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Abstract

Background: A growing body of clinical research attests to the psychological and physiological benefits of meditation. EcoMeditation is a non-pharmacological therapeutic approach used to promote health and well-being, comprising four evidence-based techniques: The Quick Coherence Technique for regulating heart rate variability (HRV), Emotional Freedom Techniques (EFT), mindfulness, and neurofeedback.

Objectives: This study investigated changes in psychological symptoms of anxiety, depression, posttraumatic stress disorder (PTSD), pain, and happiness following a one-day EcoMeditation training workshop delivered in a large-group format and at 3-months post-intervention.

Methods: A convenience sample of 208 participants (137 women, 71 men) aged between 21 and 87 years ($M = 55.4$ years; $SD = 12.8$ years) attended a one-day EcoMeditation training workshop. Participants completed a pen-and-paper survey pre-workshop and post-workshop, and an online survey three months following the EcoMeditation intervention.

Results: Post-workshop results revealed significant reductions in anxiety ($-23.4%$, $p < .001$), depression ($-15.8%$, $p = .011$), PTSD ($-11.8%$, $p < .001$), and pain ($-18.5%$, $p < .001$), while happiness scores increased significantly ($+8.9%$, $p < .001$). At 3-month follow-up, one-way repeated-measures ANOVA ($N = 65$) found significant decreases in anxiety between pre-test and post-test, and pain between pre-intervention and 3-month follow-up. Differences in depression and PTSD scores were not significant over time. Happiness scores significantly increased from pre-test to 3-month follow-up. However, post-hoc analyses suggested that the final sample size was inadequate to detect significant differences between time points.

Conclusion: Findings provide preliminary support for EcoMeditation as a brief group-based stress reduction intervention with benefits for improved psychological functioning.

Keywords

meditation, anxiety, depression, PTSD, group therapy, EcoMeditation, Emotional Freedom Techniques

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Introduction

Background

The rapidly expanding field of meditation research has delineated the therapeutic benefits of meditation practice.^{1–3} Empirical work has identified meditation as an evidence-based strategy that assists in emotional regulation and supports self-care management.^{3,4} The literature has detailed the positive psychological effects of meditative mindfulness-based interventions on cognitive responses and mood.^{5–9} In particular, outcome measures

of anxiety, depression, psychological distress, and pain have indicated significant improvements following meditation practice.^{10,11} Collectively, research has delineated the far-reaching effects of meditation and similar practices on enhanced psychological functioning.

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Meditation is a form of mental training designed to improve individuals' core psychological abilities using techniques such as mindfulness, mantra meditation, and qigong.² Although the benefits of individual meditation practice are detailed in the literature, the psychological effects of brief group-based administered meditation training have been less studied. Recently a contemplative science task force report was published that made recommendations for the expansion of the meditation research field.¹² The report identified several research opportunities, including the clinical exploration of social and relational aspects of meditation. This particular recommendation drew from social norm research, which has suggested the presence of others can influence the nature of the individual meditation experience.¹³ Specifically, group-based meditation has been found to enhance concentration, focus, and deepen the meditative experience.¹² Furthermore, while previous research suggests that proficient meditators can manage negative emotions more effectively than non-meditators,¹⁴ little research has explored the psychological effects of meditation as a brief group-based training intervention in non-meditator samples. Given the established cognitive impact of meditation, it is timely to examine the psychological effects of an intensive group-based meditation intervention.

EcoMeditation is an emergent non-pharmacological meditation practice. This new approach to meditation derives from the Whole Energy Lifestyle (WEL) suite of evidence-based stress-reduction and interpersonal relationship skills. EcoMeditation draws on elements of four empirically-established techniques: The Quick Coherence Technique for regulating heart rate variability (HRV),¹⁵ Emotional Freedom Techniques (EFT; see Research.EFTuniverse.com),¹⁶ mindfulness meditation,¹⁷ and neurofeedback.¹⁸ WEL is described in a manual,¹⁹ and besides those listed above includes qigong, Gestalt empty chair work, yoga poses, and other evidence-based techniques.²⁰⁻²⁴ Although the empirical evidence above offers support for the four individual methodologies that comprise EcoMeditation, the effects of EcoMeditation remain largely untested. As with any innovative therapeutic approach, scientific advances should be incorporated with past evidence to support the approach, which presents a challenge for new practices. The current research aimed to present an examination of a novel meditation technique to thereby contribute to the developing field of therapeutic meditation practice.

