

# Comparing AIT and EFT in Reduction of Negative Emotions Associated with a Past Memory: A Randomized Control Study

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## Abstract

Advanced Integrative Therapy [AIT] is an Energy Psychology-based system of intervention utilized by psychotherapists since the late 1990s. Recently, a study investigated the perceptions of therapists regarding the effectiveness of AIT in reducing negative emotions related to past traumatic events. Emotional Freedom Techniques (EFT) are a set of well-researched Energy Psychology based interventions which have been established as an effective intervention for post-traumatic stress disorder. This study is the first to compare the effectiveness of AIT to EFT in reducing negative emotions associated with a particular memory in a sample of college and professional students, who were randomly assigned to the intervention. A total of 72 students (intervention AIT:  $n = 38$ , 52.8%) or EFT (intervention EFT:  $n = 34$ , 47.2%), completed a pre/post survey consisting of Subjective Units of Distress (SUD) scale, presence of the initial negative emotion, and presence of the original physical sensation. Both interventions led to a significant drop in SUD scores from over 4 (pre-intervention) to about 1 (post-intervention). There were no statistically significant differences observed in the post-intervention mean scores of SUD ( $1.03 \pm 1.10$  vs.  $1.29 \pm 0.71$ ,  $p = 0.2$ ) and HRV ( $52.02 \pm 20.68$  vs.  $47.23 \pm 21.55$ ,  $p = 0.4$ ) among both intervention arms. Interestingly, a significantly higher proportion of participants who underwent AIT required only one round of intervention to report their SUD dropped to 0 or 1 (elimination of negative emotion) as opposed to those with intervention EFT (47.4% vs. 14.7%,  $p = 0.012$ ). The results of this trial suggest the equivalence

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of AIT and EFT, that AIT provides the same degree of robust response already documented with EFT in reducing the negative emotions associated with traumatic past experiences. This first randomized control trial (RCT) of AIT compared with a known effective treatment, EFT, provides an initial set of data to suggest that AIT demonstrates similar efficacy in the reduction of negative emotions associated with past traumatic experiences.

## Keywords

Advanced Integrative Therapy, Emotional Freedom Techniques, Subjective Units of Distress, Post-Traumatic Stress Disorder

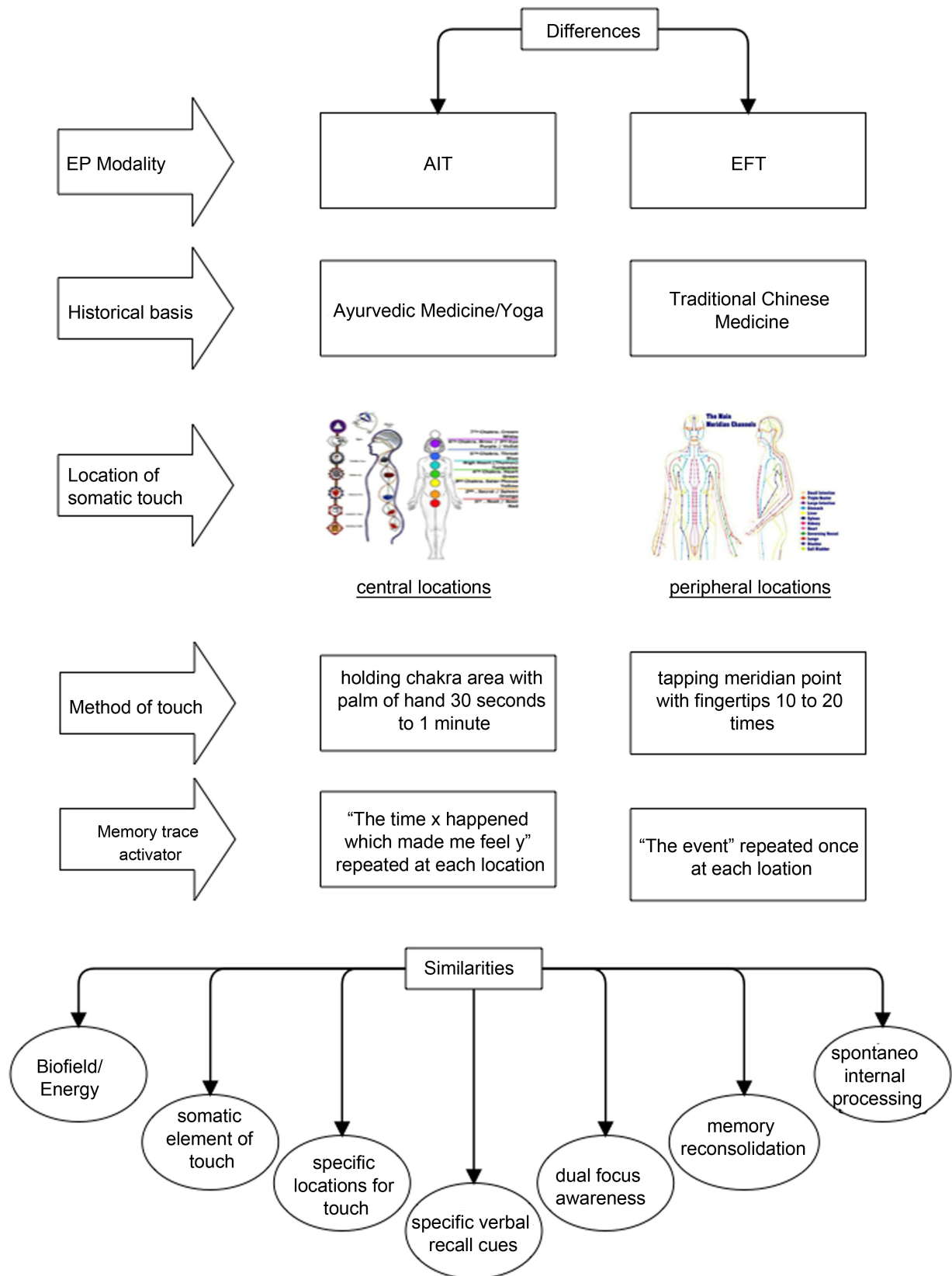
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## 1. Introduction

In the wake of the COVID-19 pandemic, the United States (U.S.) has experienced a rising incidence of serious psychiatric conditions, including depressive disorders, anxiety disorders, and post-traumatic stress disorder (PTSD) (Nochaiwong et al., 2021). Despite the availability of a range of pharmaceutical and non-pharmaceutical treatment options, a considerable number of patients continue to struggle with mental illness that is resistant to conventional therapies (Howes et al., 2022). It is therefore important to investigate and validate new treatment techniques as they become available.

