder phrase to facilitate psychological exposure, they did not use the setup statement. The results showed that on measures of phobic response, results were superior for the EFT group. A partial replication of Wells et al., (2003) was explicitly designed to control for additional variables such as expectancy effects and nonspecifics (Baker & Siegel, 2010). It also used more stringent methods such as assessor blinding and a no treatment control in addition to a supportive interview group. After controlling for these variables, it concluded that the positive results noted were due to EFT and not to experimental artifacts.

All five studies showed that tapping was an active ingredient in EFT when tested against an active control. They had minor differences between them, such as whether or not they included EFTs setup statement in the control group. They showed various degrees of rigor in their methodological design. Rogers and Sears (in press) did not use a validated assessment. Waite and Holder (2003) was the weakest of the designs, failing to recognize that the “sham” points selected were in fact actual acupuncture points. They also failed to follow the manualized EFT protocol or use valid and reliable measures. Reynolds (2015) was perhaps the strongest study in that it minimized cross-contamination between the experimental and control groups by using demographically matched groups instead of randomization

within a single group. This body of literature—including widely differing populations as well as methodological variations—provides a consensus for the hypothesis that acupoint tapping has a therapeutic effect.

Meta-Analyses

The availability of a large number of randomized controlled trials of EFT has made meta-analyses possible. The first of these examined studies published up until 2013 (Gilomen & Lee, 2015). A moderate treatment effect for EFT was found (Hedge’s $g = -0.66$). However the authors concluded that the absence of dismantling studies isolating acupoint tapping made it impossible to determine if this effect was due to the nonspecific effects of any therapy. Gilomen and Lee (2015) apparently missed the dismantling design of the Wells et al. (2003) study, while their literature search failed to identify the meticulously designed Reynolds (2015) study, which had been published as a doctoral dissertation in 2010. A later meta-analysis, this time of 20 studies of the use of EFT for depression, found a large effect (Nelms & Castel, in press). A contemporary meta-analysis of 14 randomized controlled trials of EFT for anxiety also found a large effect size (Clond, 2016). One examining the use of EFT in seven studies of PTSD found a very large treatment effect (Sebastian & Nelms, in press). These later meta-analyses included the dismantling studies that qualified for analysis under their quality criteria, and using Cohen’s d found that EFT produced large treatment effects.

Control Treatment in Current Study

The current study used DB as an active control. There were several reasons for this choice of control treatment. One is that it is a somatic intervention, as is acupoint tapping. Additionally, DB has demonstrated therapeutic benefits in many studies. DB is associated with a number of health-promoting effects, including reduced oxidative stress (Martarelli, Cocchioni, Scuri, & Pompei, 2011), improved vasomotor activity (Bacon & Poppen, 1985), and autonomic regulation as measured by EEG (Fried, 1987). It has been used successfully with patients with chronic obstructive pulmonary disease (Faling, 1986; Yamaguti et al., 2012) cardiac disease symptoms (DeGuire, Gevartz, Hawkinson, & Dixon, 1996), and stress (Harvey, 1978). Third, DB has already been used as a control treatment in two other EFT studies. A study of students with test anxiety compared EFT to DB, and found that both were equally efficacious (Jain & Rubino, 2012). When DB was used as a control in a randomized controlled trial of EFT for phobias, it was found to be effective, though not as effective as EFT (Salas, Brooks, & Rowe, 2011). Finally, three other studies have demonstrated that participants tolerate DB, and perceive it as a credible equivalent treatment in terms of expectancy effects (Jain & Rubino, 2012; Salas et al., 2011; Wells et al., 2003). These characteristics rendered DB an appropriate choice of control for this dismantling study.

American Psychological Association (APA) Division 12 Standards as Applied to EFT Research

Clinical EFT research has been informed by the criteria established by the APA Division 12 Task Force on Empirically Validated Therapies (hereafter “the Criteria”; Chambless et al., 1998; Chambless & Hollon, 1998; Chambless et al., 1996). Church et al. (2014) identified seven “essential criteria” based on these papers along with material found on the Division 12-maintained website for “Research-Supported Psychological Treatments” (<https://www.div12.org/psychological-treatments>). These criteria include:

- Randomization between the treatment of interest and a control treatment.
- Adequate sample size, sufficient to detect statistically significant effects ($p < .05$ or better).
- Assessments of demonstrated validity and reliability.
- Clearly defined treatment populations as defined by assessments and/or diagnosis by qualified clinicians.
- Blindness to group assignment by interviewers in studies in using interviews.
- Treatment manuals, or in the case of simple treatments, full descriptions within the study.
- Sufficient data for the study's conclusions to be reviewed for appropriateness, including sample sizes, the use of assessments that detect targeted outcomes, and reporting of the magnitude of statistical significance.

