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Reexamining the Effect of Emotional Freedom Techniques on Stress Biochemistry: A Randomized Controlled Trial

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Objective: In a direct replication of Church, Yount, and Brooks (2012), this study examined changes in stress biochemistry and psychological distress symptoms in 53 participants randomly allocated to one of three 60-min group interventions: Emotional Freedom Techniques (EFT), psychoeducation (PE), and no treatment (NT). The Symptom Assessment−45 (SA-45) was used to assess psychological distress symptoms. ***Method:*** Salivary cortisol assays were administered 30 min pre- and postintervention to test cortisol levels. The original study by Church et al. indicated the EFT group showed statistically significant improvements in anxiety (−58.34%, $p < .05$), depression (−49.33%, $p < .002$), overall severity of symptoms (−50.5%, $p < .001$), and symptom breadth (−41.93%, $p < .001$). The group also experienced a significant decrease in cortisol (−24.39%) compared to the PE group (−14.25%) and NT group (−14.44%). ***Results:*** The present results indicated the EFT group experienced a significant decrease in cortisol greater than the original study (−43.24%, $p < .05$), but these results were not mirrored by subjective reports of psychological distress. The EFT group reduction in cortisol was significantly different from that of the PE group (−19.67%), and as expected, the posttreatment cortisol level detected among the EFT group was lower than that of the NT group (2.02%); however, there was not a statistically significant difference between the 2 groups. Additionally, there were no significant improvements in cortisol reduction among the NT and PE groups. ***Conclusions:*** Findings support the original study indicating EFT to be an efficient and effective brief treatment for reducing biological markers of stress.

Clinical Impact Statement
Acupoint stimulation (Emotional Freedom Techniques, EFT) has previously resulted in significant changes in stress biochemistry and psychological distress symptoms in a clinical trial, and this replication study confirmed the original outcomes: that 1 hr of tapping on acupoints results in a significant decrease in the stress hormone cortisol. Changes in corresponding psychological symptoms were not observed in the replication trial. EFT may be an efficient and effective brief treatment for reducing biological markers of stress.

Keywords: cortisol, stress, biochemistry, Emotional Freedom Techniques (EFT), tapping

Stress is typically defined as an actual or perceived threat to homeostasis and is considered a risk factor for a wide range of psychological disorders (Schneiderman, Ironson, & Siegel, 2005). Maladaptive stress responses occur when the interrelated network of physiological mediators, such as endocrinal hormones (e.g., cortisol), neurotransmitters, neuropeptides, and cytokines, delays the body's return to the state of allostasis following stress exposure (Joëls & Baram, 2009). Many physiological mediators that are implicated in the persistent elevation of the stress response (e.g., subgenual prefrontal cortex, amygdala, noradrenergic system) are evident in various psychological disorders (Gold, 2005). Dysregulation of a major stress response system, the hypothalamic–

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pituitary–adrenal (HPA) axis, is associated with the well-defined relationship between traumatic stress and psychological disorders (Kessler et al., 2010).

Cortisol is the physiological biomarker linked to a wide range of genetic, hormonal, and neurological effects of stress. The stress hormone cortisol regulates levels of inflammation, immune markers, and neurotransmitters within the body (Miller, Maletic, & Raison, 2009). Cortisol is produced by the HPA axis hormonal system in response to physical, psychological, and environmental stimulation (Medzhitov, 2008). Research now suggests chronic stress, including single traumatic events, leads to adverse health outcomes, and multiple traumas can have an accumulative effect on physical health, which appears to be independent of the development of conditions such as posttraumatic stress disorder (PTSD; Sledjeski, Speisman, & Dierker, 2008). Numerous studies have demonstrated strong associations between cortisol levels and psychological health such as anxiety, depression, and PTSD (Cruess, Antoni, Kumar, & Schneiderman, 2000; de Kloet, Joëls, & Holsboer, 2005; Powers, Laurent, Gunlicks-Stoessel, Balaban, & Bent, 2016), as well as other conditions such as trauma (Gaab et al., 2003; Kellner, Yehuda, Arlt, & Wiedemann, 2002; Olff, de Vries, Güzelcan, Assies, & Gersons, 2007).

In addition, elevated levels of cortisol are implicated in numerous adverse health conditions as the majority of the body's systems are adversely affected by trauma (D'Andrea, Sharma, Zelechoski, & Spinazzola, 2011). The risk of future medical disease is also exponentially greater following exposure to trauma. Impaired immune system function, cardiovascular disease (CVD), and stroke (Gold, 2005; Lester, Brown, Aycock, Grubbs, & Johnson, 2010; Rhen & Cidlowski, 2005; Stalder, Evans, Hucklebridge, & Clow, 2010), as well as significant disruption to gastrointestinal functioning, the reproductive system, and brain structure functioning, are all affected by trauma and cortisol functioning (D'Andrea et al., 2011).