Energy Psychology is a mind-body approach to psychotherapy that combines principles from both Eastern and Western medicine (Gallo, 2004). It utilizes verbal and somatic techniques to reduce troubling emotions tied to specific memories. In this context, the term “energy” refers to the biofield elements linked to specific conduits (meridians) or reservoirs (chakras) to promote health and facilitate healing (Church et al., 2022) (Figure 1). Energy Psychology is therefore a hybrid of ancient and modern concepts. Traditional Chinese medicine, for instance, focuses on correcting disruptions or blockages in the flow of life energy, known as Qi, through the twelve primary meridians associated with an organ or organ system (Li, 2011). This meridian system is known to Western medicine through acupuncture, which targets specific points on the body to address energy imbalances between meridians and is commonly used to alleviate pain (Zhou & Benharash, 2014). Similarly, Ayurvedic medicine from the Indian subcontinent consists of a system based on seven discrete energy centers called “chakras”. Manipulation of these chakras was similarly thought to treat a wide variety of physical and psychological illnesses (Chase, 2018; Goldsby & Goldsby, 2020). Acupressure techniques are becoming increasingly used in clinical practice, suggesting a growing interest in energy psychology (Feinstein, 2021). The literature now contains multiple randomized controlled trials and anecdotal clinical reports that suggest the efficacy of Energy Psychology in treating psychological conditions (Feinstein, 2012; Feinstein, 2022).

Beginning in the 1990s, clinical psychologist Roger Callahan developed a



EP = Energy Psychology, AIT = Advanced Integrative Therapy (Quick AIT Protocol), EFT = Emotional Freedom Technique

**Figure 1.** Differences and similarities between AIT and EFT.

treatment modality titled thought field therapy (TFT) which incorporated principles derived from both acupuncture and applied kinesiology for the treatment of mental illness (Lee & Kim, 2012). TFT relies on the tenets of traditional Chinese medicine and specifically focuses on the imbalance of Qi within the primary meridians as the underlying pathology of psychiatric illness. In Thought Field Therapy, the individual percusses on or near an acupoint while recalling a distressing memory to relieve the unpleasant emotions associated with that memory (Callahan & Callahan, 1996). TFT employs a comprehensive protocol to determine the order in which acupressure points are stimulated, based on the nature of the disorder or memory being treated (Pignotti, 2007).

More recently, Gary Craig developed the emotional freedom techniques (EFT), a simplified version of TFT. Craig introduced a “basic recipe” of treatment points on the body that can be stimulated a standardized order as opposed to the more complicated algorithmic approach to treatment point selection found in TFT (Craig & Fowlie, 1995). EFT can effectively treat a variety of psychiatric conditions including anxiety, depression, and PTSD (Bach et al., 2019). On the SUD scale, a score of 0 indicates no emotional distress, while a score of 10 signifies severe emotional distress (Wolpe & Lazarus, 1966). This scale is used throughout clinical medicine to measure negative emotions and is the basis of the “pain scale”. The SUD scale allows an individual to quantify emotions on a numerical scale, which can communicate the intensity of their experience. EFT is validated for use in multiple patient populations, including veterans who suffer from PTSD and has received approval for use in the treatment of PTSD from the Veterans Administration (VA) (Church et al., 2013; Church et al., 2017; Church et al., 2022). Additionally, Stapleton et al. (2020) found EFT effective for reducing the overall severity of symptoms of depression and anxiety, demonstrating a broader potential treatment focus.

In addition to subjective measures, such as SUD scores, Energy Psychology treatment modalities have also been evaluated using empirical measurement of various physiological processes to understand the biological mechanisms that may underlie the reported changes in symptom severity. Post-treatment physiological change as measured by fMRI, EEG, endocrine findings, and heart rate variability (HRV), have been correlated with the subjective reports of symptom improvement to assess the effects of therapy. For example, in overweight and obese patients who underwent EFT and reported significant reductions in food cravings, fMRI revealed decreased activity in the cortical regions of the brain associated with feeding response including the limbic system pathways thought to regulate emotional eating (Stapleton et al., 2017; Stapleton et al., 2019). Similarly, chronic pain patients who experienced reduced pain after EFT treatment showed fMRI evidence indicating a significant decrease in connectivity between the pain-modulating area of the brain and the thalamus, a pathway thought to be important in the catastrophizing of pain (Stapleton et al., 2020). In previous studies, electroencephalography (EEG) has been used to evaluate improvements in

altered emotional processing in patients with various psychiatric disorders. A study by König et al. (2019) used changes in late positive potential (LPP), as measured by EEG, to assess improvements in emotional processing in patients with anxiety disorders. In comparing EFT to progressive muscle relaxation (PMR), the study found that patients demonstrated reduced responsiveness to fear and anger-inducing stimuli with EFT (König et al., 2019). Bach et al. (2019) reported reductions in salivary cortisol levels and an increase in salivary immunoglobulin a post-EFT treatment, suggesting decreased stress and improved immune system function.

Although the exact mechanisms of action for verbal-somatic therapies like EFT remain unknown, touch-based therapies have been found to increase parasympathetic activation and lead to reduced sympathetic tone (Lane, 2009). A study measuring heart rate variability (HRV) in participants undergoing EFT found an overall increase in their HRV, suggesting a change in the balance between parasympathetic and sympathetic activation (Bach et al., 2019). HRV, which measures the variation in between-beat intervals, is associated with autonomic nervous system activity, with decreased HRV suggesting increased sympathetic activation and increased HRV suggesting increased parasympathetic activation (Shaffer & Ginsberg, 2017; Singh et al., 2018). Although HRV and similar measures have helped to reveal physiological changes following EFT, they do not explain the underlying reasons for these changes. While a definitive explanation for EFT's efficacy remains elusive, several mechanisms have been proposed. These include the manipulation of Qi and meridian rebalancing as reported in acupuncture, as well as the possible involvement of dual attention awareness theory, memory reconsolidation, and classical conditioning. In the context of classical conditioning, EFT intervenes in the encoding and recalling of implicit and explicit memories, particularly in disorders like PTSD where maladaptive fear-memory learning leads to conditioned fear responses. Tapping on acupuncture points while recalling the problematic memory blocks the stress response and allows for the re-encoding of the memory without the associated fear response (recovered fear-extinction capability) (Feinstein, 2012).