Most EFT studies have used these Criteria in their design (Church et al., 2014).

Method

The current study was designed to meet the Criteria as well as the CONSORT standards (Consolidated Standards of Reporting Trials). Further criteria to control for extraneous variables that might have limited the generalizability of the study were added. These included a control of demonstrated efficacy (DB) in addition to a wait list control, observer-rated physiological measures rather than participant self-report, the assessment of symptoms by an independent diagnostician with no knowledge of, or allegiance to, either treatment, and blind analysis of the study results.

The current study recruited participants with clinically verified ROM limitations. The study was registered with the National Institutes of Health clinical trials database (NCT00526266) after approval by the research ethics committee of the National Institute for Integrative Healthcare and prior to recruitment. Participants were recruited using local online forums and posters in physical therapy offices. The sole inclusion criterion was limited ROM. Exclusion criteria were postoperative recovery, current receipt of physical rehabilitation treatment, being under psychiatric care, or currently using psychoactive medications. Of a total of 69 applications, 17 were excluded based on these criteria, and a further 15 were excluded for failure to meet the clinical criteria for frozen shoulder. All participants provided informed consent. Settings included two integrative medical clinics and one occupational therapy clinic.

Psychological symptoms were assessed using the Symptom Assessment-45, an instrument of demonstrated validity and reliability (Davison et al., 1997; Maruish, 1999). It requires respondents to rate each of 45 items on a severity scale from 1 (*not at all*) to 5 (*extremely*). It provides two general measures of psychological distress: the depth of symptoms is measured by the Global Severity Index; the breadth of symptoms is assessed using the Positive Symptom Total. It has nine subscales, which measure anxiety, depression, obsessive-compulsive behavior, somaticization, phobic anxiety, hostility, interpersonal sensitivity, paranoid ideation, and psychoticism.

Pain was self-assessed on an 11-point Likert scale, with 0 indicating no pain and 10 extreme pain. ROM was measured in five different planes of arm movement using a goniometer, a protractor-like device employed in physical and occupational therapy. To control for investigator expectancy, ROM measurement was performed by an independent licensed occupational therapist with no experience in or allegiance to either intervention and blind to group assignment. ROM can be measured passively, with the therapist moving the limb, or actively, with the limb moved by the client. All measurements were

taken using active ROM. The randomization table was generated by Research Randomizer (randomizer.org). The study derived normal values for shoulder ROM from a standard text entitled *Measuring and Recording of Joint Motion: Instrumentation and Techniques* (Gerhardt & Rippstein, 1990). Limited ROM is defined as less than the following degrees of motion (abbreviations in parentheses):

- forward flexion (FwdFlex): 170,
- backward extension (BackExtn): 50,
- abduction (Abduct): 170,
- horizontal extension (HorizExt): 45, and
- horizontal flexion (HorixFlex): 135.

Participants were assigned to one of three groups, DB, EFT, or a wait list using random allocation. Participants randomized to the wait list were randomly allocated to one of the two treatment groups after 30 days. After pretest, participants received a half-hour treatment with either EFT including acupoint tapping, or EFT with DB substituted for acupoint tapping. For convenience, in the remainder of this paper, we refer to these as the EFT and the DB group, and the wait list as WL. EFT was administered by one of two trained and experienced EFT practitioners. DB was administered by a certified hypnotherapist trained in DB. Follow-up assessments were obtained from Participants 30 days after treatment.

EFT was performed with fidelity to *The EFT Manual* (Church, 2013b; Craig & Fowlie, 1995). Fidelity was assessed through written session note forms equivalent to those used in EFT training and certification. Participants in both treatment groups were given a two-page sheet describing the intervention, referred to as the Basic Recipe. The EFT with DB protocol was identical to the EFT with acupoint tapping protocol, with the exception of the substitution of DB in the Basic Recipe.

Statistical analysis of ROM and psychological symptoms was performed using general linear modeling for repeated measures. There were three data points for each of the two treatment groups (pretest, posttest, and follow-up) and two data points for the WL (before and after the wait period). Within-subject variations were tested using repeated measures one-way ANOVA for each parameter. For the two treatment groups, three periods were compared: pre versus post, post versus follow-up, and pre versus follow-up.

