

# Measuring the Effect of Clinical Emotional Freedom Techniques (EFT) Treatment for Depression Using a Seed Bioassay: A Randomized Controlled Trial

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**How to cite this paper:** Church, D. (2023). Measuring the Effect of Clinical Emotional Freedom Techniques (EFT) Treatment for Depression Using a Seed Bioassay: A Randomized Controlled Trial. *Psychology*, 14, 1687-1697.  
<https://doi.org/10.4236/psych.2023.1411098>

**Received:** August 23, 2023

**Accepted:** November 18, 2023

**Published:** November 21, 2023

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## Abstract

**Objective:** Bioassays are used to investigate the effect of mechanisms of action, such as human intention and mood, on living organisms. This study examined the effect of depression using a seed bioassay as an objective biomarker. **Design:** Sixty Clemson spineless okra seeds were randomly assigned to three equal groups. Group one provided an untreated control. Group two was attached to a clipboard held for 15 minutes by a 42-year-old female patient with major depressive disorder while completing the Beck Depression Inventory (BDI). Group three was held while the BDI was readministered following a 2-hour treatment session using an evidence-based modality, Emotional Freedom Techniques (Clinical EFT). BDI scores improved, going from a pre value of 20 (the clinical cutoff for “moderate” depression) to 3 (“minimal” depression). The three groups of seeds ( $n = 20$  each) were germinated blind. The number of seeds to germinate and produce visible root hairs was assessed by an independent observer at 12-hour intervals across 72 hours. **Results:** In the control group, 18 seeds germinated, and of those, four developed visible root hairs. In the pretreatment group, 15 germinated and four evidenced hairs. In the posttreatment group, all but one germinated and 14 developed hairs. Seed germination was greatest in the seeds exposed to the client following EFT treatment and a significant pre/post difference was observed ( $p = .042$ ). Root hair growth in the posttreatment group was significantly higher than the control ( $p < .000$ ) and pretreatment group ( $p < .000$ ). **Conclusion:** Seed viability appears sensitive to human mood. Consistent with the published literature, the results suggested that human emotions affect seeds through proximity. Possible mechanisms of action to explain the observed effects may include electromagnetic field fluctuations associated with

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mood and conventionally measured with fMRI. The findings support the use of simple seed bioassays as objective biomarkers to examine the treatment effects of healing therapies.

### **Keywords**

Bioassay, Depression, Emotional Freedom Techniques (EFT), Germination, Biomarker, Healing Energy, Biofield

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## **1. Introduction**

In the field of healing energy, objective ways in which to study interactions between humans and their environment are critical. A greater understanding of such mechanisms of action can help illuminate the treatment effects of healing therapies. The term “biofield” has been used to describe noncontact or intentional healing energy interactions among organisms. Biofields describe multiple energies that can affect living organisms such as in their self-regulation processes (Rubik, 2002). Among the candidates for elements of the biofield are electromagnetic fields, biophotons, and quantum processes (Kafatos et al., 2015). The term “biofield” has been defined as “a field of energy and information, both putative and subtle, that regulates the hemodynamic function of living organisms and may play a substantial role in understanding and guiding health processes” (Jain et al., 2015). Biofields are considered particularly useful in understanding the scientific basis underlying energy-based therapies. The biological effects of biofields have been examined in a range of multicellular living organisms such as proteins, bacteria, animals, and plants (Baldwin & Schwartz, 2006; Chien et al., 1991; Mo et al., 2003; Schwartz et al., 2015).

Mounting research has examined the effect of healing energy biofields on living organisms. In a series of experiments conducted at McGill University, Grad (Grad, 1963) examined noncontact healing intentions in mice. A former Hungarian cavalry officer was enlisted to project energy from his hands that he believed to be electromagnetic. Wounds on mice that had received healing energy were observed to heal significantly faster than wounds left untreated. The same effect was tested on barley seed germination. Seeds that received water that had 30 minutes of healing intention resulted in a greater volume of germination, taller growth, increased chlorophyll content, and enhanced quality of leaf growth.