Modalities, such as Advanced Integrative Therapy (AIT) also fall under the general umbrella of Energy Psychology. AIT, developed by Asha Clinton in the late 1990s, aims to eliminate negative emotions associated with traumatic memories, reduce negative cognitions linked to these memories, and establish positive alternative emotional responses (Advanced Integrative Institute, 2021). Unlike EFT, AIT does not involve tapping on acupoints. Instead, a hand is placed over specific areas on the body, progressing from the crown of the head to the base of the spine, while speaking a simple phrase. These areas correspond roughly to the Chakra energy centers of ancient Ayurvedic medicine. Moga (2022) suggested that during an AIT session, manipulation of broad-spectrum electromagnetic radiation associated with the underlying nerve plexuses takes place. Individual Chakras store memories encoded within their energy patterns; for in-

stance, the solar plexus chakra, located where the ribs meet the tip of the sternum, has been thought to hold memories related to an individual's core identity (Feinstein, 2022).

As noted above, AIT incorporates both verbal and somatic components. To begin, an individual selects a troubling memory and then assigns a word or short phrase that will represent the memory throughout the AIT session. The individual then identifies the negative emotion associated with the memory and reports the location and nature of any physical sensations associated with the memory. A 0 - 10 SUD score measures the initial intensity of the negative emotions associated with the memory. The combined somatic-verbal process is begun, in which the somatic component of AIT uses light touch instead of tapping. A moving hand is placed in sequence over each chakra-associated area, while a stationary hand is held over the energy center identified by the individual as the focus of memory-associated physical sensation. If the individual does not identify a specific physical sensation and its location, then the stationary hand is placed over the midline chest (in Ayurvedic medicine, the heart chakra). The clinician mirrors the hand placement and movement between the energy centers. A phrase incorporating the memory-specific word (words) is spoken antiphonally by the clinician and patient once the center of the palm of the moving hand is positioned over each energy center. The moving hand remains in place in each area until the clinician observes subjective signs of emotional clearance, such as a slight relaxation in posture or a transient change in the individual's facial expression. Once a cycle of hand placement has been completed, a change from baseline is measured by subjective units of distress (SUD). This sequence repeats until a SUD score of 0 or 1 is reported by the individual for the specific event, emotion, or limiting belief. Depending on the complexity and severity of the emotional content, multiple repetitions of the protocol may be necessary to achieve the desired reduction in negative emotions.

Despite limited data availability, reports from case studies and a recent cross-sectional study suggest that AIT may be promisingly effective in the treatment of persistent negative emotions. In one case reported by Elizabeth Pace (2021), an African-American patient underwent AIT to address ancestral trauma and comorbid PTSD. The patient experienced reduced trauma-associated negative emotions and reported feeling more connected to their body. A recent cross-sectional study surveyed clinicians trained in AIT and found that the average pre-intervention SUD score was  $8.3 \pm 2.7$ , which after a single AIT session, consisting of three to five rounds of AIT intervention, it significantly decreased to either 0 or 1 in 92% of cases (Brown et al., 2022). While this pilot study relied solely on clinician assessments, their observations support the clinical utility of AIT in reducing negative emotions related to past traumatic events. However, further research in the form of client-based assessments and randomized control clinical studies against established therapies is necessary to systematically evaluate AIT. Currently, however, the limited evidence on the successful use of AIT

in reducing the severity of emotionally activating memories has not been validated by systematic comparison to previously studied treatment modalities such as EFT. Consequently, it remains unknown whether AIT is equivalent, inferior, or superior to other Energy Psychology or nonenergy psychology treatment techniques. To address this gap, the current study conducted a randomized controlled trial comparing the Quick-AIT protocol to basic EFT using a sample of students at a UNLV, The University of Nevada, Las Vegas.