Test statistics and p values were computed in order to compare the average increase in ROM and psychological test variables among treatment groups. A p value less than 0.05 indicates that there was a statistically significantly greater increase in a certain parameter when comparing repeatedly measured values among treatment groups. Cohen's d was calculated using the mean difference divided by the pooled standard deviation. Statistical analysis was performed in SPSS version 21. Data were analyzed blind. Three dropouts occurred in the WL; two due to medical events unrelated to the study, and one due to transportation difficulties. No dropouts occurred in either treatment group. No adverse events were reported. The flow of participants through the study is illustrated in the CONSORT diagram in Figure 1.

Results

Sixty-nine potential participants were assessed for eligibility. Of these, 15 failed to meet the clinical criteria for frozen shoulder, and 17 were excluded based on the other criteria. Thirty-seven were recruited. Of these, 16 were randomized to the WL, of which three dropped out prior to the 30-day assessment. Of those who received one of the two interventions, 22 were female, and 12 male. Ages ranged from 31 to 69. Sixteen participants received EFT (6 males, 10 females) while 18 received DB (6 males, 12 females). After dropouts,

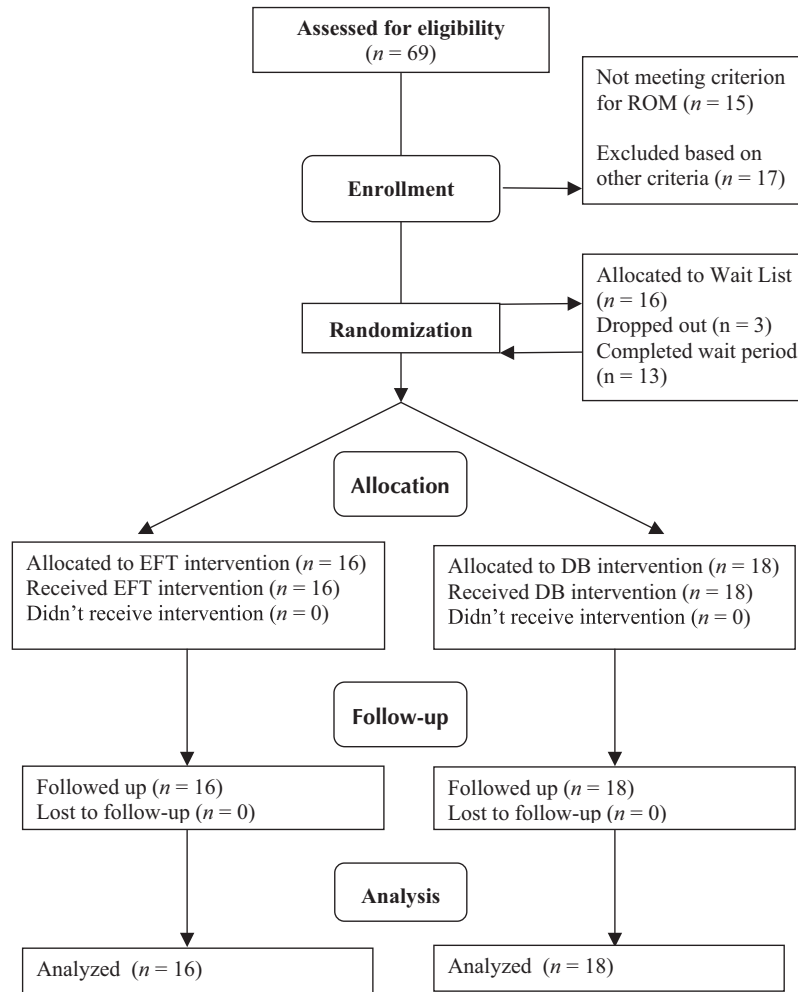


Figure 1. CONSORT flowchart.

the WL included 13 participants (5 males, 8 females). Mean age was 53.88 for EFT, 54.39 for DB, and 57 for WL. Table 1 illustrates the demographic characteristics of participants.

Psychological Symptoms

Table 2 details the distribution of psychological testing results across treatment groups and periods. No significant changes occurred over time in the WL. Posttest symptoms were significantly lower than pretest in the EFT group for all values except for phobic anxiety ($p = .245$), psychoticism (0.401), and paranoia, which approached significance at $\alpha = .05$ ($p = .055$). All posttests in the DB group revealed significant decreases except for hostility ($p = .262$), psychoticism

($p = .169$), depression ($p = .068$), and phobic anxiety (0.053). Both depression and phobic anxiety approached significance and would have attained it at the more lenient level of $\alpha = .10$.