Empirically Based Stress Intervention

A field that has increased empirical attention to the physiological assessment of intervention efficacy is Emotional Freedom Techniques (EFT; Church, 2013). Clinical EFT represents a manualized evidence-based practice that draws on aspects of traditional psychological interventions (i.e., cognitive therapy and brief exposure therapy) and somatic stimulation (Church, Geronilla, & Dinter, 2009). Specifically, EFT involves the application of fingertip pressure on acupoints on the face and upper body with a concurrent cognitive reframing of target issues. Research has assessed the efficacy of EFT treatment for a range of psychological and physiological conditions (Bach et al., 2019), including psychological trauma, fibromyalgia, and food cravings (Brattberg, 2008; Church, Yount, Rachlin, Fox, & Nelms, 2018; Salas, Brooks, & Rowe, 2011; Stapleton et al., 2017, 2019).

Recent meta-analysis examined EFT treatment of PTSD compared to other evidence-based therapies, such as eye movement desensitization and reprocessing and cognitive–behavioral therapy (CBT). Seven of the randomized clinical trials reviewed in the meta-analysis met quality evidence-based standards published by the American Psychological Association's (APA's) Division 12 Task Force on Empirically Validated Therapies. A large treatment effect for EFT intervention was found (weighted Cohen's d = 2.96, 95% CI [1.96, 3.97], $p < .001$), compared to the traditional psychotherapies (Sebastian & Nelms, 2017). A meta-analysis of 14 randomized controlled trials of EFT for anxiety disorders (n = 658) has found a very large treatment effect of d = 1.23, 95% CI [0.82, 1.64], $p < .001$, while the effect size for combined controls was 0.41, 95% CI [0.17, 0.67], p = .001. Even when accounting for the effect size of control treatment, EFT treatment was associated with a significant decrease in anxiety scores (Clond, 2016). Finally, a meta-analysis of EFT for depression has examined 20 studies (Nelms & Castel, 2016) that included outcome studies (n = 446) as well as randomized clinical trials (n = 653; 306 EFT and 347 control). EFT demonstrated a very large effect size (Cohen's d across all studies was 1.31) in the treatment of depression. EFT was more efficacious than diaphragmatic breathing, as well as psychological interventions such as supportive interviews. EFT was also superior to standard treatments, as usual, and efficacious in treatment time frames ranging from 1–10 sessions, with a mean of symptom reductions across all studies of −41% (Nelms & Castel, 2016).

Finally, a comparative review and meta-analysis have addressed the question of whether acupoint tapping is an essential ingredient in the intervention, and identical protocols with and without the acupoint tapping component were compared (Church, Stapleton, Gallo, & Yang, 2018). The conditions that included the tapping protocol produced a significantly larger effect size than those with the other components but without tapping, and the study indicated the outcomes were not due to cognitive, exposure, and nonspecific therapeutic elements of the protocol (Cohen's d = 1.28, 95% CI [0.56, 2.00]; Hedges's g = 1.25, 95% CI [0.54, 1.96]).

The EFT Process

A standard EFT treatment session requires a client to identify an issue or concern and verbally rate its emotional intensity using a Likert scale of subjective units of distress (SUDs; Wolpe, 1973). A rating of zero rating would represent no distress or a neutral state, while a rating of 10 would indicate maximum distress. This process provides a tangible assessment of distress reduction for the client and practitioner. A "setup statement" of self-acceptance that relates to the target issue is then formulated while tapping on the side of the hand point (e.g., "Although I have this concern/issue, I completely accept myself"; see Figure 1). The setup statement

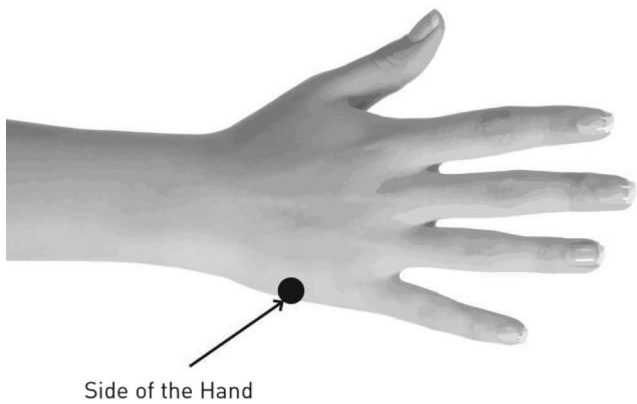

Figure 1. Side of the hand point.

objective is twofold: (a) The client is exposed to the issue (exposure therapy), and (b) the issue is reframed in the context of self-acceptance (cognitive therapy). The client uses two fingers to tap on a prescribed set of eight acupoints (e.g., temples) while repeating key words from the setup statement (see Figure 2). The client reevaluates his or her level of distress while completing a typical round of tapping (8 points). The tapping sequence is normally repeated until the SUD rating is low (<2).