## **2. Methods**

### **2.1. Study Design, Setting, and Participants**

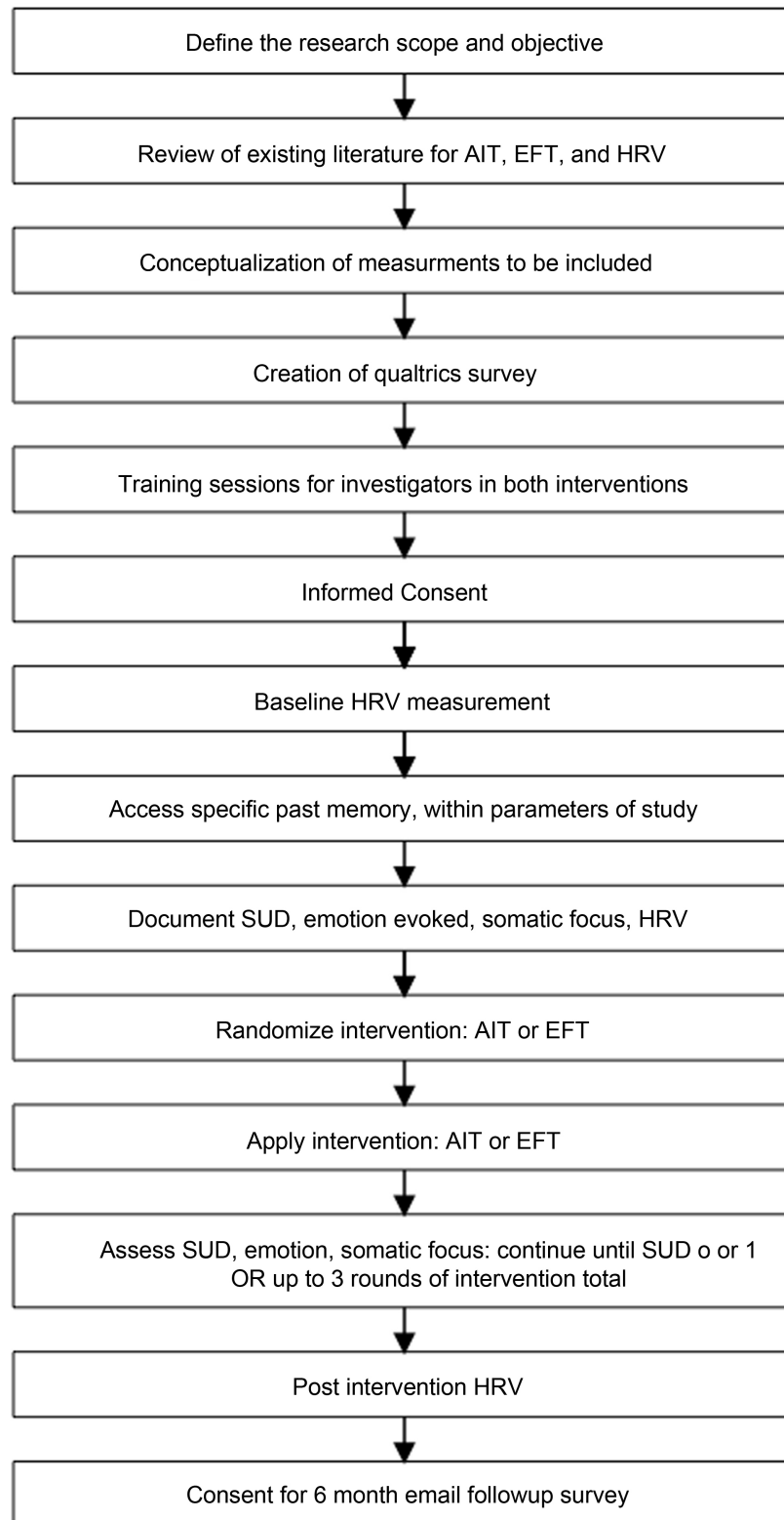
This study was a randomized control, parallel study design being conducted at the University of Nevada, Las Vegas. The complete flow of the study creation and process are illustrated in **Figure 2**. Inclusion criteria included English-speaking students enrolled in degree programs at undergraduate, graduate, or postgraduate levels who could sign the informed consent. Participants were excluded if they were under the age of 18 years or non-English speaking. Participants with pre-intervention SUDs of 0 or 1 and those with unknown SUD values were also excluded.

### **2.2. Ethical Consideration**

The study protocol was approved by the UNLV IRB on September 26, 2022 (UNLV-2022-455). It was identified as a Category 3 (i) (A) study (research involving a benign psychological intervention in such a manner that the identity of subjects cannot be readily ascertained). To protect the identity of subjects, a separate email and data system was created by the university IT department. Personal identifying information was not included in the data collection system. Subjects received a \$20 debit card for their time and participation in the study; this debit card payment was processed on-site through an online system separate from the data collection system provided by UNLV for the payment of study subjects. There was no way to connect information from the data analysis Qualtrics survey and the payment processing system. Access to survey data was limited to the primary investigators. Data collection was performed during each intervention session, and the Qualtrics system was programmed to prevent duplicate data entry.

### **2.3. Recruitment of Subjects**

Subjects were recruited through multiple channels of electronic communication, which included university newsletters, listservs of the institutional students' organizations, contacts of the investigators, and mass emails sent to the undergraduate, graduate, and postgraduate schools within the university system, in addition to word of mouth. Participants demonstrated interest in inclusion by completing a brief online questionnaire that captured contact information for scheduling purposes. Data collection spanned from January through May 2023.



AIT = Advanced Integrative Therapy [Quick AIT Protocol], EFT = Emotional Freedom Technique, HRV = Heart Rate Variability, SUD = Subjective Units of Distress

**Figure 2.** Flow chart depicting the design and conceptualization of the study.



## 2.4. Study Procedures

Subjects were randomized to the AIT intervention or EFT intervention via a random number process in which the investigator pulled a numbered piece of paper from a jar, numbered with either a one (1) or a two (2). The random number 1 was assigned to Intervention A, which will hereafter be identified as AIT. The random number 2 was assigned to Intervention B, which will hereafter be identified as EFT. EFT protocol was the control standard used for the study, as described by Bond University (Church, 2018). Quick AIT protocol (Clinton, 2010) was used as described by the Basic AIT manual and standardized for this research project. Both intervention protocols were of similar complexity and duration.

## 2.5. Measures

Subjects identified a memory of a single incident, unrelated to family, from middle to late childhood that, when recalled, still provoked a negative emotional response of between 3 and 5 on the SUD scale, at the time of the study. The SUD score is a subjective measure of emotional intensity first described by psychologist Joseph Wolpe (1973) and is used in a significant number of EP studies and EP-based clinical interventions, in addition to being part of the protocols of treatment. Using the SUD scale, the intensity of a negative emotion is measured between 0-10 with zero being the absence of negative emotion and 10 being the most intense negative emotion ever experienced by the rater. This study used the pre-post-intervention difference in SUD as its primary outcome measure. HRV is a measure of the balance between parasympathetic versus sympathetic nervous system activity and was used as a physiological measure to compare baseline, post-memory selection, and post-intervention autonomic nervous system balance. A higher HRV score is correlated with decreased sympathetic activation and increased parasympathetic activation which has been associated with reduced emotional distress/emotional tone. Pre- post-intervention change in HRV was the secondary outcome of this study. The investigators prompted the participants to select an alternative memory if the initial memory identified did not meet the selection criteria (involved family, was assigned a SUD > 5, etc.). The subjects did not relate the details of the memory to the investigators. After selecting the memory, the pre-intervention SUD score, the emotion evoked, and the physical location of the emotion in the body, each was documented via iPad in the data collection system.