EcoMeditation is not aligned with a particular spiritual philosophy or orientation; instead, practitioners are instructed to imitate the physiological states of an experienced meditator by assuming particular breathing patterns and body postures. EcoMeditation does not require prior training or practice; an EEG study found that these physiological cues were associated with

advanced brainwave patterns even in novices during their first attempt.²⁵ Another study examined changes in psychological and physiological markers in 34 participants following a two-day EcoMeditation workshop.²⁶ Improvements were found in psychological symptoms of anxiety, depression, and pain, as well as physiological measures including cortisol and resting heart rate. Happiness levels also increased significantly.

EcoMeditation was designed to lower the barriers that prevent most people who experiment with meditation from establishing a regular practice. It is ideologically neutral, based purely on evidence-based physiological instructions. That is, no *a priori* belief or subscription to a particular religious worldview or philosophy is required. The benefits of EcoMeditation are experienced within a short time frame.²⁵ Practitioners typically feel changes in their minds and bodies on the first attempt, therefore, they do not need to engage in prolonged periods of practice to experience meditation's benefits, which in turn increases compliance. EcoMeditation is freely available (www.EcoMeditation.com) and requires no prior training or instruction, increasing its utility to potential meditators and offering broader community appeal. Additionally, practitioners are not required to still the mind, an instruction that requires diminishing the activity of the brain's default mode network, the hub that typically produces unhappy thoughts.²⁷ Meditators with 10,000 total lifetime hours of practice are able to activate the brain's dorsolateral prefrontal cortex and ventromedial prefrontal cortex, which work together to quiet the default mode network. The instructions in EcoMeditation keep the brain's task-positive network minimally engaged, sufficient to prevent activation of the default mode network even in novices.²⁵

The two studies referenced above represented the first empirical investigations of the combination of the four techniques. Their results provide preliminary support for EcoMeditation as an effective method of stress-reduction in both psychological and physiological dimensions. The current study aimed to build on this early EcoMeditation research and examine the psychological effects of a brief one-day EcoMeditation intervention delivered in a large-group format.

Method

Participants and Procedure

The study was reviewed for human subject protections and determined to present minimal risk to participants by the Ethics Committee of the National Institute for Integrative Healthcare (NIIH; approval number NIIHCT02082017). A convenience sample of 208 participants, comprising 137 women (65.9%) and 71 men (34.1%), attended the one-day training workshop (6 training hours) in a North American location.

Participants were aged between 21 and 87 years ($M = 55.4$ years; $SD = 12.8$ years). More than 50% of participants were tertiary educated (23% had completed graduate school, 30% had attended university). All participants provided informed consent and were 18 years or older. Participants completed a pen-and-paper survey pre-workshop and post-workshop, and an online follow-up survey three months later.

Measures

The pre-test and post-test survey consisted of demographic items and eight questions from empirically established measures, which assessed symptoms of anxiety, depression, PTSD, general happiness, and pain, as described below.

Psychological Markers

Anxiety. Two items from the Generalized Anxiety Disorder-7 (GAD-7)²⁸ were used to assess participants' anxiety symptoms. Item scores (ranging from 0 = *Not At All* to 3 = *Nearly Every Day*), were summed to produce an overall anxiety score (0-6), with higher scores indicating higher symptoms of anxiety. The GAD-7 has good internal consistency ($\alpha = .82$)²⁹ and is considered a valid screening tool for GAD in clinical research samples.³⁰

Depression. The Patient Health Questionnaire-2 (PHQ-2)³¹ was used to assess symptoms of depression over the previous two weeks. The PHQ-2 correlates with the GAD-7, supporting its construct validity.³² The scale has good sensitivity (79%) and specificity (86%) for screening depressive symptomology.³³ Item scores were summed to produce a range of scores (0-6), with higher scores indicating possible clinical levels of depression.

Posttraumatic Stress. The two-item PTSD Checklist (PCL-2)³⁴ was used to assess symptoms of PTSD over the past month. The scale has high sensitivity, providing a reliable indicator of clinically significant change³⁴ and as a PTSD screener in military veterans.³⁵ Possible scores ranged from 2 to 10, with higher scores indicating possible clinical levels of psychological distress.

Happiness and Pain. General happiness was rated using the Happiness Scale,³⁶ a 10-point Likert scale to indicate if respondents felt happy in general (0 = *Not At All* to 10 = *Very*). The Numeric Pain Rating Scale³⁷ is based on a self-rated average of pain experienced in the previous 24 hours, ranging from 0 (*Not At All*) to 10 (*Worst Pain Imaginable*). The scale is considered a valid measure of acute pain, strongly correlating with the verbally administered numerical rating scales (NRSs).³⁸

EcoMeditation Training and Practice. EcoMeditation combines commonly used stress-reduction skills such as mindfulness, heart coherence, EFT, and neurofeedback. Participants in the current study attended a full-day workshop at a conference center and received psychoeducation on the physiology of stress and the effects of meditation. The individual components of EcoMeditation were explained, after which they participated in meditation exercises and group feedback. The six-hour training workshop was administered by the first author, the developer of EcoMeditation, and other trained practitioners. Participants received handouts containing the instructions for EcoMeditation and were encouraged to practice the technique at home, although no specific practice guidelines were administered.