From within the fields of epigenetics, neuroplasticity, and psychoneuroimmunology, research indicates that stress-reduction interventions can encode physiological responses to stress in the way brief traumatic experiences can physiologically encode emotional trauma (Church, Stapleton, et al., 2018; Oschman, 2006). While some speculation continues regarding the mechanisms that underlie EFT intervention effects (Feinstein, 2018), research suggests that EFT targets specific areas of the brain involved in hyperarousal, such as the amygdala and hippocampus. Functional MRI studies indicate that EFT provides similar effects to acupuncture in the downregulation of the amygdala and anterior cingulate areas of the brain, which are activated by exposure to stress and trauma (Dhond, Kettner, & Napadow, 2007; Fang et al., 2009; Feinstein, 2008; Felmingham et al., 2007; Stapleton et al., 2019). Similarly, electroencephalographic recordings of participants performing EFT have demonstrated decreased arousal in the right frontal cortex, a pattern observed in other forms of neurotherapy (Swingle, Pulos, & Swingle, 2004). During EFT treatment, the manual stimulation of acupuncture points is linked to the production of opioids, serotonin, and gamma-aminobutyric acid that help regulate cortisol (Lane, 2009). Accordingly, the neurochemical changes are thought to contribute to the regulation of heart rate and the autonomic nervous system, thereby reducing the experience of distress or arousal (Feinstein, 2018; Varvogli & Darviri, 2011). Such results support the role of EFT in assisting the regulation of sympathetic-parasympathetic interaction, particularly the HPA axis (Lane, 2009).

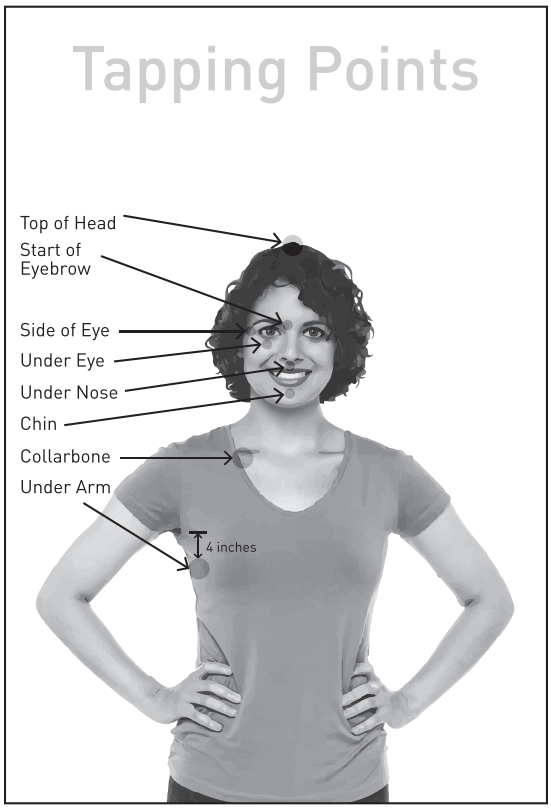

Figure 2. Clinical Emotional Freedom Techniques tapping points. This image is used with permission.

Stress Biochemistry and EFT

Empirical research utilizing cortisol biomarkers in the assessment of therapeutic intervention has gained momentum. This is particularly evident in the use of endocrinal signaling to assess EFT intervention efficacy. In a recent randomized controlled trial (RCT) examining the impact of EFT on a range of physiological measures (e.g., blood pressure, cortisol levels), participants in one workshop ($n = 31$) experienced significant declines in psychological symptom measures of anxiety (−40%), depression (−35%), and PTSD (−32%). Significant improvements were also found in the circulatory system (e.g., resting heart rate, blood pressure) and the endocrine system (e.g., cortisol −37%, $p < .001$; Bach et al., 2019). Results provided support for physiological and psychological benefits of EFT, specifically the upregulation of cortisol, which appeared to be moderated by learned relaxation techniques (Lutgendorf et al., 2000; Newberg, 2008).