Previous studies have also examined the effects of intentionally treated water with untreated controls. Research has identified alterations in the molecular structure of water following contact with a healer (Radin et al., 2006; Kronn, 2009). In addition, under controlled experimental conditions, water exposed to therapeutic healing had significant changes in its absorption of infrared light (Schwartz et al., 2015). This difference in infrared spectroscopy readings indicated that the bonding angle between the single oxygen and two hydrogen atoms

had been reduced by contact with the healing biofield.

In a rigorous examination, Rao, Sedlmayr, Roy, and Kanzius (Rao et al., 2010) disrupted the main bonding structure of liquid water using polarized microwave and radiofrequency radiation. Water molecules can bond together in various potential configurations. This study's results indicated it was possible to alter these bonds by passing specific frequencies through the water. The analysis, also using infrared spectroscopy, identified significant changes in the water structure. Therefore, Rao et al. (Rao et al., 2010) suggested that water resonating within these frequencies may contain healing properties. Other changes in the infrared properties of water have been noted following contact with healers (Bengston, 2012).

Alterations to the molecular structure of water have been documented in experiments involving distant healing intention (Yan et al., 2002). Chinese qigong master Dr. Xin Yan stood at varying distances, ranging between 7 km and 1,900 km, and applied intentional healing energy ("qi") to water. When examined with Raman spectroscopy, the intentionally treated water displayed attributes different from those of untreated controls. Despite exerting energy in a form that has not been identified within the accepted framework of the four fundamental forces of physics, the influence of this intentional energy on physical reality was supported (Yan et al., 2002).

To explore further the area of human healing biofields, experiments with nonhuman targets such as plants and seeds have been conducted throughout the last half-century. As complex multicellular organisms, plants have been used as objective markers of biological effects because they exclude the potential confounds of placebo effects. A series of experiments were conducted at McGill University, with several involving depressed clients (Grad, 1963; Grad, 1962; Grad, 1972; Grad, 1967). Vials of water were held and then used to water seeds. In the randomized double-blind experiments, the germination rate of seedlings and their rate of growth were assessed. Statistically significant differences were found between controls and plants watered with water that had been either held by healers or depressed clients. Other experiments using treated water to water seedlings showed correlations between healing intent and plant growth (Berden, et al., 1997). Additional studies have found significant increases in patchouli plant regeneration (Patil, 2012) and improvement in weed control in an *in vivo* study on soya bean crops (Lenssen, 2013) following treatment with intentional healing. Several other experiments have been performed using seeds to measure healing effects (Roney-Dougal & Solfvinn, 2002; Scofield & Hodges, 1991).

A meta-analysis reviewed the effect of noncontact healing on biological systems of animal, plant, and human cell cultures (Roe et al., 2015). Review findings suggested that biological systems were less susceptible to placebo and expectancy effects, rendering greater delineation outcome measures than found in human trials. Thirteen studies of plant or seed-targeted systems had a significant mean weighted effect size of  $r = .197$  (CI 95% = .156 - .238). The weighted average effect

sizes lay outside the confidence interval in the other studies reviewed, which suggested that the plant study outcomes were significantly different (Roe et al., 2015).

While research has offered support for the interaction between material and biofield energies (Patil et al., 2012; Nayak & Altekari, 2015), there is a dearth of studies in which experimental conditions are specified to enable replication (Nayak & Altekari, 2015). To develop independently replicable methods, investigators from the University of Arizona developed a standard protocol to examine the effects of sound and healing energy sources using seed bioassays (Creath & Schwartz, 2004). The study consisted of 14 trials involving 4600 seeds. Differences in germination rates were found between conditions of music and healing energy compared to untreated controls, independent of temperature differences between growth chambers, seed position, and inter-rater growth assessment.

These findings supported seeds' sensitivity to music and bioelectromagnetic healing energy sources. Therefore, seed germination bioassay was identified as an objective measure of different types of applied energy. Since seed germination bioassay has the sensitivity to enable the detection of effects caused by various applied energetic conditions, the authors recommended further examination of the efficacy of healing energy to treat adverse human conditions. Other studies have found significant improvements in plant growth or seed germination following healing intention (Radin et al., 2006; Scofield & Hodges, 1991).

