



## ORIGINAL ARTICLE

# A randomized clinical trial of emotional freedom techniques for chronic pain: Live versus self-paced delivery with 6-month follow-up

Peta Stapleton<sup>1</sup>  | Clara Wilson<sup>1</sup> | Nicola Uechtritz<sup>1</sup> | Michele Stewart<sup>2</sup> | Michelle McCosker<sup>3</sup> | Tom O'Keefe<sup>1</sup> | Matthew Blanchard<sup>4</sup> 

<sup>1</sup>School of Psychology, Bond University, Gold Coast, Queensland, Australia

<sup>2</sup>Elm Psychology, Mudgeeraba, Queensland, Australia

<sup>3</sup>Nurture Health Solutions, Robina, Queensland, Australia

<sup>4</sup>School of Psychology, University of Sydney, New South Wales, Australia

## Correspondence

Peta Stapleton, School of Psychology, Bond University, Gold Coast, QLD 4229, Australia.

Email: [pstaplet@bond.edu.au](mailto:pstaplet@bond.edu.au)

## Abstract

**Background:** Chronic pain represents a major global healthcare crisis, and current treatments are limited in effectiveness and safety. Emotional freedom techniques (EFTs) show promise as a potential psychological treatment.

**Methods:** The current study investigated the effect of a randomized clinical trial of EFT for chronic pain in a sample of 147 adult chronic pain sufferers (89.9% female; mean 54.63 years). Participants engaged in a 6-week EFT programme (either online self-paced or in-person).

**Results:** The per-protocol analysis indicated pain severity and interference scores were significantly lower at the end of treatment for the EFT group compared to waitlist, and these were sustained at follow-up. There were no differences between the in-person or self-paced programmes at follow-up for pain severity and interference. Somatic symptoms were significantly lower after EFT, although no further differences at follow-up. Quality of life scores were significantly higher after EFT, which were sustained at follow-up, and no differences between two styles of programme. No significant effects were found for anxiety, depression, happiness or satisfaction with life across the 6-week programmes for either style of delivery or at follow-up. These are discussed in terms of clinical score meanings. Intent-to-treat analysis was consistent with the per-protocol analyses. Limitations of the study are identified and future directions are discussed.

**Conclusions:** Findings offer early promise for EFT as a potentially effective pain management strategy, as well as support for online intervention without compromising treatment outcomes.

**Significance Statement:** An emerging body-based intervention for chronic pain may be a possible solution for remote clients who cannot attend in-person sessions. In this clinical trial Emotional Freedom Techniques (EFT) significantly reduced chronic pain severity and interference, and there were no differences between and online self-paced program to an online in-person EFT intervention. Both were equally effective, also enhancing quality of life without compromising outcomes. The results were significant at 6-month follow-up/. These findings

highlight a body-based approach as a promising, accessible pain management strategy, and highlights that online programs may be part of the solution for chronic pain patients.

## 1 | INTRODUCTION

Chronic pain is a major global healthcare crisis with significant physiological, psychological, social and economic impacts (Australian Institute of Health and Welfare, 2020). It affects one in five adults during their lifetime (Zelaya et al., 2020) and the severity of pain may contribute to poor pain outcomes (Bernfort et al., 2015). The subjective experience of pain severity affects daily ability to function (Blyth et al., 2001) and sufferers report low quality of life (Hadi et al., 2019).

Chronic pain negatively impacts psychological well-being with associations between pain and psychological distress (Blyth et al., 2001; Hadi et al., 2019; Stapleton et al., 2017), including depression, anxiety and somatoform disorders (De Heer et al., 2014; Hooten, 2016; Knaster et al., 2012). It has been reported that up to 75% of sufferers exhibit the symptoms of anxiety and depression (Dahan et al., 2014). Finally, adverse childhood experiences (ACE), single or systematic maltreatment of children in the first 18 years, have been linked with chronic long-term illness in adulthood (Felitti et al., 1998), including chronic pain (Craner et al., 2022; Fuller-Thomson et al., 2016; Sachs-Ericsson et al., 2017).

The management of pain is usually multidisciplinary (Pain Australia, 2019), and pharmacological interventions, although common, are associated with dependence, accidental overdose, hospitalization and death (AIHW, 2020; Pain Australia, 2019). Improvement in psychological outcomes may influence the development and maintenance cycle of pain comorbidities, as well as improve sufferers' quality of life and satisfaction (Gerrits et al., 2015; Guzmán et al., 2001; Hadi et al., 2019). A radical re-imagining of therapy for chronic pain is needed, perhaps altering pain through a consideration of embodied perception (Stapleton et al., 2019).