To date, one study has examined the physiological effect of EFT on salivary cortisol levels following a single training session. In a triple-blind RCT involving 83 nonclinical participants, changes in cortisol levels and symptoms of psychological distress were examined following a 60-min EFT intervention (Church, Yount, & Brooks, 2012). Participants were randomly assigned to one of three individually administered interventions: EFT, psychotherapy supportive interview (SI), or no treatment (NT). Participants who received EFT showed statistically significant improvements in anxiety, depression, overall severity of symptoms, and symptom breadth as assessed using the Symptom Assessment Checklist–45 (SA-45). Cortisol levels decreased by 24% in the EFT group ($p > .05$) compared with participants receiving either SI or NT. The control participants reported a 14% reduction consistent with normal daily decreases (Church et al., 2012). Cortisol level results for participants exposed to the hourlong EFT session correlated with a 58% reduction in anxiety scores ($p > .05$). Such research provides support for EFT as an intervention for psychological stress symptoms. Additionally, since strong physiological associations between cortisol levels and psychological stress have also been identified in the literature, it was timely to reexamine the efficacy of EFT on stress biochemistry and self-reported psychological distress.

Study Aims

In line with Church et al.'s (2012) findings, the current study hypothesized that following the 60-min intervention, (a) mean salivary cortisol levels would be lower in the EFT group compared with psychoeducation (PE) and NT groups, and the mean difference between pre- and postmeasures of cortisol would be statistically significant in the EFT group, and (b) a statistically significant improvement in psychological distress symptoms postintervention,

assessed using the SA-45 (Davison et al., 1997; Maruish, 1999), would be found in the EFT group compared to the PE and NT groups.

Method

Participants

Participants were 53 adults (aged 20–79 years; M_{age} = 45; SD_{age} = 13.74), with 42 women and 11 men. Study exclusion criteria included individuals who were pregnant or undergoing menopause, had Cushing's disease, and had a history of major depressive disorder, PTSD, or chronic diseases characterized by abnormal cortisol levels (e.g., osteoporosis, hypertension, diabetes), as per the original study. Individuals who used steroidal-based medication or medication for the management of depression, hormones, thyroid, diabetes, or contraception were also ineligible to participate. Participant demographic characteristics, as well as baseline and posttreatment stress levels, are displayed in Table 1.

Before commencement, the study received ethical approval from the universities' Human Research Ethics Committee in accordance with the National Statement on Ethical Conduct in Research Involving Humans. The study design met quality criteria established by the APA's Task Force on Empirically Validated Treatments of Division 12 (Clinical Psychology; Chambless et al., 1998; Chambless & Hollon, 1998) and CONSORT standards for clinical trials (Moher, Schulz, & Altman, 2001). It was also prospectively registered with the Australian New Zealand Clinical Trials Registry (ACTRN12618001272280). Participants were recruited using convenience sampling procedures, including online announcements (i.e., university bulletin boards, social media). A total of 118 individuals responded to trial announcements, with 70 presurvey responses completed. Six participants withdrew from the study and 11 did not attend the trial. Fifty-three participants were randomly assigned via computer to one of three parallel groups: EFT, psychoeducation information session, and NT (control; see Figure 3). The computer randomization was generated using random number lists (one for each location) with a sequential blind allocation of participant to groups from the website www.randomizer.org.

Measures

A pretrial survey was administered comprising demographic items and study exclusion criteria. Pre- and postintervention measures assessed psychological distress symptoms and cortisol levels.

SA-45. Psychological distress symptoms were assessed using the SA-45 (Davison et al., 1997; Maruish, 1999) in the week prior to the study. The scale comprises nine subscales (anxiety, depression, obsessive–compulsive behavior, phobic anxiety, hostility, interpersonal sensitivity, paranoia, psychosis, and somatization) and assesses the breadth (Positive Symptom Total) and severity (General Symptom Index) of psychological symptoms. Participants rate the degree to which the item has distressed them in the previous 7 days using a 5-point Likert scale (1 = *not at all,* 5 = *extremely*). An example depression item is "feeling lonely." *T* scores based on sex-normed data for nonclinical populations are calculated, with scores greater than 60 considered in the clinical range. The SA-45 has sound psychometric properties (Sandín, Valiente, Chorot, Santed, & Lostao, 2008) and is used as a screening tool and outcome measure (McConnell, Pargament, Ellison, & Flannelly, 2006). The SA-45 subscales have good internal reliability, with Cronbach's alphas of .74 for the anxiety subscale (e.g., tension) and .87 for the depression subscale (e.g., hopelessness, worthlessness; Davison et al., 1997). In the current study, the SA-45 presented an alpha of .95.