Emotional Freedom Techniques (EFT) is a simple intervention that involves tapping with one or two fingers on 14 acupuncture points on the body (acupressure). This occurs while recalling the memory of a traumatic event. The acupoints are ones often unconsciously tapped or rubbed by people under stress, such as the sides of the eyes, and the inside edge of the collarbone. EFT simply organizes these stress reduction gestures into a reliable brief protocol. When this protocol is performed while recalling a traumatic emotional event, the emotional distress associated with the event is often discharged. Before beginning treatment, but after recall, subjects rate the severity of their distress on a Subjective Units of Distress (SUD) scale, with 10 being the maximum and 0 being none at all. After treatment, subjects re-rate their SUD level. Additional rounds of EFT may be administered to lower the SUD score further. Clinical EFT is the manualized form of EFT that has been validated in over 100 studies (Church, 2018). Meta-analytic review found EFT to be an efficacious treatment for depression (Nelms & Castel, 2016).

The current study adopted the standardized seed germination protocol employed by Creath and Schwartz (Creath & Schwartz, 2004) to provide further research in the field of human energy biofields. Specifically, the impact of depression before and after EFT treatment was examined using objective seed bioassays. Based on prior research, we hypothesized that seeds exposed to the biofield of a clinically depressed human patient would result in reduced seed germination compared to control and post-EFT treatment seeds, and secondly that root hair growth would be most robust in seeds in the post-EFT treatment group.

## 2. Materials and Methods

The current study employed the University of Arizona's protocol (Creath & Schwartz, 2004) using 60 dicots of Clemson spineless okra seeds (*Hibiscus esculentus/Abelmoschus esculentus*). An identical 72-hour germination protocol was used, and an *N* of 20 seeds was selected for each group based on the results of prior University of Arizona studies (Creath & Schwartz, 2004).

**Depression.** The Beck Depression Inventory-II (BDI) is a 21-item 4-point Likert scale self-report instrument used to assess depression severity in adults and adolescents (Beck et al., 1996). Each inventory item corresponds to a specific category of depressive symptom and/or attitude. Each category describes a specific behavioral manifestation of depression and consists of a graded series of four self-evaluative statements. The statements are rank-ordered and weighted to reflect the range of severity of the symptom from neutral (0) to maximum severity (3). The instrument is reliable and valid and has excellent test-retest reliability (Dozois et al., 1998; Sprinkle et al., 2002). The BDI-II is the most common clinical instrument to assess depression severity and takes less than five minutes to administer.

### Intentional Treatment and Blinding Procedure

The client, a 42-year-old woman, had been diagnosed with major depressive disorder 10 years prior after her long-term marriage ended. Her psychiatrist prescribed sustained-release Zoloft at 400 mg once/day. Disliking the side effects, the client attempted to cease her medication several times in the ensuing years. She had managed to discontinue medication use voluntarily five years previously, though she currently reported feeling consistently depressed.

The client was introduced to a life coach trained in Clinical EFT for the first time on the day of the study. Both the client and the practitioner were naïve to the presence of seeds and were informed that the purpose of the study was to measure posttreatment change using the BDI measure. While certain other studies examine the effects of human intention on targets such as seeds and plant growth, this study was designed to leave practitioner and client blind to eliminate the confounding variable of intention.

The client was given a clipboard to complete an informed consent form and the BDI measure. Prior to EFT intervention, the client's BDI score was 20, which indicated symptoms of "moderate" depression. The okra seeds were located in a small pouch taped inconspicuously to the back of the clipboard. A research assistant engaged the client in conversation during and after form completion to ensure the client held the clipboard for exactly 15 minutes. The clipboard was made of a non-conductive material. The client was then led to another room for a 2-hour EFT session.