Clinical emotional freedom techniques (EFT), also referred to as 'tapping' or psychological acupressure, is an evidence-based practice that has been clinically validated for a range of disorders and psychological outcomes such as anxiety, depression, PTSD and chronic pain (Chatwin et al., 2016; Church et al., 2022; Feinstein, 2012; Stapleton et al., 2010, 2017). EFT combines prolonged exposure therapy and cognitive therapy, with the addition of acupoint stimulation through percussion with the fingertips (see Figure 1). Vivid recall of a situation is facilitated through verbal statements (exposure) with a cognitive frame of

self-acceptance. Before and after tapping, the client rates the emotional intensity of the event on an 11-point Likert scale (Stapleton et al., 2017).

EFT's effectiveness may relate to the body's physiological systems that regulate stress, and studies show significant cortisol reduction (Church et al., 2012; Feinstein, 2012; Stapleton et al., 2017; Stapleton, Crighton, et al., 2020). EFT shows promise for fibromyalgia patients (Brattberg, 2008), and in brief formats for chronic pain (Stapleton et al., 2017). fMRI analysis has indicated significantly decreased connectivity between the medial prefrontal cortex (a pain modulating area) and bilateral grey matter areas in the posterior cingulate cortex and thalamus after a 6-week programme (Stapleton et al., 2022).

This study aimed to investigate the effectiveness of EFT on pain symptomology and psychological well-being for individuals with chronic pain. In addition, it explored in-person versus self-paced delivery to help guide future interventions.