Cortisol levels. Salivary cortisol assays are conventionally used in series (i.e., 4 hr apart) to test individuals' diurnal cortisol rhythm. This rhythm indicates aspects of general function levels, such as sleep quality, mood, and balance of neurotransmitters and hormones. In contrast, spot cortisol assays taken pre- and postintervention offer an immediate assessment of the stress-reduction effects of therapeutic intervention. Salivary cortisol is therefore considered an objective biomarker of the efficacy of psychotherapy (Hellhammer, Wusta, & Kudielka, 2008; Kirschbaum & Hellhammer, 1989). Specifically, salivary cortisol has been found to represent an objective neuroendocrine marker for observed changes in anxiety and distress during relaxation training (Cruess et al., 2000). Because cortisol's diurnal cycle shows that cortisol levels in blood or saliva are not stable over time but are high just after awakening and then decline (Kunz-Ebrecht, Kirschbaum, Marmot, & Steptoe, 2004), we adhered to a strict prestudy regime. Participants were asked to refrain from consuming food 1 hr prior to saliva collection, as well as avoiding caffeine, nicotine, medication, and vigorous physical activity 12 hr prior to collection. Participants were asked to rinse the mouth with water and wait at least 10 min after rinsing before collecting saliva 30 min prior to and after each intervention group. Saliva was collected using the SalivaBio Oral Swab (SOS) Saliva Collection Method (Salimetrics, State College, Pennsylvania), which consisted of a SalivaBio oral swab and swab storage tube. Whole saliva was obtained from

Table 1
Participant Characteristics and SA-45 and Cortisol Baseline and Posttest Means and Standard Deviations

	NT (n = 17)		EFT (n = 19)		PE (n = 17)		Total sample (n = 53)	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Age, y	43	12.9	47	13.9	46	14.83	45	13.74
Female, *n* %	14 (82)		14 (74)		14 (82)		42 (79)	
SA-45 BL	55.71	9.26	56.05	8.65	58.35	8.43	56.68	8.69
SA-45 PT	49.36	10.59	56.37	8.2	57.29	9.19	54.41	9.81
Cortisol μg/dl BL	.14	.05	.18	.09	.22	.09	.18	.09
Cortisol μg/dl PT	.15	.09	.10	.03	.18	.10	.14	.09

Note. Post hoc Tukey's tests: SA-45: NT > PE (p = .043). Cortisol: EFT > PE (p = .012). NT = no treatment; EFT = Emotional Freedom Techniques; PE = psychoeducation; SA-45 = Symptom Assessment−45; BL = baseline; PT = posttest.