## 2.6. Survey Tool

The survey tool was completed in the Qualtrics system. Subjects completed a Qualtrics survey on a provided mobile device. The survey was reviewed to ensure its face and content validity, and pre-testing of the survey was performed multiple times by the study's investigators and a few volunteers from the target population. The first item on the survey was the informed consent information

and confirmation of receipt and agreement to participate. Next, the survey included eleven demographic questions. Before each round of AIT or EFT, the survey recorded the reported SUDs, the emotion evoked, the location of the memory-associated physical sensation if any, and the HRV as measured by the smartphone application “Camera HRV” (Table 1). Measurements made from photoplethysmography by use of a smartphone application have been shown to be valid and reliable to detect heart rate variability when correlated with ECG, however the smartphone applications significantly overestimated LnRMSSD (Holmes et al., 2020). A total of three rounds of intervention were possible, however, if the subject SUD dropped to a zero or one after any given round, the survey was designed not require additional rounds. All subjects received a post intervention HRV measure whether or not their SUD dropped to zero or one. The final question on the survey requested permission to reach out by email in 6 months to assess the durability of the treatment’s effects.

## 2.7. Treatment Intervention

A total of seven investigators were involved in delivering the interventions. The lead author, Dr. G. Brown, psychiatrist, was trained and certified in AIT by the Advanced Integrative Therapy Institute [AITI]. He completed EFT training at basic, intermediate, and advanced levels in Gary Craig’s initial video training modules, and later trained in EFT through the official training program through The Association for Comprehensive Energy Psychology at both level 1 and level 2. He trained and assessed each investigator in a series of four 90-minute standardized training sessions, in which skill sets were observed for competence in following the basic protocols for Quick AIT and basic EFT. The EFT protocol additionally matched those used in studies conducted by Bond University online. Each of the four sessions included both the practice of skill sets necessary to deliver each intervention and the assessment of competence in each of these skill sets. This was not a crossover study design, and each participant received either AIT or EFT only. After randomization, each participant consented and

**Table 1.** Variables and measures used in the study.

| Variable               | Tool used                                  | Type of the variable          | Measurement scale | Total # of items | Score range |
|------------------------|--|-------------------------------|-------------------|------------------|-------------|
| SUD Score              | Subjective Units of Distress               | Dependent (primary outcome)   | Continuous        | 1                | 0 - 10      |
| Heart Rate Variability | Camera HRV app using rMSSD measure for HRV | Dependent (secondary outcome) | Continuous        | 1                | 0 - 100     |
| Type of emotion        | Naming the emotion felt                    | Independent                   | Categorical       | 1                | -           |
| Location in body       | Naming the location in the body            | Independent                   | Categorical       | 1                | -           |

recorded their demographics in the data collection system via survey. An initial HRV was measured using each investigator's smartphone device and recorded in the survey. The participant then selected a memory, the memory was assessed for the inclusion criteria as above, and the initial SUDs, emotion identified by the participant, and the location of any memory-associated physical sensations were recorded. Another post-memory-identification HRV measurement was recorded. At the end of the first intervention, SUD, emotion identified, and the location of the physical sensation was documented by the subject. Up to three rounds of intervention were available within the protocol design. At the end of each round of intervention, the SUD, emotion, and bodily sensation was identified. A final HRV measurement occurred whether or not the SUD reached a zero or one. If the SUD was reported as a zero or one after intervention round one or two, further rounds of intervention did not occur; thus some subjects completed the study after one round, some after two rounds, some after three rounds. All subjects had three total HRV measurements.

## 2.8. Sample Justification

Due to the lack of existing literature on this topic area, we relied on the conventional method of power analysis. G power software (version 3.1) was used to perform a priori power analysis (Faul et al., 2007). For the repeated measures, within-between interaction, effect size of 0.25, with a power of at least 80% at 5% alpha error probability, the minimum sample size of  $N = 34$  was deemed appropriate. Our current sample size was relatively large, which allowed us to analyze subgroup differences.

## 2.9. Data Analysis

First, univariate and bivariate tests were conducted to analyze the data. Statistical assumptions, including the normality and homogeneity of variance were assessed, and outliers were assessed. Levene's test was conducted to assess the homogeneity of variance assumption. Categorical variables were reported as frequencies or percentages. Continuous variables were presented as mean and standard deviation. The mean differences in the continuous outcomes at the pre-interventional level were calculated using an independent-sample t-test/or Welch t-test if homogeneity of variance was not assumed. The Chi-square/Fisher exact test was used for comparing the nominal variables. The Two-Way Mixed ANOVA model was also used to establish whether there is an interaction between the between-subjects factor (e.g., type of intervention) and within-subjects factor (e.g., time points, pre, and post) on the two dependent variables separately (SUD and HRV). A subgroup analysis to compare groups by different criteria i.e., emotional clearance "yes" vs. emotional clearance "no" regardless of the intervention rounds was also conducted. The significance level was set at 5% and the normal approximation to the binomial distribution method was used to calculate 95% confidence intervals of proportions in the univariate analyses. All

analyses were conducted using SPSS version 28.

### 3. Results

Among a total of seventy-two participants, 38 (52.8%) were randomly assigned to AIT [intervention A] and the remaining 34 (47.2%) were assigned to EFT [intervention B]. The mean age of the sample was  $31.19 \pm 8.092$  years and 58% of the sample constituted females. Over 3/4<sup>th</sup> of the sample was non-Hispanic with only 6.9% African Americans. About 50% of the sample had “never married” status, had full-time employment, and were professional trainees that included medical residents/fellows (**Table 2**).

Upon comparing baseline characteristics of the participants in AIT and EFT, no statistically significant differences were found in the type of emotions evoked or the associated physical sensations, HRV at baseline and post-memory levels as well as post-memory SUD scores. The differences in the location of the physical sensation were marginally significant ( $p = 0.05$ ), with 23.5% of EFT participants having felt the physical sensation in the head region as opposed to 5.3% among AIT participants (**Table 3**).