## 2 | METHOD

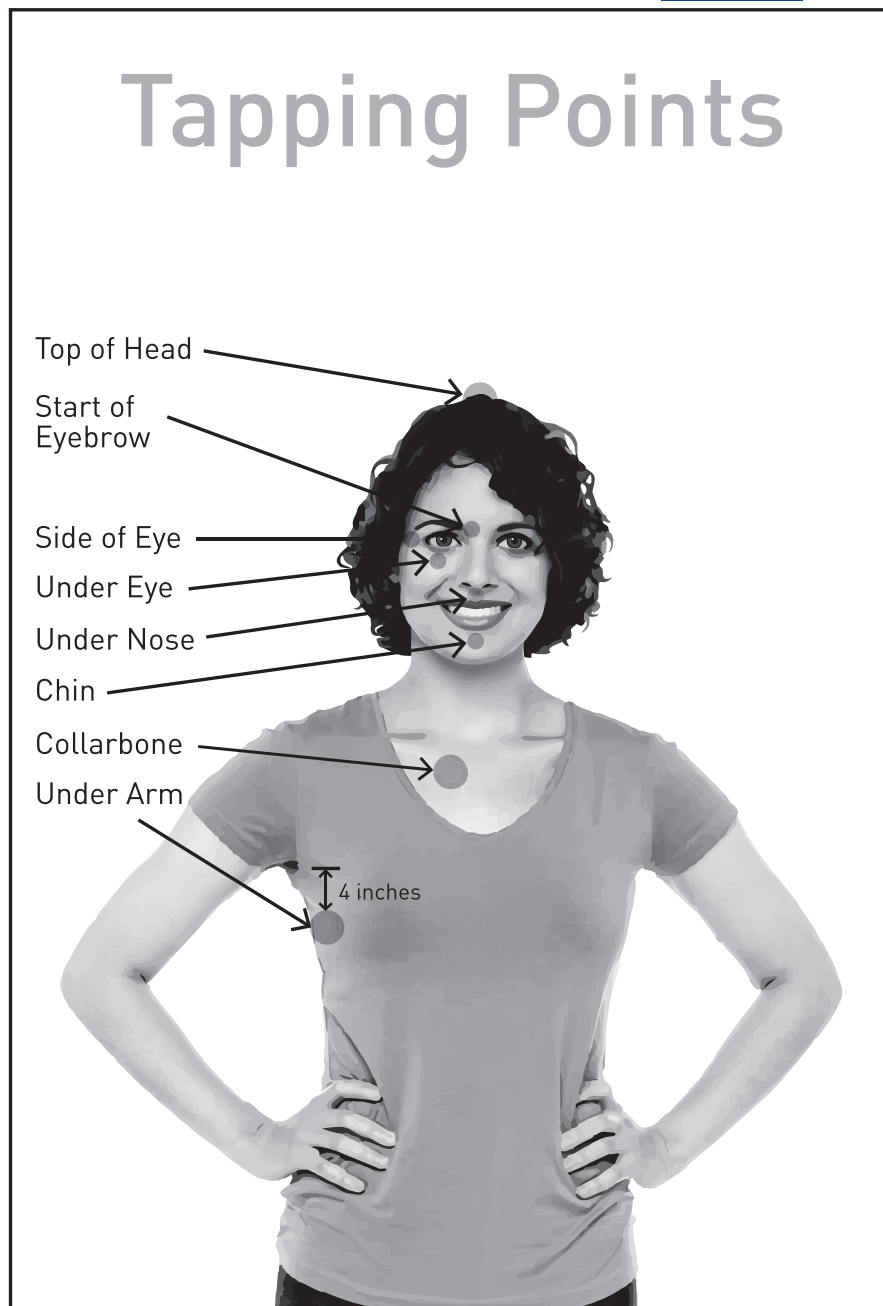
### 2.1 | Participants

Within the current study, 423 participants were recruited via community advertising.

Inclusion criteria for male and female participants were age 18 years or above; English speaking; endorsement of chronic pain for at least 6 months out of the past 12 months, and that had negatively impacted overall functioning and quality of life; chronic pain without clear organic aetiology; and current pain rating of 4 or higher on a 0–10 visual analogue pain index. Exclusion criteria were no current psychological or surgical treatment for chronic pain; no history of psychological impairment; not engaged in treatment for cancer or substance use disorder; and no co-morbid autoimmune disorders.

From 423 registrations, 371 participants completed the presurvey. To be included in the per protocol analysis, participants needed to complete both the presurvey and the required post-survey(s), indicating that they had completed the EFT intervention, leaving a total sample size of 147. An a priori power analysis was conducted using G\*Power (Faul et al., 2007) for sample size estimate. With significance criterion of 0.05, and a power of 0.80,

**FIGURE 1** Tapping points for EFT. Copyright 2019 by Peta Stapleton. Reprinted with permission.



**TABLE 1** Age and pain duration of participants in years.

	Mean	Std. dev	Minimum	Maximum
Age	54.63	12.52	18	80
Pain duration	10.76	10.47	<1	59

the minimum sample size of 74 was needed for a medium effect; thus, the present study exceeded this. [Tables 1](#) and [2](#) show the participants' age and duration of pain, as well as the frequency and percentage values of the sample's demographic characteristics. See [Figure 2](#) for flowchart of participant pool for analysis.

## 2.2 | Measures

### 2.2.1 | Brief pain inventory (BPI)

The BPI measures pain intensity (severity) and its impact on functioning (interference; Cleeland, 1991). The BPI short form was used in the current study and contains four pain severity items and seven pain interference items. The measures use a linear scale from 0 to 10, with 0 representing 'no pain' and 10 being indicative of 'pain as bad as you can imagine'. A mean score for severity and for interference is calculated from their respective items, where higher scores indicate greater severity or

**TABLE 2** Demographics of the current study sample.

Categorical variable	Frequency (n)	Percentage (%)
Gender		
Male	15	10.2
Female	132	89.8
Marital status		
Divorced	66	44.9
Living with another	5	3.4
Married	25	17.0
Separated	29	19.7
Single	13	8.8
Widowed	9	6.1
Highest education level		
High school or equivalent	16	10.9
Vocational/technical college	23	15.6
Bachelor's degree	48	32.7
Master's degree	27	18.4
Doctoral degree	8	5.4
Other	25	17.0

interference, respectively (Cleeland, 1991). In the current study, the BPI demonstrated good internal reliability, with Cronbach alpha's of severity = 0.82, interference = 0.90.

### 2.2.2 | Quality of life scale (QOLS) for pain

The QOLS is a single-item measure of an individual's ability to function with pain. The item was assessed on an 11-point Likert scale (from 0 = non-functioning to 10 = normal quality of life). The QOLS aims to evaluate the impact chronic pain has on basic daily life activities (Cowan & Kelly, 2003). The QOLS has been extensively used by medical professionals around the world and is useful in measuring progress over time (Callan et al., 2020). The current study demonstrated strong test-retest reliability over the 6-week waitlist period, with a Pearson's correlation of 0.85 ( $p < 0.001$ ).

### 2.2.3 | Satisfaction with life scale (SWLS)

The SWLS is a 5-item instrument designed to measure global cognitive judgements of one's life satisfaction. Participants indicate their level of agreement with each of the five items using a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). Items include statements

such as 'In most ways my life is close to my ideal' and 'If I could live my life over, I would change almost nothing'. Items are summed together to create a total score, with higher scores indicating greater satisfaction with life. In the current study, the SWLS scale demonstrated excellent internal consistency with Cronbach alpha of 0.93.