Results

A priori power analysis suggested the sample ($N = 208$) was sufficient to detect a medium effect size (significance level of .05, 80% power).

The data was screened prior to analysis. Visual inspection of Normal Q-Q Plots indicated that the data was approximately normally distributed. However, since the Shapiro-Wilk test indicated violations of the assumption of normality, and the distribution of the difference scores were roughly symmetrical, pre-test and post-test scores were analyzed using a Wilcoxon Signed Rank Test for paired samples in SPSS (Version 26.0). Figure 1 indicates the spread of scores and outliers in the data set.

Results indicated statistically significant decreases in anxiety, depression, PTSD, and pain when pre-test scores were compared with post-test scores. General happiness scores were statistically significantly higher following the EcoMeditation training ($p < .001$) (see Table 1).

Additionally, a series of one-way repeated measures ANOVAs were performed to determine whether statistically significant differences in symptoms of anxiety, depression, PTSD, happiness, and pain levels were found over time. The sample consisted of 65 participants who had provided a survey response at all three separate time points: pre-EcoMeditation workshop, post-EcoMeditation workshop, and 3-month follow-up. A priori power analysis suggested that the sample was sufficient to detect a medium effect ($\alpha = .05$, $\beta = .20$).

Assumption Testing

Outliers identified in the dataset were considered reasonable values. Although the Shapiro-Wilk test was significant, ANOVA is robust to violations of normality,³⁹ therefore, the data was assumed to be normally distributed. Assumptions of homogeneity of variances were met, and where Mauchly's test of sphericity was violated, a Huynh-Feldt correction was applied.

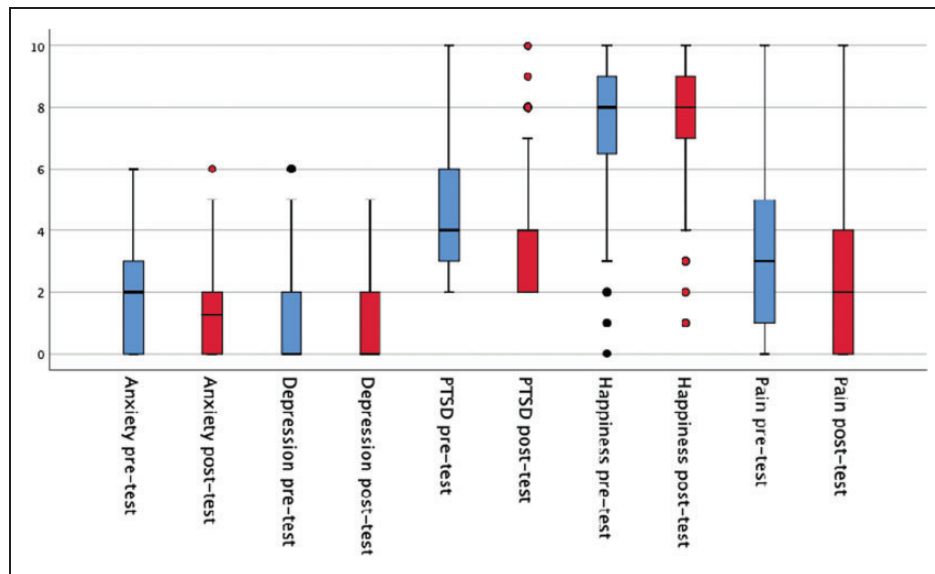


Figure 1. Measured Outcomes Score Changes Pre- and Post 1-Day EcoMeditation Training Workshop (N = 208).

Table 1. Measure Outcomes Pre- and Post 1-Day EcoMeditation Training Workshop (N = 208).