To determine if participants maintained their gains, we examined the differences between posttest and 30-day follow-up. No changes were observed in any of the psychological symptoms in the EFT group, indicating that the results of treatment held over time. In the DB group, however, participants failed to maintain their gains on all measures of psychological symptoms. Large treatment effects were found, with $d = 1.1$ for depression and .9 for anxiety.

ROM

ROM was measured in five possible planes. Right- and left-side measurements were taken. A typical presentation of frozen shoulder is on one side only, and predominantly in one plane. For instance, the arc described by the right arm when raised forward may be limited, but normal when raised toward the back as well as the side. Normal values are averages, and some participants evinced above-normal range on the nonfrozen side. Table 3 illustrates the distribution (mean, standard deviation) of all five ROM measurements in both shoulders, and the significance of change, posttest and on follow-up. All ROM values that were normal or above were not analyzed since no impairment existed in that dimension. They are indicated as N/A.

Significant ROM improvements at posttest and/or follow-up were found in left abduction and right abduction in the EFT group, and for

Table 1
Participant Characteristics

Group	Gender			Age	
	Male	Female	Total	Mean	SD
EFT	6	10	16	53.88	7.80
DB	6	12	18	54.39	7.99
WL	5	8	13	57.00	6.27
Total	17	30	47	54.94	7.44

Note. EFT = emotional freedom techniques; DB = diaphragmatic breathing; WL = wait list.

Table 2
Pain and SA-45 Psychological Symptoms

Group	1. Pretest		2. Posttest		<i>p</i> (1 vs. 2)	3. Follow-up		<i>p</i> (2 vs. 3)	<i>p</i> (1 vs. 3)
	Mean	<i>SD</i>	Mean	<i>SD</i>		Mean	<i>SD</i>		
EFT									
Pain	4	3	2	2	.003	2	1	.544	.004
ANX	58	9	52	7	.006	51	6	.764	.005
DEP	57	5	53	4	.010	52	4	.423	.001
OC	58	9	53	8	.049	53	7	.857	.007
SOM	64	10	56	8	.000	59	9	.077	.002
PHO	61	4	60	3	.245	60	3	.362	.078
HOS	57	6	55	4	.007	54	2	.348	.025
INT	55	7	52	4	.011	52	5	.429	.015
PAR	53	10	51	7	.055	51	6	.953	.098
PSY	59	3	58	3	.401	59	2	.832	.567
GSI	56	10	49	8	.000	50	8	.930	<.001
PST	56	10	50	9	.003	50	8	.817	<.001
DB									
Pain	4	3	3	2	.004	3	2	.863	.018
ANX	55	7	50	6	.037	56	7	.015	.767
DEP	54	7	50	5	.068	54	6	.031	.941
OC	56	9	50	8	.014	55	9	.021	.635
SOM	60	7	56	9	.003	59	8	.127	.286
PHO	60	4	59	2	.053	60	3	.170	1.000
HOS	56	4	54	4	.262	57	5	.052	.871
INT	54	6	51	3	.038	53	6	.059	.596
PAR	52	7	49	5	.024	51	8	.131	.399
PSY	59	3	59	1	.169	59	2	.331	.226
GSI	54	8	47	8	.002	53	8	.008	.464
PST	54	8	47	8	.005	53	9	.008	.451
WL									
Pain	4	3	N/A	N/A	N/A	3	3	N/A	.068
ANX	57	7	N/A	N/A	N/A	58	9	N/A	.674
DEP	56	9	N/A	N/A	N/A	54	6	N/A	.446
OC	56	9	N/A	N/A	N/A	56	11	N/A	.766
SOM	61	9	N/A	N/A	N/A	62	12	N/A	.562
PHO	60	4	N/A	N/A	N/A	60	3	N/A	.851
HOS	55	3	N/A	N/A	N/A	57	6	N/A	.165
INT	54	8	N/A	N/A	N/A	55	7	N/A	.806
PAR	52	9	N/A	N/A	N/A	51	7	N/A	.803
PSY	59	2	N/A	N/A	N/A	58	1	N/A	.337
GSI	54	9	N/A	N/A	N/A	54	10	N/A	.720
PST	53	8	N/A	N/A	N/A	53	10	N/A	.908