### 2.2.4 | Self-rating scale of happiness

Happiness was measured using a single item self-rating scale of happiness. Respondents rate the item, 'Do you feel happy in general?' on an 11-point scale (from 0 = Not at all happy, 10 = Very happy). This item has demonstrated good concurrent validity with significant positive correlation with the SWLS (Diener et al., 1985; Pavot & Diener, 1993) and the Oxford Happiness Inventory (OHI; Argyle et al., 1995; Hills & Argyle, 1998). The current study demonstrated strong test-retest reliability over the 6-week waitlist period, with a Pearson's correlation of 0.78 ( $p < 0.001$ ).

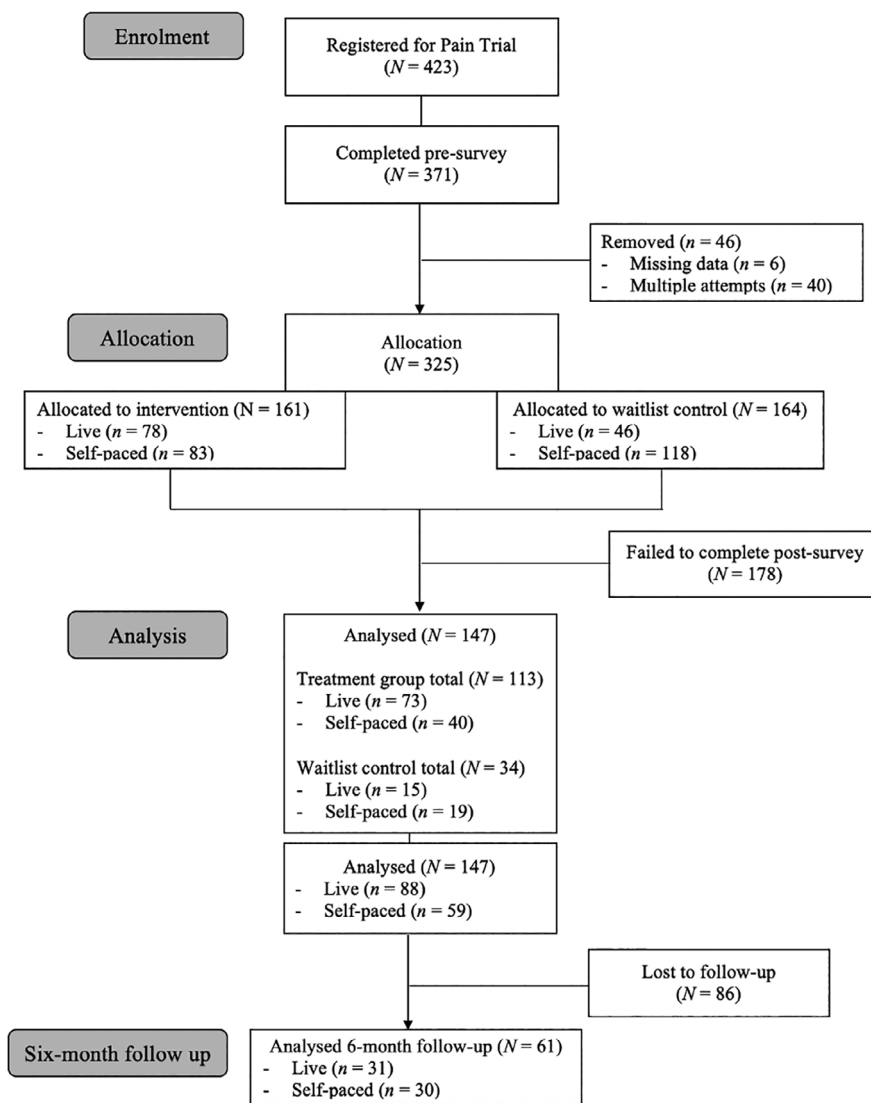
### 2.2.5 | Patient health questionnaire (PHQ)

The PHQ is a scale used to assist clinicians in making provisional criteria-based diagnoses for selected DSM-IV disorders (Kroenke et al., 2010; Spitzer et al., 1999). The current study included three modules of the PHQ: anxiety (seven items), depression (nine items) and somatoform (15 items). The depression module is scored 0–3, providing a maximum of 27. The anxiety module is scored 0–3, providing a maximum of 21, and the somatoform module is scored 0–2, providing a maximum of 30. In the current study, all subscales demonstrated good internal reliability, with Cronbach alpha's of depression = 0.86, anxiety = 0.80, somatoform = 0.76.