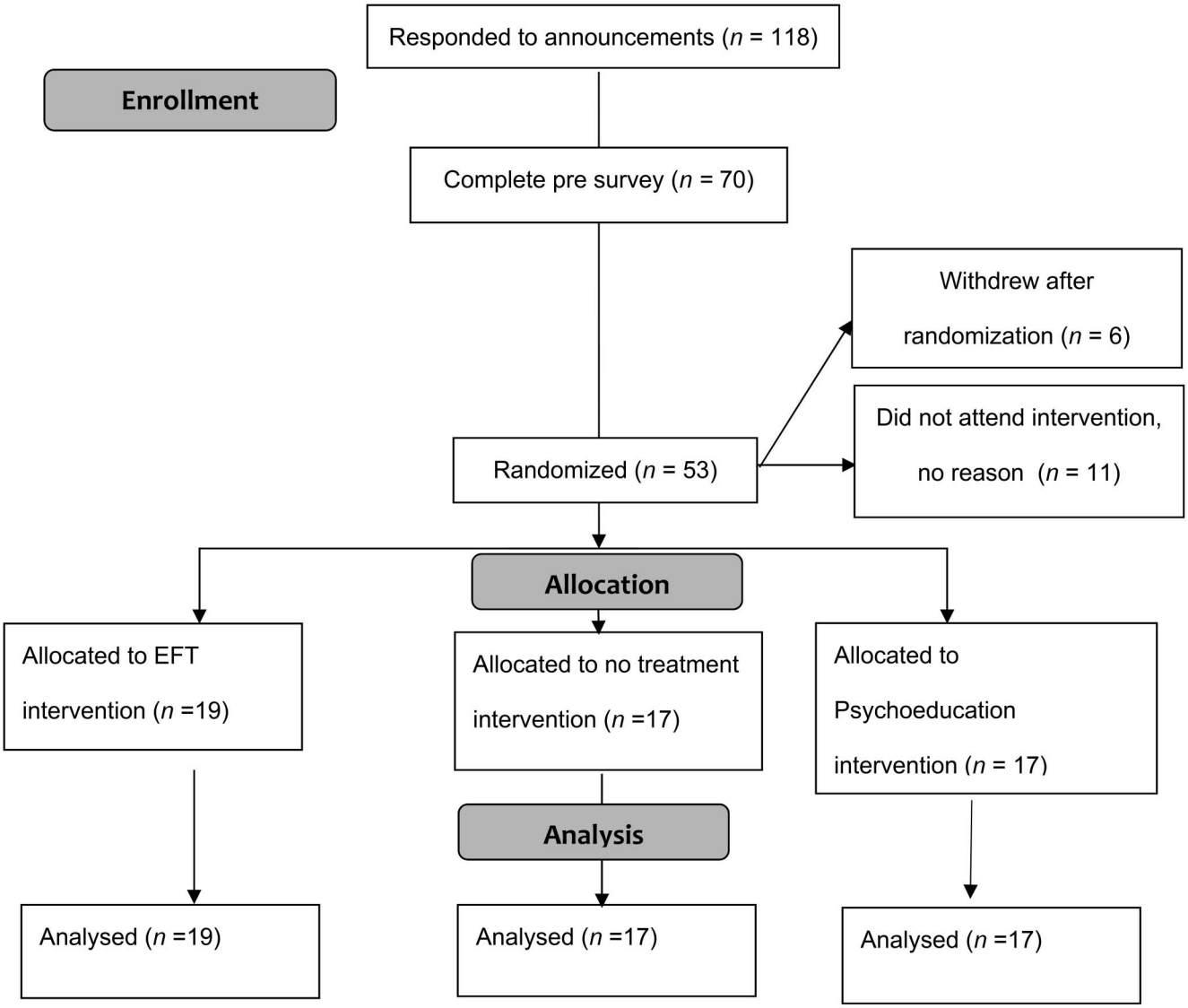

Figure 3. CONSORT flowchart. EFT = Emotional Freedom Techniques.

chewing Salivette swabs for 60 s, and all samples were stored at −40 °C until analysis. Salivary cortisol was measured in duplicate by an enzyme immunoassay kit (Salimetrics, #1–3002) with a sensitivity of <0.007 μg/dl and a reference range of 0.012–3.000 μg/dl and analyzed following the manufacturer's recommendations at an absorbance of 450/490 nm. Participant saliva samples were coded by number to ensure blind analysis by the researcher employed for this aspect. In the current study, salivary cortisol was measured in duplicate using The Salimetrics® High Sensitivity Cortisol Enzyme Immunoassay Kit (Salimetrics).

APA Division 12 Criteria

The current parallel-group study design met CONSORT quality standards (Moher et al., 2001) and the following criteria developed by the APA's Division 12 Task Force on Empirically Validated Treatments developed to standardize the evaluation and comparison of research findings (Chambless et al., 1998; Chambless & Hollon, 1998): (a) random allocation of participants to treatment and control groups, (b) sample size adequacy for detection of statistically significant differences, (c) clearly defined sample characteristics, (d) use of empirically validated measures, (e) blind allocation of participants to groups, (f) standardized treatments, and (g) sufficient reporting of results.

Treatments

Participants were randomly assigned in equal ratio to one of three groups, and groups were run with 10–12 participants per session and were standardized by time of day. The EFT group intervention (n = 19) received a 60-min EFT session administered according to standardized treatment protocols as reflected in the EFT manual (Church, 2013) from a registered psychologist with master's qualifications in clinical psychology and a qualified EFT

practitioner. The EFT intervention required participants to identify a recent stress memory and were guided through a standard clinical EFT tapping protocol using a group delivery method known as "Borrowing Benefits" (Church & House, 2018), where EFT is administered to one individual while the remainder of the group simultaneously self-applies EFT. The PE group intervention (n = 17) was conducted by a registered psychologist with master's qualifications in clinical psychology. The PE participants received dialogue on stress and behavioral-style strategies to adaptively respond to stress. The NT participants (n = 17) were supervised by a registered psychologist with master's qualifications in clinical psychology. The NT participants were provided reading material (e.g., magazines) to quietly peruse for 60 min in a relaxing environment on the university grounds.