Scale	Pre-test Mean \pm SD	Post-test Mean \pm SD	Change in Mean	z Statistic	p Value	% Change
Anxiety	1.84 \pm 1.65	1.41 \pm 1.33	-0.43	-4.72	<.001	-23.37
Depression	0.95 \pm 1.31	0.80 \pm 1.13	-0.15	-2.54	.011	-15.79
PTSD	4.34 \pm 2.00	3.83 \pm 1.81	-0.51	-4.58	<.001	-11.75
Happiness	7.29 \pm 1.93	7.94 \pm 1.83	+0.65	6.35	<.001	+8.92
Pain	3.08 \pm 2.67	2.51 \pm 2.43	-0.57	-4.69	<.001	-18.50

Anxiety

A statistically significant difference in mean anxiety scores was found over time, $F(1.60, 99.48) = 4.61$, $p = .018$, partial $\eta^2 = .07$, with symptoms of anxiety at post-intervention ($M = 1.29$, $SD = 1.26$) and 3-months follow-up ($M = 1.17$, $SD = 1.51$) lower than at pre-intervention ($M = 1.82$, $SD = 1.54$). Post hoc analysis with a Bonferroni adjustment revealed a statistically significant decrease in anxiety from pre-intervention to post-intervention, $M = 0.53$, 95% CI [0.14, 0.92], $p = .004$, but not between pre-intervention and 3-month follow-up ($M = 0.64$, 95% CI [-0.01, 1.29], $p = .054$), or between post-intervention and 3-month follow-up ($M = 0.11$, 95% CI [-0.48, 0.71], $p = 1.000$).

Depression

There were no statistically significant differences in mean depression scores at pre-intervention ($M = 0.83$, $SD = 1.17$), post-intervention ($M = 0.66$, $SD = 0.98$),

and 3-month follow-up ($M = 0.86$, $SD = 1.36$), $F(1.28, 80.44) = .62$, $p = .472$, partial $\eta^2 = .01$.

Post-Traumatic Stress Disorder

Post-traumatic stress disorder (PTSD) symptoms decreased from pre-intervention ($M = 4.16$, $SD = 1.81$) to post-intervention ($M = 3.64$, $SD = 1.61$) and 3-month follow-up ($M = 3.59$, $SD = 1.83$), although the differences were not statistically significant, $F(1.59, 100.37) = 2.68$, $p = .085$, partial $\eta^2 = .04$.

Happiness

A statistically significant difference in happiness scores was found over time, $F(2, 128) = 3.17$, $p = .046$, partial $\eta^2 = .05$, with mean happiness scores increasing from pre-intervention ($M = 7.38$, $SD = 1.88$) to post-intervention ($M = 7.96$, $SD = 1.77$) and 3-month follow-up ($M = 7.53$, $SD = 1.84$). However, pairwise comparisons results suggested that happiness scores did not statistically

significantly increase from pre-intervention to post-intervention ($M = -0.58$, 95% CI $[-1.17, 0.01]$, $p = .057$), from pre-intervention to 3-month follow-up ($M = -0.15$, 95% CI $[-0.70, 0.40]$, $p = 1.000$), and from post-intervention to 3-month follow-up ($M = -0.20$, 95% CI $[-0.19, 1.03]$, $p = .280$).

Pain

Statistically significant changes in self-reported pain levels were found over time, $F(1.82, 116.16) = 7.928$, $p = .001$, partial $\eta^2 = .11$, with pain scores decreasing from pre-intervention ($M = 3.28$, $SD = 2.61$) to post-intervention ($M = 2.50$, $SD = 2.40$) to 3-months follow-up ($M = 2.11$, $SD = 2.16$). Post hoc analysis with a Bonferroni adjustment revealed that there was a statistically significant decrease in pain from pre-intervention to post-intervention, $M = 0.78$, 95% CI $[0.19, 1.40]$, $p = .006$, and from pre-intervention to 3-month follow-up ($M = 1.17$, 95% CI $[0.35, 2.00]$, $p = .003$), but not from post-intervention to 3-month follow-up ($M = 0.40$, 95% CI $[-0.38, 1.16]$, $p = .647$).

Discussion

This study builds on two earlier examinations of the efficacy of EcoMeditation, a method combining four evidence-based stress-reduction techniques, designed to improve emotion regulation and help facilitate self-care management. Post-workshop results indicated that participants ($N = 208$) experienced significant decreases in psychological symptoms of anxiety, depression, PTSD, and pain, and an increase in general happiness following the one-day group EcoMeditation training. At 3-month follow up ($N = 65$), significant decreases were found in symptoms of anxiety (between pre-test and post-test), and pain levels (pre-test and post-test, and pre-test and 3-month follow-up). Increases in happiness were sustained over time, although post hoc analyses were underpowered to detect significant differences in happiness between the three time points. Additionally, although not statistically significant, results indicated that symptoms of depression and PTSD were lower immediately following the EcoMeditation training.