Results of two-way ANOVA revealed no statistically significant interaction between the intervention and time on SUD and  $F(1, 70) = 1.554, p = 0.22$ , partial  $\eta^2 = 0.022$ . The main effect of time showed a statistically significant difference in mean SUD at the different time points (pre and post),  $F(1, 70) = 276.520, p < 0.001$ , partial  $\eta^2 = 0.798$ . The main effect of intervention showed that there was no statistically significant difference in the SUD score between intervention groups  $F(1, 70) = 1.089, p = 0.300$ , partial  $\eta^2 = 0.015$ . Likewise, there was no statistically significant interaction between the intervention and time on HRV and,  $F(2, 138) = 2.558, p = 0.08$ , partial  $\eta^2 = 0.036$ . The main effect of time showed no statistically significant difference in mean HRV at the different time points (pre-intervention, post-memory, and post-intervention),  $F(1, 138) = 2.330, p < 0.101$  partial  $\eta^2 = 0.03$ . The main effect of intervention showed that there was no statistically significant difference in the HRV score between intervention groups  $F(1, 69) = 1.587, p = 0.212$ , partial  $\eta^2 = 0.022$ . The descriptive statistics of post-interventional emotional statistics are provided in **Table 4**. Interestingly, a significantly larger proportion of AIT participants had emotional clearance in just one round as opposed to those who underwent EFT (47.4% vs. 14.7%,  $p = 0.012$ , **Table 4**).

Of the total thirty-eight participants who underwent AIT, 31 (81.6%) had SUD dropped to either 0 or 1 (meaning emotional clearance). There were no statistically significant differences found in HRV at baseline, post-memory, or post-intervention time points (**Table 5**). However, in the case of EFT, significant differences were noted in the baseline HRV.

Of the total seventy-two participants, 28 (38.9%) underwent three rounds for clearing negative emotions. The sub-analysis of this group has been presented in **Table 6**. In this sub-sample, no statistically significant differences were found in

**Table 2.** Demographic characteristics of the entire sample (N = 72).

| Variable                                | Categories/Groups                                    | n (%)         | 95% CI (LCL, UCL) |
|---|--|---------------|-------------------|
| Age in years (Mean ± SD)                | -  | 31.19 ± 8.092 | 29.29, 33.10      |
| Gender assigned at birth                | Male   | 27 (37.5)     | 26.3, 49.7        |
|   | Female   | 42 (58.3)     | 46.1, 69.8        |
|   | Other  | 2 (2.7)       | 0.3, 9.6          |
| Sexual Orientation                      | Heterosexual   | 60 (83.3)     | 72.7, 91.0        |
|   | Gay or Lesbian                                       | 3 (4.2)       | 0.8, 11.7         |
|   | Bisexual   | 5 (6.9)       | 2.3, 15.5         |
| Ethnicity                               | Hispanic   | 13 (18.1)     | 9.9, 28.8         |
|   | Not Hispanic   | 56 (77.8)     | 66.4, 86.7        |
| Race                                    | White  | 30 (41.7)     | 30.2, 53.8        |
|   | African American                                     | 5 (6.9)       | 2.2, 15.5         |
|   | Asian  | 22 (30.6)     | 20.2, 42.5        |
|   | Other*   | 10 (13.8)     | 6.8, 24.0         |
| Permanent resident or Citizen of the US | Yes  | 68 (94.4)     | 86.3, 98.5        |
|   | No   | 3 (4.2)       | 0.8, 11.7         |
| Marital Status                          | Divorced   | 5 (6.9)       | 2.2, 15.5         |
|   | Married  | 20 (27.8)     | 17.8, 39.5        |
|   | Member of an unmarried couple                        | 9 (12.5)      | 5.8, 22.4         |
|   | Never married  | 37 (51.4)     | 39.3, 63.3        |
| Highest level of education              | 4-year college degree                                | 19 (26.4)     | 16.7, 38.1        |
|   | Graduate level degree                                | 42 (58.3)     | 46.1, 69.8        |
|   | High school diploma or GED                           | 3 (4.2)       | 0.8, 11.7         |
|   | Some College   | 8 (11.1)      | 4.9, 20.7         |
| Student Type                            | Undergraduate  | 12 (16.7)     | 8.9, 27.3         |
|   | Graduate   | 26 (36.1)     | 25.1, 48.2        |
|   | Professional trainees, including residents & fellows | 34 (47.2)     | 35.3, 59.3        |
| Employment Status                       | Part-time paid job                                   | 18 (25.0)     | 15.5, 36.6        |
|   | Full-time paid job                                   | 37 (51.4)     | 39.3, 63.3        |
|   | Not-working  | 16 (22.2)     | 13.2, 33.5        |
| Household Annual Gross Income           | 0 to \$10,000  | 7 (9.7)       | 4.0, 19.0         |
|   | \$100,001 to \$25,000                                | 7 (9.7)       | 4.0, 19.0         |
|   | \$25,001 to \$50,000                                 | 10 (13.9)     | 6.8, 24.1         |
|   | \$50,001 to \$100,000                                | 27 (37.5)     | 26.3, 49.7        |
|   | \$100,001 to \$250,000                               | 12 (16.7)     | 8.9, 27.3         |
|   | Above \$250,000                                      | 2 (2.8)       | 0.3, 9.6          |
| Intervention given                      | Intervention A                                       | 38 (52.8)     | 40.6, 64.6        |
|   | Intervention B                                       | 34 (47.2)     | 35.3, 59.4        |

M = Mean; SD = Standard deviation; CI: Confidence interval; LCL: Lower Confidence Level; UCL: Upper Confidence Level. Note: All measures are shown as frequency and proportions unless stated otherwise. \*Other races include multiracial groups, American Indians, Native Hawaiians, or Other Pacific Islanders. The percentage may not add up to 100% due to some missing data.