### 2.2.6 | Adverse childhood experience questionnaire

The ACEQ is a self-report questionnaire used widely to assess the impact of adverse childhood experiences on health and well-being in adulthood (Felitti et al., 1998). The ACE questionnaire comprises 10 items assessing exposure to different forms of abuse, neglect and household dysfunction before age 18. Responses are given on a binary scale (yes or no) to each item (e.g. 'Did a household member go to prison?'). The score range for the ACE questionnaire is 0–10, with higher scores indicating greater exposure to adverse experiences.

FIGURE 2 Flowchart of participants.



### 2.3 | Design and procedure

Following ethics approval by the Bond University Human Research Ethics Committee and retrospective registration on the Australian New Zealand Clinical Trials Registry (Trial Id: ACTRN12620000585921), an online assessment package was created using Psychdata ([www.psychdata.com](http://www.psychdata.com)). Participants were recruited using community advertisement that provided an overview of the study, alongside a link to register interest in participation. Participants indicated preference for either self-paced delivery or the in-person delivery (to account for worldwide time zones). After consent was provided and upon completion of the presurvey, participants were randomly assigned via computer generation into treatment or wait-list control groups, within their preferred mode of delivery (i.e. self-paced or in-person). The EFT intervention consisted of 2 h per week spanning over a 6-week period. Two trained EFT practitioners, one of whom was a clinical psychologist, delivered the intervention with sessions based on

the standardized Clinical EFT protocols (Church, 2013). Acupressure points on the eyebrow, side of eye, under eye, under nose, chin, collarbone, under arm and the top of the head were used.

The self-paced groups accessed the pre-recorded teaching modules and practice videos that were presented on a secure, private platform (<https://www.thinkific.com/>) by the first author. Each week's module was released week-by-week, and they could watch previous modules if they wished. Participants were supported by a discussion forum in the platform where they could ask specific questions of the facilitator. The in-person online sessions were offered weekly at the same time and delivered via Zoom (<https://zoom.us/>) by the two facilitators. Physical in person sessions was initially planned; however, the trial occurred during the worldwide pandemic, and thus, online delivery was offered.

At the end of Week 6, both treatment and wait-list participants were sent the treatment survey to complete. The wait-list groups for both the in-person and self-paced

versions of the programme began the 6-week EFT intervention the following week, following the same process as the initial treatment group. The participants in the wait-list group completed a second post-survey at the end of the intervention. The data were then collapsed for both delivery styles after the post measures were complete, leaving the in-person versus self-paced groups to analyse for effectiveness.

### 3 | RESULTS

Before conducting the main analyses, we performed two data integrity checks. First, the baseline characteristics were compared between the EFT treatment condition (across both treatment delivery modes) and the wait-list control group using independent sample *t*-tests. There were no differences between the intervention and wait-list groups across type of delivery except for the number of people in a household. For that variable, Welch's *t*-test was used and it was non-significant, indicating no differences between the groups. Second, those in the wait-list group were assessed twice pretest (waiting period), so we compared the time points for differences on the outcome variables: pain severity, pain interference, anxiety, depression, somatic symptoms, happiness, life satisfaction and quality of life. There were no significant differences between the two pretest time points; thus, the wait-list group did not change on any of the outcome variables during the waiting period.

The main analyses are presented in the following order. First, we examined the immediate effect of treatment to see if the outcome variables differed as a function of time (pre vs. post) and treatment (waitlist vs. in-person EFT vs. self-paced EFT). Second, we investigated the sustained

effect of treatment to see if the outcome variables differed as a function of time (pre vs. follow-up and post vs. follow-up) and treatment (in-person EFT vs. self-paced EFT). Lastly, we examined the prevalence of adverse childhood experiences for those in the in-person EFT and self-paced EFT conditions.

All results reported were derived using a per-protocol analysis. Given the asymmetric rates of attrition in our treatment groups, we also conducted the same analyses using an intent-to-treat analysis (ITT). The results of ITT are presented in the supplementary materials and were consistent with the per-protocol analyses.