Overall current findings provide preliminary support for prior empirical work that has investigated the impact of meditation on psychological functioning. In particular, current results support research that has revealed improvements in psychological outcome measures of pain, anxiety, depression, and PTSD following meditation.^{10,11,26} Extending Groesbeck et al.'s²⁶ study results, the present study provided a sample size sufficient to assess improvements in symptoms of PTSD and the degree to which participants maintained their gains over time. Therefore, the present study has provided

preliminary evidence for EcoMeditation as an effective stress-reduction tool when delivered in a group-based format. Group administration of stress-reduction techniques can enable large numbers of participants to benefit using the resources of a limited number of facilitators. The current clinically meaningful results point to the utility of EcoMeditation in settings, such as group therapy clinics, hospital and outpatient support groups, professional organizations, workplaces, training centers, veterans' organizations, armed forces units, and wherever groups of stressed individuals are treated collectively.

The continued improvement measured in certain dimensions of mental health over time may have been due to the use of EcoMeditation by a motivated subset of participants after the training. Clinical experience has shown that simple, easily remembered and easily practiced techniques like EcoMeditation are more likely to be practiced than complicated protocols.

Although present results suggest the one-day group-based EcoMeditation training was associated with significant changes in a range of psychological measures, the study had several limitations. Due to the group-based nature of the EcoMeditation, the psychological improvements observed in participants may be attributed to aspects of therapeutic interventions identified by Vieten et al.¹² Such factors include the supportive group dynamic, demand characteristics, or the stress-reducing effects of the meditation environment itself. Additionally, the intervention was administered by the developer of EcoMeditation, making therapist effects and allegiance bias factors in the results. There was no control group, so while pre-post training results showed significant improvements in many dimensions, the contribution of non-specifics is unknown, as is the efficacy of EcoMeditation compared to established evidence-based therapy. As with any therapeutic approach comprised of a combination of multiple techniques, it is critical to determine whether results are the collective effect of the combined techniques, or merely the result of one or more of the empirically supported approaches. Accordingly, future research design should look to test the efficacy of individual techniques that comprise EcoMeditation against the EcoMeditation approach itself.

The current sample comprised self-selected participants, who may have had high levels of motivation to participate in the workshop. This self-selected nature of the convenience sample makes it impossible to generalize current findings to a heterogeneous population. Future research could examine the impact of EcoMeditation on psychological symptoms in randomly selected samples. Additionally, the current study did not identify whether participants had regularly applied the EcoMeditation techniques before the training. Without having assessed

the prior meditation experience of participants, the effect of the technique on meditators versus non-meditators is not possible to determine. An additional limitation of the study was participant attrition. Since the three-month follow-up sample was one-third of the size of the initial sample, it may be that non-responders did not experience the same improvements reported. It is also important to note that high participant attrition rates are found in online studies⁴⁰ and that non-response rates (up to 85%) do not tend to bias reported outcomes.^{41,42}

Future research could consider comparing EcoMeditation administered as individual therapy with group-based meditation training. The cost-effectiveness of both could be compared. Cost savings from mental health improvements, especially in mental health and workplace settings could be measured. Comparing EcoMeditation with placebo, with other evidence-based forms of meditation, as well as with other energy therapies such as EFT and Eye Movement Desensitization and Reprocessing (EMDR), would determine its efficacy relative to each. Dismantling and comparative studies would determine the contribution made by each of the four components to EcoMeditation's cumulative effect.

Future longitudinal studies using larger samples could include an assessment of the frequency of participant application of EcoMeditation subsequent to training, and the dose-response effect over time. Moreover, as psychological stress such as anxiety, fear, worry, and tension are concomitant with physiological stress reactions,^{43,44} future assessment of physiological markers (e.g., fMRI, cortisol, immunoglobulins, C-reactive protein, interleukins) may offer objective data independent of participants' self-reports.

Conclusions

The current study contributes to the burgeoning field of meditation research, providing a preliminary examination of the effects of EcoMeditation on a range of psychological symptoms using a group-based study design. EcoMeditation is a non-pharmacological stress-reduction method, found to produce improvements in both psychological and physiological symptoms. Present findings suggest that the four techniques comprising EcoMeditation, in combination, offer a promising brief intervention for health promotion administered within group settings. As a meditation practice that does not prescribe specific philosophical ideologies or religious orientations, EcoMeditation offers broad appeal. Future examination using randomized controlled trials will identify whether the psychological improvements found in early EcoMeditation studies are replicated in rigorous experimental designs. Such findings would validate EcoMeditation as a useful self-care management

tool and an effective brief group-based intervention to improve mental health.

Declaration of Conflicting Interests


The authors declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Dawson Church receives income from presentations and publications on the therapeutic approach described. Peta Stapleton receives income from presentations and publications on the EFT therapeutic approach described. The other author declares that they have no conflicts of interest.

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