**Table 3.** Comparing baseline characteristics of emotions evoked among participants who underwent AIT vs. EFT.

| Variable  | Categories                         | Overall sample   | Intervention AIT | Intervention EFT | P value |
|---|------------------------------------|------------------|------------------|------------------|---------|
|   |                                    | N = 72           | n = 38 (52.8)    | n = 34 (47.2)    |         |
| Emotion evoked  | Anger                              | 12 (16.7)        | 5 (13.2)         | 7 (20.6)         | 0.4     |
|   | Anxiety                            | 12 (16.7)        | 9 (23.7)         | 3 (8.8)          |         |
|   | Fear                               | 8 (11.1)         | 5 (13.2)         | 3 (8.8)          |         |
|   | Guilt                              | 6 (8.3)          | 3 (7.9)          | 3 (8.8)          |         |
|   | Sadness                            | 13 (18.1)        | 4 (10.5)         | 9 (26.5)         |         |
|   | Shame                              | 11 (15.3)        | 7 (18.4)         | 4 (11.8)         |         |
|   | Other                              | 10 (13.9)        | 5 (13.2)         | 5 (14.7)         |         |
| Physical sensation associated with emotion            | Yes                                | 62 (86.1)        | 30 (78.9)        | 32 (94.1)        | 0.09    |
|   | No                                 | 10 (13.9)        | 8 (21.1)         | 2 (5.9)          |         |
| Location of physical sensation                        | Chest                              | 23 (31.9)        | 16 (42.1)        | 7 (20.6)         | 0.05*   |
|   | Head                               | 10 (13.9)        | 2 (5.3)*         | 8 (23.5)*        |         |
|   | Limbs                              | 9 (12.5)         | 4 (10.5)         | 5 (14.7)         |         |
|   | Neck                               | 6 (8.3)          | 3 (7.9)          | 3 (8.8)          |         |
|   | Abdomino-pelvic region and stomach | 11 (15.3)        | 4 (10.5)         | 7 (20.6)         |         |
|   | Other                              | 3 (4.2)          | 1 (2.6)          | 2 (5.9)          |         |
|   | None                               | 10 (13.9)        | 8 (21.1)         | 2 (5.9)          |         |
| HRV (in milliseconds) at baseline (M ± SD)            | -                                  | 48.93 ± 24 [KB1] | 53.96 ± 25.52    | 43.44 ± 21.43    | 0.06    |
| HRV (in milliseconds) associated with memory (M ± SD) | -                                  | 45.24 ± 22.74    | 47.90 ± 24.69    | 43.61 ± 21.57    | 0.43    |
| SUD associated with memory (M ± SD)                   | -                                  | 4.11 ± 1.029     | 4.03 ± 1.078     | 4.21 ± 0.978     | 0.5     |

Note: Cells marked with an asterisk (\*) are statistically significant as they had adjusted residuals greater than two. All estimates are presented as frequencies and proportions unless stated otherwise; HRV = Heart Rate Variability; M = Mean; SD = Standard deviation; The SUD is focused on a particular event, and thus a “baseline SUD” is not possible theoretically or practically.

SUD and HRV at post-memory time points except for baseline HRV (**Table 6**).

#### 4. Discussion

This study reports the findings of the first randomized controlled comparison of AIT versus EFT when used to extinguish (or reconsolidate memory) negative emotions associated with traumatic memories. The results suggested that the

**Table 4.** Comparing emotional clearance statistics among intervention groups (N = 72).

| Variable                                       | Categories     | Overall sample | Intervention AIT | Intervention EFT | P value |
|--|----------------|----------------|------------------|------------------|---------|
|  |                | N = 72         | n = 38 (52.8)    | n = 34 (47.2)    |         |
| The number of rounds for SUD to drop to 0 or 1 | One round only | 23 (31.9)      | 18 (47.4)*       | 5 (14.7)*        | 0.012*  |
|  | Two rounds     | 21 (29.2)      | 9 (23.7)         | 12 (35.3)        |         |
|  | Three rounds   | 28 (38.9)      | 11 (28.9)        | 17 (50.0)        |         |
| Post-intervention SUD score** (M ± SD)         | -              | 1.12 ± 0.978   | 1.03 ± 1.10      | 1.29 ± 0.71      | 0.2     |
| Post-intervention HRV (M ± SD)                 | 49.80 ± 21.07  | 47.90 ± 24.69  | 52.02 ± 20.68    | 47.23 ± 21.55    | 0.4     |

Note: SUD dropping to 0 or 1 indicates emotional clearance; Cells marked with an asterisk (\*) are statistically significant as they had adjusted residuals greater than 2; HRV = Heart Rate Variability measured in milliseconds; M = Mean; SD = Standard deviation; \*\*Post-intervention SUD score was calculated taking the value from the final round conducted.

**Table 5.** Comparing outcomes of participants whose emotions were cleared vs. those without the emotional clearance (N = 72).

| Variable                              | SUD dropped to 0 or 1 |                   | P value |
|---------------------------------------|-----------------------|-------------------|---------|
|                                       | Yes                   | No                |         |
| <b>Intervention AIT, n = 38</b>       | <b>31 (81.6%)</b>     | <b>7 (18.4%)</b>  |         |
| SUD (pre-intervention or post-memory) | 4.00 ± 1.095          | 4.14 ± 1.069      | 0.8     |
| SUD post-intervention (M ± SD)        | 0.48 ± 0.50           | 3.14 ± 0.69       | <0.001* |
| Baseline HRV (M ± SD)                 | 52.57 ± 22.04         | 59.94 ± 38.83     | 0.5     |
| HRV associated with memory (M ± SD)   | 48.61 ± 24.30         | 44.76 ± 28.20     | 0.7     |
| Post-intervention HRV (M ± SD)        | 50.28 ± 20.83         | 52.33 ± 28.83     | 0.8     |
| <b>Intervention EFT, n = 34</b>       | <b>23 (67.6%)</b>     | <b>11 (32.4%)</b> |         |
| SUD (pre-intervention or post-memory) | 4.13 ± 0.968          | 4.36 ± 1.027      | 0.5     |
| SUD post-intervention (M ± SD)        | 0.83 ± 0.38           | 2.18 ± 0.40       | <0.001* |
| Baseline HRV (M ± SD)                 | 49.59 ± 19.85         | 30.59 ± 19.50     | 0.01*   |
| HRV associated with memory (M ± SD)   | 48.40 ± 18.83         | 33.58 ± 24.35     | 0.06    |
| Post-intervention HRV (M ± SD)        | 50.27 ± 21.49         | 32.29 ± 24.54     | 0.04*   |

two interventions produced similar, therapeutic effects post-treatment as measured by reduced SUD scores. Both interventions led to a significant drop in SUD scores from over 4 (pre-intervention) to about 1 (post-intervention). Interestingly, a significantly higher proportion of participants who underwent AIT required only one round of intervention to reduce their reported SUD score to either 0 or 1 (elimination of negative emotion) as opposed to those treated with EFT. In both groups, HRV decreased after subjects identified the traumatic memory, and returned to baseline post-intervention, suggesting that sympathetic