#### 3.1 | The immediate effect of treatment

To examine the immediate effect of the EFT interventions on the variables of interest, a series of 2×3 mixed ANOVAs with contrasts (Bonferroni procedure) were conducted. Time was a repeated measures variable (pre-test vs. post-test) and treatment condition was a between-group variable (waitlist vs. in-person EFT vs. self-paced EFT). The outcome variables were pain severity and interference; anxiety, depression and somatic symptoms; happiness; satisfaction with life; and quality of life. Descriptive statistics for the groups are presented in Table 3 and results of the mixed ANOVAs are presented in Table 4 and Figure 3. Contrasts were tested for the treatment interaction effects. For the treatment effect, contrast 1 (c1) compared WL versus in-person EFT, contrast 2 (c2) compared WL versus self-paced EFT and contrast 3 (c3) compared in-person EFT versus self-paced EFT. We used simple main effects to investigate the interaction effects. These compared pre-test versus post-test at each level of the treatment condition: waitlist (c1), in-person EFT (c2) and self-paced EFT

**TABLE 3** Descriptive statistics for the immediate effects of treatment.

Outcome	Pre						Post					
	Wait-list		In-person EFT		Self EFT		Wait-list		In-person EFT		Self EFT	
	(n = 34)		(n = 73)		(n = 40)		(n = 31)		(n = 73)		(n = 40)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Pain severity	25.32	4.52	24.25	7.34	26.35	5.57	26.13	5.43	19.00	8.92	21.55	7.52
Pain interfere	48.00	14.71	44.44	17.37	47.38	14.04	47.68	14.88	33.03	19.38	35.50	18.05
Anxiety	8.69	2.65	7.86	3.26	7.68	3.34	9.04	3.14	7.75	3.21	7.52	2.71
Depression	10.18	5.96	9.25	5.95	8.57	5.58	10.58	6.23	8.27	5.66	7.28	4.74
Somatic	8.97	3.90	8.23	4.19	8.22	4.51	9.19	4.08	7.03	4.77	6.90	4.37
Happiness	6.94	1.82	7.03	2.29	7.25	2.05	6.97	2.26	7.26	2.22	7.08	2.17
SWL	21.27	8.38	20.21	8.42	19.52	7.42	20.65	8.06	19.90	8.03	18.51	7.33
QOL	6.06	2.65	6.11	2.61	6.75	2.10	7.03	2.33	7.71	2.65	8.35	1.81

Abbreviations: *n* = number of cases; QOL, quality of life; SD, standard deviation; SWL, satisfaction with life.

**TABLE 4** Results of a series of mixed ANOVAs comparing time (pre- vs. post-test) and treatment (wait-list vs. in-person EFT vs. self-paced EFT).

Outcome	Effect	df <sup>effect</sup>	df <sup>error</sup>	F	$\eta^2$	$\eta_p^2$	c1	c2	c3
Pain severity	Time	1	141	42.88***	0.07	0.23	–	–	–
	Treatment	2	141	4.91**	0.05	0.06	<0.001	0.48	0.08
	Interaction	2	141	9.33***	0.03	0.12	0.75	<0.001	<0.001
Pain interference	Time	1	141	54.32***	0.07	0.28	–	–	–
	Treatment	2	141	3.44*	0.04	0.05	<0.01	0.09	0.82
	Interaction	2	141	8.35***	0.02	0.11	1.00	<0.001	<0.001
Anxiety	Time	1	100	1.49	0.00	0.01	–	–	–
	Treatment	2	100	1.81	0.03	0.04	–	–	–
	Interaction	2	100	1.14	0.00	0.02	–	–	–
Depression	Time	1	138	3.75	0.00	0.03	–	–	–
	Treatment	2	138	1.92	0.02	0.03	–	–	–
	Interaction	2	138	1.51	0.00	0.02	–	–	–
Somatic	Time	1	139	9.17**	0.01	0.06	–	–	–
	Treatment	2	139	1.52	0.02	0.02	–	–	–
	Interaction	2	139	2.48	0.01	0.03	–	–	–
Happiness	Time	1	136	0.11	0.00	0.00	–	–	–
	Treatment	2	136	0.09	0.00	0.00	–	–	–
	Interaction	2	136	1.00	0.00	0.01	–	–	–
Life satisfaction	Time	1	136	2.43	0.00	0.02	–	–	–
	Treatment	2	136	0.74	0.01	0.01	–	–	–
	Interaction	2	136	0.62	0.00	0.01	–	–	–
Quality of life	Time	1	141	111.96***	0.09	0.44	–	–	–
	Treatment	2	141	1.85	0.02	0.03	–	–	–
	Interaction	2	141	1.58	0.00	0.02	–	–	–

Note: *p*-values for significant contrasts are in bold.

Abbreviations: c, contrast;  $\eta^2$ , eta-squared;  $\eta_p^2$ , partial eta-squared.

\*\*\**p* < 0.001. \*\**p* < 0.01. \**p* < 0.05.