The client's divorce had triggered her depression, reinforced her feelings of worthlessness, and brought up memories of a lack of affection from both parents. In the EFT session, the client identified two instances of childhood trauma that triggered feelings similar to the divorce, while tapping on EFT's stress-reduction

points. One event involved her mother and a second event involved her father. The client was asked to rate her degree of depression on a Subjective Units of Distress (SUD) scale ( $10 = \text{Maximum}$ ,  $0 = \text{None At All}$ ). When discussing the first event, with her mother, she gave a SUD score of 10 and the location of maximum distress was her heart. After EFT intervention for the incident, she reported her SUD score as 4. After a second round of EFT, she reported her SUD score as 2. The second event was with her father. She reported a SUD score, linked to her jaw and throat, of 10. After a round of EFT treatment, her SUD score was 6, and after a second round of treatment, it was lowered to 1.

After treatment, the research assistant handed the client a second clipboard, containing the second group of okra seeds, and instructed her to complete a second BDI. The research assistant engaged the client in conversation until the client had held the clipboard for a second 15-minute period. The client's score on the BDI retest was 3.

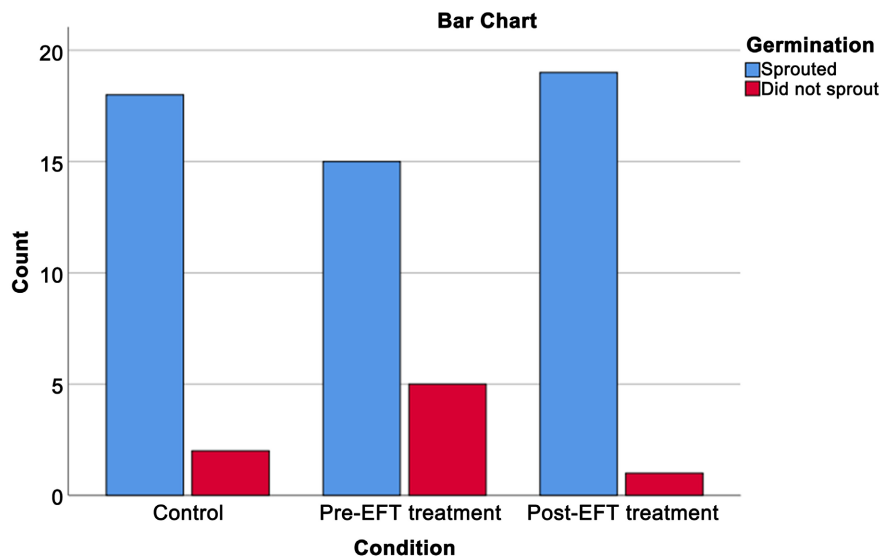
### **Seed Preparation and General Experimental Design**

The seeds from each packet were removed with tweezers by a second research assistant who was blind to the seed treatment groups. They were placed in petri dishes that had been prepared with black felt. A third batch of seeds not held by any person was used as an untreated control. Seeds were placed between layers of black felt to retain moisture and ensure darkness. The three dishes were labeled P, Q, and R. They were placed in separate closed containers, in the same room, controlling for water, temperature, light, and humidity. An independent scorer blind to the conditions monitored the number of seeds that sprouted (germinated) every 12 hours. Monitoring consisted of digitally photographing the seeds, counting the number of sprouted seeds, and adding equal measured amounts of water to each dish. Seed growth was assessed by the independent observer. Seed germination was considered to have occurred when the radicle (root shoot) was visible through the testa (seed coat). After 72 hours, at the conclusion of the study, the seeds were photographed one final time and the results were tabulated.

## **3. Results**

### **Seed Germination**

The number of seeds that germinated was measured in each group. Of the 20 seeds in the post-EFT treatment group, 95% sprouted compared with 75% in the pre-EFT treatment and 90% in the control group. The results of seed germination are displayed in **Figure 1**. Seed germination between the control and pre-EFT treatment group  $t(18) = 1.84$ ,  $p = .083$  (2-tailed) and between control and post-EFT treatment groups,  $t(18) = -1.00$ ,  $p = .331$  (2-tailed) was statistically nonsignificant. Seed germination between pre-EFT treatment group and post-EFT treatment group was statistically significant,  $t(18) = -.21$ ,  $p = .042$  (2-tailed). As can be seen from **Figure 1**, a greater germination rate was observed in the posttreatment group of seeds.