Procedure

Individuals who had registered their interest in participating in the stress trial were emailed a link to an online survey comprising demographic items and the SA-45 measure. Participants who completed the initial survey, provided consent for cortisol assessment, and met study exclusion criteria were invited to participate. Participants were advised of their random assignment to one of three 60-min group-based sessions but not told of their group until they arrived on the intervention day. Participants were instructed to arrive at their designated campus location (determined by their group allocation) 30 min prior to their session time. Upon arrival, participants received two salivary cortisol test kits that were coded by number to facilitate analyses. Participants were asked to provide their first sample. The 60-min sessions of EFT, PE, and NT were then conducted. Thirty minutes following the conclusion of the hourlong session, participants provided a second salivary cortisol sample and completed a postmeasure survey identical to the survey administered preintervention. The 30-min interval between intervention and posttest was required to allow sufficient reuptake of the cortisol hormone.

Results

Data Diagnostics

The data were analyzed using SPSS Version 25. An alpha level of .05 was employed to determine the statistical significance of all results. Analyses included descriptive statistics, repeated-measures analysis of variance (ANOVA), simple multivariate analysis of variance (MANOVA), and repeated-measures MANOVA for the three groups. Bivariate correlations allowed examination of the sample as a whole to detect a possible relationship between objective and subjective markers of stress at baseline and posttreatment. A priori power analysis was conducted to determine the sample size necessary to obtain a desired level of statistical power. The power analysis revealed that in order to obtain the desired effect size that is moderate to large (80% chance) and is significant at the 5% level, a minimum sample of 21 participants would be required.

Cortisol Level Results

Salivary cortisol was measured in duplicate using the Salimetrics® High Sensitivity Cortisol Enzyme Immunoassay Kit (Salimetrics), with a sensitivity of <0.007 μg/dl and reference range of 0.012–3.000 μg/dl. The assay was measured at an absorbance of 450 nm, subtracting values at 490 nm. The analyses were conducted by a postdoctoral researcher (Hayley Maree O'Neill) with extensive experience in cellular and molecular biology techniques. They were blind to the group allocation and intervention type.

It was hypothesized that following the 60-min intervention, mean salivary cortisol levels would be lower in the EFT group compared with the PE and NT groups, and the mean difference between pre- and postmeasures of cortisol would be statistically significant in the EFT group. Compared to baseline, results indicated the EFT group exhibited a statistically significant improvement in cortisol at posttreatment (−43.24%; $F(1, 18) = 16.84$, p = .001). Additionally, there was a significant difference between treatment groups on change in cortisol level. Furthermore, the posttreatment cortisol level detected among the EFT group was significantly different from the PE group. As expected, the posttreatment cortisol level detected among the EFT group was lower than that of the NT group; however, there was not a statistically significant difference between the two groups. Compared to baseline, there were no significant improvements in cortisol reduction among the PE (−19.67%; $F(1, 16) = 2.35$, p = .145) and NT (2.02%; $F(1, 16) = 0.01$, p = .920) groups at posttreatment. The results of the present study supported the first hypothesis, which mirrors the findings of Church et al. (2012). Repeated measures ANOVA results and percentage change scores are displayed in Table 2.

SA-45 Results

It was hypothesized that following the 60-min intervention, a statistically significant improvement in psychological distress symptoms postintervention, assessed using the SA-45 (Davison et al., 1997; Maruish, 1999), would be found in the EFT group compared to the PE and NT groups. Compared to baseline, results of the present study indicated that the NT group exhibited a statistically significant improvement in psychological distress at posttreatment (−11.40%; $F(1, 16) = 16.34$, p = .001). In contrast, the EFT (1.05%; $F(1, 18) = 0.37$, p = .851) and PE (1.81%; $F(1, 16) = 0.31$, p = .59) groups did not exhibit significant improvements at posttreatment relative to baseline. The SA-45 posttreatment level detected among the NT group was significantly different from the PE group; however, no significant differences were detected when compared to the EFT group. These results did not support the second hypothesis of the present study and thus did not reflect the findings of Church et al. (2012).

Table 2
Analysis of Variance Results for Cortisol and SA-45 Percentage Change Scores

Variable	NT (n = 17)	EFT (n = 19)	PE (n = 17)
Percentage change in cortisol	2.02	−43.24***	−19.67
Percentage change SA-45	−11.40***	1.05	1.81

Note. NT = no treatment; EFT = Emotional Freedom Techniques; PE = psychoeducation; SA-45 = Symptom Assessment−45.
*** $p < .001$.

Relationship Between Objective and Subjective Markers of Stress

Pearson correlations were conducted to assess the degree of relationship between levels of cortisol and psychological distress at baseline and posttreatment stages. Although not significant, correlational analyses revealed an inverse, weak correlation between cortisol and psychological distress at baseline, $r = -.009$, $p = .95$. Similarly, results indicated a negligible association between cortisol and psychological distress at posttreatment, $r = -.085$, $p = .55$. These findings suggest that objective and subjective markers of stress are distinct phenomena, and thus obtaining data through both an objective and subjective lens is warranted to promote an optimal assessment.