**Table 6.** Subgroup analysis of participants who underwent three rounds (n = 28).

| Variable                                     | Intervention AIT | Intervention EFT | P value |
|--|------------------|------------------|---------|
| Baseline SUD associated with memory (M ± SD) | 4.45 ± 1.2       | 4.47 ± 1.0       | 0.9     |
| SUD post-intervention (M ± SD)               | 2.27 ± 1.3       | 1.76 ± 0.66      | 0.2     |
| Baseline HRV (M ± SD)                        | 61.61 ± 33.30    | 36.77 ± 20.11    | 0.020*  |
| HRV associated with memory (M ± SD)          | 48.56 ± 23.90    | 39.13 ± 21.97    | 0.3     |
| Post-intervention HRV (M ± SD)               | 60.13 ± 17.00    | 44.55 ± 21.28    | 0.065   |

M = mean; SD = Standard deviation; Results marked with an asterisk were obtained by Chi-square analysis.

activity increased with memory recall and emotional activation, and conversely parasympathetic activity (autonomic balance) was restored after intervention with AIT or EFT, however there was an inadequate number of subjects for this HRV change to find statistical significance. The results of this trial suggest the general equivalence of Quick AIT and Basic EFT; AIT may therefore potentially provide the same degree of robust response in reducing the negative emotions associated with traumatic memories as the better-studied EFT. Of note, in this study both interventions were administered in a standardized manner via a written protocol by a trained team of investigators, ensuring consistency and minimizing potential bias in the delivery of the treatments.

The tentative explanation for the comparable effectiveness of AIT and EFT can be attributed to several shared attributes. Both therapeutic modalities incorporate somatic elements, utilize verbal reminders, and follow the principle of dual attention awareness, all of which are believed to contribute to their ability to reduce negative emotions associated with distressing memories. Additionally, both interventions adhere to the effective pattern associated with memory reconsolidation, aiding in the processing and reorganization of traumatic memories for positive therapeutic outcomes (Brown et al., 2023). While EFT is based on the meridian system of acupoints, AIT draws from the chakra system. However, each potentially alters/affects neuroanatomical pathways to promote emotional processing. It has been proposed that the stimulation of the meridian points in EFT results in increased release of serotonin in the amygdala and the prefrontal cortex. Additionally, during the tapping process, subjects' repeated exposure to and concentration on a traumatic event in a safe environment may lead to emotional processing (thought to be inhibited in disorders such as PTSD) and thus a decrease in hyperarousal (Karatzias et al., 2011). Supporting a physiological basis for AIT, studies have correlated chakra locations to major neurological plexuses thought to emit photoelectric and high-frequency oscillations when activated. AIT is also thought to use dual attention stimuli and top-to-bottom tactile stimulation, potentially allowing for physically stored traumas to enter conscious awareness, leading to desensitization, reprocessing, and eventual release (Brown et al., 2023). Despite the differences in their protocols, these energy psychology interventions demonstrate similar therapeutic potential, support-



ing their utility in treating persistent unpleasant emotions linked to traumatic memories (Brown et al., 2023).

HRV served as an indicator of alterations in parasympathetic activity in response to the treatment protocols (AIT and EFT). After identifying the memory, subjects experienced a decrease in HRV, indicating heightened sympathetic activity during memory activation. However, following the intervention in both AIT and EFT groups, HRV returned to baseline levels, suggesting a notable increase/recovery in parasympathetic activity associated with these interventions. It is worth noting that no statistically significant differences were observed in the post-intervention mean scores of HRV between both intervention arms, underscoring likely similarity in the effectiveness of AIT and EFT as measured by HRV change over time.

### Limitations

While this study represents the first randomized controlled trial (RCT) investigating the effectiveness of AIT in reducing negative emotions associated with traumatic memories, this study has some limitations. First, this study was limited to young adults and others associated with the university, thus potentially limiting generalizability to the population at large. Second, in using the CameraHRV to measure HRV, the app provided some challenges in obtaining rapid and accurate measurements of HRV, as differences in the orientation of the device or pressure of the finger could lead the app to fail in an initial reading. Frustration with repeated HRV measurements may have affected the HRV if it activated the sympathetic nervous system. This might be resolved in a future study using a different measurement device to assess HRV, ear clip designs. Third, this study had a relatively small sample size. Although adequate for this analysis, replication with a more robust sample size would provide potentially confirming data. The randomization process used in this study was conducted by the investigator, which serves as an additional possible limitation. Finally, the adoption of Energy Psychology interventions, such as AIT, by clinicians may prove problematic due to the current inability to fully model the mechanism by which these interventions act within the structure of allopathic medicine, although the introduction of memory reconsolidation may provide a terminology which allopathy could find tolerable. The current Western school of thought in conceptualizing and treating mental health problems differs significantly from the principles underlying Energy Psychology techniques. Therefore, proper education and training of clinicians would be necessary to facilitate the understanding and integration of these interventions into clinical practice.

### 5. Conclusion

This study supports the utility of AIT as an intervention to target and potentially improve emotional distress associated with past trauma. While not tested in this study, the AIT protocol includes specific language which may be used to reduce

emotions related to patterns of traumatic experiences as opposed to focusing on a single memory trace. EFT does not offer a similar option in its structure of language. This unique feature of AIT has the potential to resolve negative emotions if these emotions are part of a broader pattern of behaviors and experiences more efficiently. The possibility of incorporating AIT into treatment for the range of indications demonstrated by EFT could eventually be supported provided additional studies comparing the modalities find similar results. The ability of patients to use these techniques at home after learning them may also help to support better self-regulation of negative emotional states. Additional case studies and RCTs comparing AIT with trauma-focused cognitive behavioral therapy and EMDR could further assess the effectiveness of this novel Energy Psychology method. It would be beneficial to replicate this study with a larger sample size and a potentially different HRV measurement device. Future studies to be considered include physiological brain-based studies with either QEEG or fMRI to directly measure additional parameters. Energy Psychology interventions such as AIT and EFT are shown to be noninvasive, non-pharmaceutical, typically without significant adverse effects, and simple to teach to clinicians; thus, they demand further consideration as a useful clinical strategy in practice.

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### Conflicts of Interest

The authors confirm no special interests or disputes associated with the research, authorship, and/or publication of this article.

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