(c3). To account for the unbalanced conditions, we conducted the mixed ANOVAs using Type II sums of squares (Langsrud, 2003).

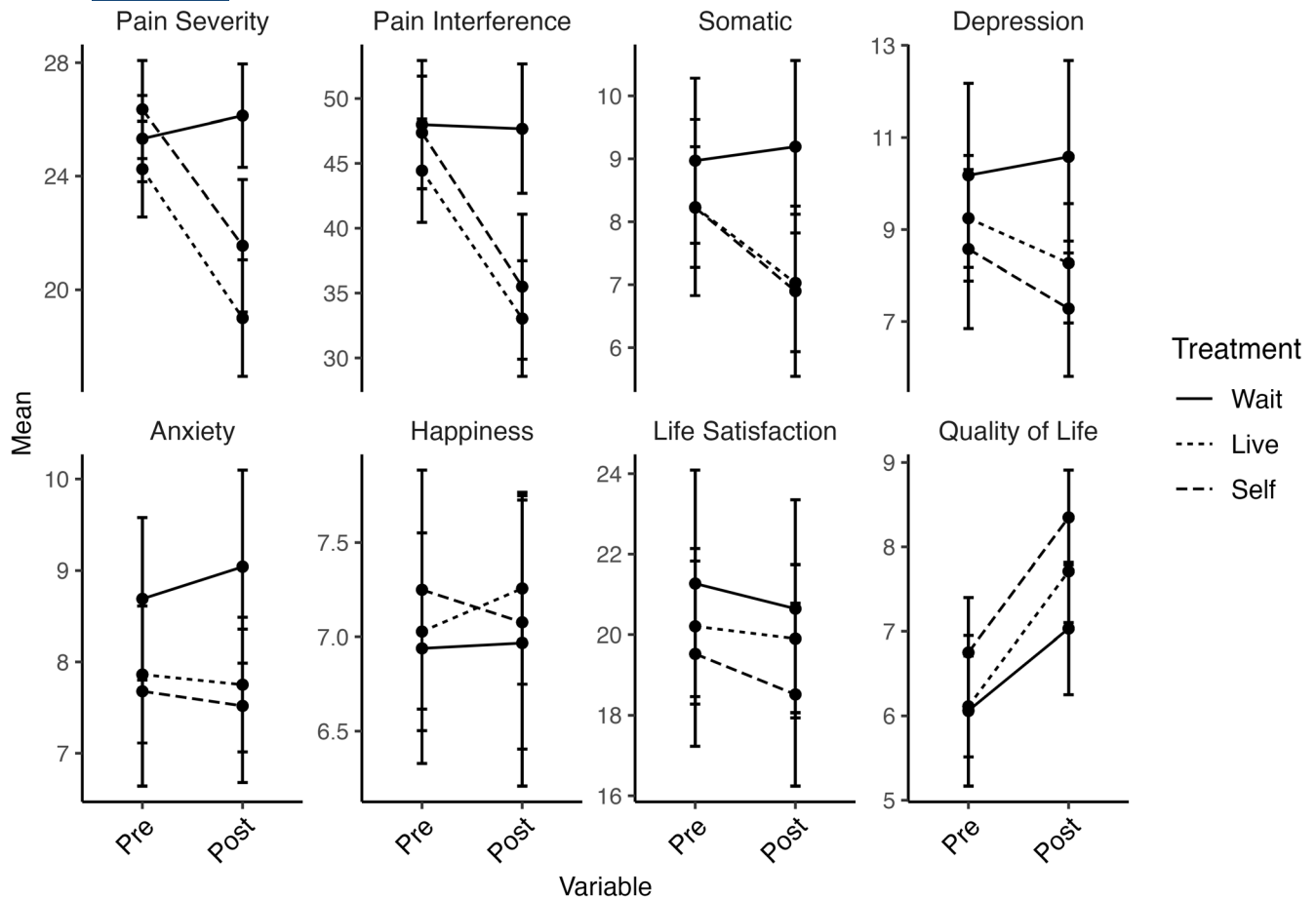
### 3.1.1 | Pain severity

Scores were significantly lower at post-test (Mean = 21.24) compared with pretest (Mean = 25.07), averaging across treatment condition ( $F_{1,141} = 42.88$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.23$ ). Significant effects were also observed for treatment ( $F_{2,141} = 4.91$ ,  $p < 0.01$ ,  $\eta_p^2 = 0.06$ ) and the interaction ( $F_{2,141} = 9.33$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.12$ ). Main effect contrasts revealed that pain severity was significantly lower for in-person EFT than the wait-list group, averaging across time (Mean difference = 4.09,  $p < 0.001$ ). None of the other contrasts were significant. Simple main effect contrasts showed that pain severity was significantly lower at post-test compared with pretest for participants in the

in-person EFT (Mean difference = 5.25,  $p < 0.001$ ) and self-paced EFT (Mean difference = 4.80,  $p < 0.001$ ) but not the wait-list condition.