Note. EFT = emotional freedom techniques; DB = diaphragmatic breathing; WL = wait list; ANX = anxiety; DEP = depression; OC = obsessive-compulsive behavior; SOM = somaticization; PHO = phobic anxiety; HOS = hostility; INT = interpersonal sensitivity; PAR = paranoid ideation; PSY = psychoticism; GSI = Global Severity Index; PST = Positive Symptom Total; N/A = not applicable.

left forward flexion and right horizontal flexion in the DB group. While other dimensions of ROM improved clinically, the improvements were not statistically significant. In the WL, only left horizontal flexion improved significantly over time. Pain decreased significantly in both the DB and EFT groups, with a mean pretest reduction in score from 4 to 2 ($SD = 2$). It remained 2 on follow-up ($SD = 1$). The pain reduction was half that size in the DB group, from 4 to 3 ($SD = 2$), and remained 3 on follow-up ($SD = 2$). Pain change was nonsignificant in the WL. A large treatment effect was found for EFT, with $d = .9$.

Discussion

The study sought to answer the question of whether acupoint tapping is an active or an inert component in EFT, and whether its efficacy is due to components it shares with cognitive and exposure therapies. The study found that tapping improved immediate outcomes on both psychological measures and pain. Even on measures in which DB produced similar posttest improvements, the improvements did not persist over time, while gains made by participants in the EFT

group proved durable. The results indicate that acupoint tapping is an active ingredient in EFT. The improvement in psychological symptoms obtained with EFT were similar to those observed in other studies. All groups exhibited modest clinical improvement in ROM symptoms, with EFT producing better overall outcomes than those noted in the other two groups. However, there were few dimensions of movement in which ROM changes rose to the level of statistical significance. Participants who experienced clinical gains, even if these were statistically nonsignificant, were observed to express satisfaction with the outcome. EFT reduced pain scores by half, double the improvement in the DB group, with gains maintained on follow-up.

EFT proved efficacious in a single 30-min session. Other studies have also demonstrated the utility of a brief treatment. Three randomized controlled trials of EFT for phobias used sessions 15- to 45-min in length (Baker & Siegel, 2010; Salas et al., 2011; Wells et al., 2003). The Baker and Siegel study was carefully designed as a replication of Wells et al. (2003) to eliminate nonspecific effects such as sympathetic listening, client expectancy, and therapist attention. Baker and Siegel also designed their study to control for experimental artifacts

Table 3
Range of Motion Measurements by Group

Group	Norm	1. Pretest		2. Posttest		3. Follow-up		<i>p</i> (1 vs. 2)	<i>p</i> (1 vs. 3)
		Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>		
EFT									
LFwdFlex	170	145	24	148	21	154	18	.249	.09
LBackExtn	50	51	10	60	9	61	11	N/A	N/A
Labduct	170	124	31	138	22	144	22	.01	.003
LHorizExt	30	27	5	29	3	28	6	.187	.624
LHorizFlex	135	123	17	117	20	120	18	.088	.514
RFwdFlex	170	155	19	155	17	154	19	.818	.725
RBackExtn	50	53	10	57	7	55	9	N/A	N/A
Rabduct	170	137	29	144	25	149	24	.069	.014
RHorizExt	30	30	6	32	6	35	11	.529	.15
RHorizFlex	135	118	20	123	16	124	15	.144	.116
DB									
LFwdFlex	170	145	26	151	24	154	23	.006	.007
LBackExtn	50	58	14	60	15	64	15	N/A	N/A
LAbduct	170	139	32	141	32	146	28	.304	.135
LHorizExt	30	32	9	33	10	32	7	.588	.984
LHorizFlex	135	111	25	115	22	113	17	.106	.804
RFwdFlex	170	148	22	152	22	147	20	.187	.917
RBackExtn	50	57	14	60	13	63	14	N/A	N/A
RAbduct	170	131	37	137	32	138	31	.077	.336
RHorizExt	30	35	6	37	11	37	7	.263	.221
RHorizFlex	135	104	27	114	19	112	19	.001	.082
WL									
LFwdFlex	170	147	24	N/A	N/A	150	18	N/A	.432
LBackExtn	50	60	13	N/A	N/A	56	13	N/A	N/A
LABduct	170	131	32	N/A	N/A	133	32	N/A	.751
LHorizExt	30	35	10	N/A	N/A	28	8	N/A	.001
LHorizFlex	135	98	21	N/A	N/A	110	19	N/A	.104
RFwdFlex	170	144	23	N/A	N/A	145	21	N/A	.484
RBackExtn	50	59	12	N/A	N/A	59	7	N/A	N/A
RAbduct	170	124	30	N/A	N/A	126	25	N/A	.666
RHorizExt	30	38	13	N/A	N/A	33	8	N/A	.205
RHorizFlex	135	92	28	N/A	N/A	100	19	N/A	.246