Discussion

Replication is considered a hallmark of scientific integrity, but the Reproducibility Project: Psychology study that examined 100 psychological studies highlighted that effects may be exaggerated, and replication is challenging (Open Science Collaboration, 2015). However, the current study confirmed most of the original trial by Church et al. (2012). While the study by Church et al. indicated that the EFT group showed statistically significant improvements in anxiety, depression, the overall severity of symptoms, and symptom breadth, the present study results were not similar. There were no significant improvements in psychological distress symptoms among the EFT participants. However, the present results indicated the EFT group experienced a significant decrease in cortisol greater than the original study (−43.24%, $p < .05$) that was also significantly different from the PE (−19.67%) and NT groups (2.02%). The observed improvement in psychological distress at posttreatment for the NT group may well be attributed to the restful hour of reading magazines.

Biological and physiological measurement in traditional therapy settings is still considered unusual, despite the research indicating successful psychotherapy can impact the body's stress mechanisms (Feinstein & Church, 2010; van der Kolk, 2006b). For therapy to be effective, it might be useful to focus on the patients' physical self-experience and increase their self-awareness, rather than focusing exclusively on the meaning that people make of their experience (the narrative of the past). If past experience is embodied in current physiological states and action tendencies and the trauma is reenacted in breath, gestures, sensory perceptions, movement, emotion, and thought, therapy may be most effective if it facilitates self-awareness and self-regulation. Once patients become aware of their sensations and action tendencies, they can set about discovering new ways of orienting themselves to their surroundings and exploring novel ways of engaging with potential sources of mastery and pleasure (van der Kolk, 2006a).

Increasing knowledge and understanding in the use of inexpensive biological measurements, such as salivary cortisol assays in the therapeutic process, has the ability to demonstrate to clients the changes that may be occurring. This includes not only mood changes, but physiological changes as well.

Strengths and Limitations

This study controlled for the effect of circadian rhythms on cortisol levels (Chan & Debono, 2010), since participant testing was conducted simultaneously at the same time of day. Rigorous exclusion criteria also assisted in reducing potential confounds in cortisol readings. Having the participants blind to the treatment condition until the day of intervention and the biostatistician blind to the group allocation for cortisol analyses prevented bias occurring. Group administration of stress-reduction techniques such as EFT can also enable large numbers of participants to benefit using the resources of a limited number of facilitators.

The study has a number of limitations. In contrast with Church et al.'s (2012) study, funding restraints prohibited the individual sessions as per the original trial. Both active interventions have been tested as group approaches in the published literature, and thus for efficiency of delivery, this represented the only change to the replication. Group versus individual therapy is important for both conceptual and practical reasons. Group treatment is likely to offer more opportunities for normalization, positive peer modeling, reinforcement, social support, and exposure to social situations (Manassis et al., 2002) and may also be more cost-effective (Flannery-Schroeder, Choudhury, & Kendall, 2005). For example, comparative efficacy trials of individual CBT versus group CBT have been conducted (de Groot, Cobham, Leong, & McDermott, 2007; Flannery-Schroeder & Kendall, 2000; Liber et al., 2008; Manassis et al., 2002), and no trial has found significant differences between the two approaches. Group application of EFT has been shown to be efficacious for treating psychological symptoms and changes persist over time (Church & House, 2018), and a unique feature called "Borrowed Benefits" is considered a useful adjunct when delivering EFT in a group setting.

The use of the SA-45 may not have been the most appropriate measure given participants' postratings, including the previous 7 days, when they also completed the premeasure. While the original study was replicated as precisely as possible and included this measure, participants with known mood disorders/diagnosis were excluded, and this may have impacted the results. Future research may benefit from more appropriate mood and anxiety measures, as well as including diagnostic disorders to investigate the impact of EFT on cortisol levels in clients. A final limitation may exist due to known cortisol level variation throughout the day; therefore, future studies would be strengthened by including more frequent measurement of cortisol throughout each day.

Future Directions

The significant improvement observed in EFT participants, as reflected in their cortisol levels, is consistent with the published literature on EFT's efficacy and underscores its impact on physiological stress. Further research is recommended to determine whether endocrinal measures and application of EFT techniques to address stress-related issues such as food cravings (e.g., EFT as an intervention for food cravings in obese adults) are viable. Despite the highlighted limitations, the current study has added to the growing evidence base supporting acupoint-based protocols that result in physiological decreases of biomarkers and indicated the replication effects were consistent with the original trial.

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