**Figure 1.** Seed germination results for seeds exposed to three conditions: untreated control, held by the client pre-EFT treatment, and held by the client post-EFT treatment.

### Root Hair Growth

Seeds in the post-EFT treatment group developed more visible root hairs in the 72-hour growth period ( $n = 14$ ) compared to the groups held pre-EFT and the untreated controls ( $n = 4$  for both groups). The proportion of seeds with root hair growth in the post-EFT treatment group was statistically significantly higher than the control group,  $t(18) = 4.47$ ,  $p = .000$  (2-tailed). The proportion of seeds with hair growth in the control and pre-treatment groups could not be evaluated statistically because there was no change between these groups. The pre/post change was significant,  $t(18) = -.4.47$ ,  $p = .000$  (2-tailed).

## 4. Discussion

This study provided one of the first examinations of human mood using seed assays. The results supported the second study hypothesis but not the first. Okra seeds exposed to the clinically depressed client before the Clinical EFT intervention showed impeded germination and root hair development. Root hair growth was significantly attenuated in seeds exposed to the client. They also germinated at a lower rate than those in the control and post-EFT intervention treatment group at a statistically meaningful level. Future longitudinal research could assess the effect of positive and negative mood on biological microorganism structure using larger seed samples under similar controlled conditions. Similar outcomes have been observed under double-blind conditions using healing energy (Grad, 1963; Creath & Schwartz, 2004).

The hypothesis that seeds exposed to the depressed client following EFT treatment would germinate at a greater rate was confirmed. No difference was found in the control condition. Consistent with the second hypothesis, seeds in the post-EFT treatment group developed more visible root hairs than those in

the control and pre-EFT groups. This finding supports prior work that has examined the benefits of noncontact healing in therapeutic techniques such as qigong (Hammerschlag et al., 2014). It is possible the seeds in the post-EFT group received the benefit of the 2-hour treatment through interaction with the client's biofield, which, in turn, stimulated increased root hair growth. As such, these findings support other studies that have observed higher rates of seed growth in healing intention samples when compared to controls.

## 5. Limitations

The current study had several limitations. The results were obtained using a single client who was blinded to the experimental condition. When compared to some of the other research involving seed bioassays (Creath & Schwartz, 2004), the sample of seeds was small. A future study could use multiple clients and a larger sample of seeds to produce greater measures of statistical effect. The primary investigator is a proponent of the EFT method, though both the research assistant assessing the seeds, and the statistician who analyzed the results, did not have therapeutic allegiance.

The scope of this study did not include measuring the magnitude of electromagnetic field fluctuations and comparing it with previous studies to conclude that the outcomes were an explicit result of biofield alterations. Assessing the electromagnetic field pre and post-intervention will add to the robustness of the outcomes in future studies.

Objective measures of psychological healing offer a means of corroborating the results obtained from subjective measures. The seed germination bioassay is one such objective method. It has the benefit of not being invasive, unlike a blood draw. Although bioassays offer objective biomarkers to help elucidate mechanisms of action, it may be possible for subjects to manipulate them consciously or unconsciously. There are documented instances of the intention of subjects affecting plant growth (Haid & Huprikar, 2001; Tompkins & Bird, 1973; McTaggart, 2001). The results of a bioassay are potentially influenced by the intention of the subject, though in the current study design the client was blind to the existence of the seeds.

## 6. Conclusion

As multicellular complex organisms, plants are thought to provide an objective mechanism to examine the effect of biofield energy. This study examined the effect of depression using a seed bioassay. It found a significant difference in root hair growth in seeds exposed to a depressed human subject, as well as a significant difference in seed germination. Consistent with the published literature, results indicated that human emotional conditions can affect the biological viability of seeds. The findings add to the literature showing that simple bioassays can provide an objective biomarker that can be used to assess the treatment effects of healing therapies.



## Conflicts of Interest

The author derives income from publications and presentations on the therapeutic modality examined in this study.

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