Note. EFT = emotional freedom techniques; DB = diaphragmatic breathing; WL = wait list; L = left; R = right; FwdFlex = forward flexion; BackExtn = backward extension; Abduct = abduction; HorizExt = horizontal extension; HorizFlex = horizontal flexion; N/A = not applicable.

such as practice effects, the passage of time, and regression to the mean. After controlling for all possible treatment variables, they concluded that the positive treatment effects noted were due to EFT. Baker & Siegel, 2010 used a single brief treatment session, in common with most EFT studies with the exception of those of PTSD. This points to EFT’s clinical utility for remediating psychological symptoms in compressed treatment time frames. A large body of case histories as well as many studies show that lengthy courses of treatment are the exception rather than the norm with EFT, with single-session treatments often used to reduce the distress that accompanies an emotional event (Church, 2013c).

The positive outcome for pain found in this study is consistent with the results of several other EFT studies. One study of 216 health care workers such as doctors, nurses, psychotherapists, chiropractors, and alternative medicine practitioners found a highly significant 68% decrease in pain (Church & Brooks, 2010). In a randomized controlled trial of veterans with PTSD, pain was significantly reduced by 41% (Church et al., 2013). Both a replication of this study, and a randomized controlled trial with a nonclinical population, found similar improvements (Church, Sparks & Clond, in press; Geronilla, McWilliams, & Clond, 2014). As a simple technique easily administered by medical support staff, and as an effective self-help method, clinical EFT should be considered as a primary treatment for the emotional aspects of pain.

The principal limitation of the study was the small sample size. Follow-up studies might determine if greater treatment duration, or a

series of sessions, produces a greater effect on psychological symptoms, and significant improvements in additional dimensions of ROM. An extension of this study might gather more detailed data on quality of life, and improvements in limitations to physical function. It is also possible that sufferers from frozen shoulder with very limited ROM and high levels of pain might have responded to a greater degree than the population assessed by this study, which had moderate levels of pain (a mean value of 4 out of 10 on a Likert scale). Further studies could also measure the expectancy of participants in advance, as did Baker and Siegel (2010).

A puzzle presented by this and several other EFT studies that include physiological measures is why participant response is so much greater on psychological than physiological measures. The experimental effect of this phenomenon is that studies with physiological measures require much greater *Ns* than are required to achieve significance for psychological measures. EFT typically has such a large treatment effect that psychological improvement is statistically significant with a very small *N*. The very first pilot study of EFT for PTSD, for instance, had only seven participants, yet reached a significance level of *p* < .016 (Church, Geronilla, & Dinter, 2009). By way of contrast, achieving significance at the *p* < .05 level for cortisol in the cortisol study required over 80 participants (Church et al., 2012). In that study, significance on psychological measures was gained with under 20 participants. Psychological changes are larger and occur more rapidly than physiological ones, but why this is so remains poorly understood.

Despite the rapid results obtained in this and other studies, Church (2014) has cautioned against excessive clinician optimism, especially in cases of complex trauma, and argues that EFT is best used as part of a comprehensive treatment regimen. Nevertheless, this study demonstrates that EFT is an easily implemented treatment for the psychological aspects of joint impairment and pain and is an accessible evidence-based self-help method. It reinforces the body of literature showing that EFT is an effective primary treatment for psychological conditions such as depression and anxiety. This study also demonstrated the feasibility of using ROM as a nonintrusive yet objective biological measure of the effects of psychotherapy.

Conclusion

This study is the sixth to assess whether or not acupoint tapping is an active ingredient in EFT's efficacy. Designed with a methodological rigor exceeding both APA and CONSORT criteria, this study sought to avoid the methodological shortcomings found in previous dismantling studies. Like previous research, it confirms that tapping produces psychological improvements beyond what might be expected as a result of EFT's cognitive and exposure components, and that addressing psychological stress can have an immediate impact on physical symptoms. It demonstrated that EFT can reduce pain in a brief treatment time frame, and produces durable improvements in psychological conditions such as anxiety and depression. It strengthens the case for clinical EFT as an evidence-based practice, and shows that its acupoint tapping component is an active ingredient in the manualized protocol.

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