### 3.1.2 | Pain interference

Scores were significantly lower at post-test (Mean = 36.87) compared with pretest (Mean = 46.06), averaging across treatment condition ( $F_{1,141} = 54.32$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.28$ ). Significant effects were also observed for treatment ( $F_{2,141} = 3.44$ ,  $p = 0.04$ ,  $\eta_p^2 = 0.05$ ) and the interaction ( $F_{2,141} = 8.35$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.11$ ). Main effect contrasts revealed that pain interference was significantly lower for in-person EFT than the wait-list group, averaging across time (Mean difference = 9.12,  $p < 0.01$ ). None of the other contrasts were significant. Simple main effect contrasts demonstrated that post-test scores were significantly lower than pretest scores for in-person EFT (Mean



**FIGURE 3** Mean scores on each outcome variable for the immediate time and treatment effects.

difference = 11.41,  $p < 0.001$ ) and self-paced EFT (Mean difference = 11.88,  $p < 0.001$ ) but not the wait-list group.

### 3.1.3 | Somatic symptoms

Scores were significantly lower at post-test (Mean = 7.46) compared with pre-test (Mean = 8.40), averaging across treatment condition ( $F_{1,139} = 9.17$ ,  $p < 0.01$ ,  $\eta_p^2 = 0.06$ ). None of the other effects were significant.

### 3.1.4 | Quality of life

Scores were significantly higher at post-test (Mean = 7.74) compared with pretest (Mean = 6.27), averaging across treatment condition ( $F_{1,141} = 111.96$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.44$ ). None of the other effects were significant.

### 3.1.5 | Other outcome variables

None of the effects were significant for anxiety, depression, happiness or satisfaction with life.

## 3.2 | The sustained effect of treatment

To examine the sustained effect of the EFT interventions on the variables of interest (pre-test vs. follow-up and post-test vs. follow-up), a series of 2x3 mixed ANOVAs with contrasts (Bonferroni procedure) were conducted. Time was a repeated measures variable (pre-test vs. post-test vs. follow-up) and treatment condition was a between-group variable (in-person EFT vs. self-paced EFT). To increase power in the analysis, we collapsed the wait-list group into their respective treatment group—wait-list participants received an EFT treatment after recording two pre-test measures on each outcome. The outcome variables were the same as the immediate effect analyses. Descriptive statistics for the groups are presented in Table 5 and results of the mixed ANOVAs are presented in Table 6 and Figure 4. For the time effect, we tested the following contrasts only: contrast 1 (c1) compared pretest versus Follow-up; and contrast 2 (c2) compared post-test versus Follow-up. To account for the unbalanced conditions, we conducted the mixed ANOVAs using Type II Sums of Squares (Langsrud, 2003).

**TABLE 5** Descriptive statistics for the sustained effects of treatment.

Outcome	Pre				Post				Follow-up			
	In-person EFT (n = 85)		Self EFT (n = 59)		In-person EFT (n = 85)		Self EFT (n = 59)		In-person EFT (n = 32)		Self EFT (n = 30)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Pain severity	24.58	7.06	26.19	5.63	19.30	8.97	20.78	7.73	17.19	8.13	18.70	9.11
Pain interfere	45.34	16.58	46.83	15.10	34.24	19.56	34.34	19.42	29.00	18.49	29.70	19.45
Anxiety	8.11	3.30	7.96	3.25	7.84	3.25	7.60	2.74	6.68	3.31	7.41	2.65
depression	9.69	6.12	8.85	5.62	8.62	6.14	7.29	5.09	7.72	5.86	5.93	4.94
Somatic	8.52	4.27	8.32	4.25	7.16	4.87	7.14	4.21	7.25	4.34	6.87	4.53
Happiness	7.02	2.20	7.15	2.22	7.18	2.20	7.31	2.23	7.29	2.25	7.86	2.10
SWL	20.51	8.14	19.54	7.91	20.27	7.98	18.76	7.77	20.26	8.00	17.52	7.93
QOL	6.11	2.52	7.03	2.22	7.64	2.50	8.41	2.04	8.42	2.22	9.23	2.03

**TABLE 6** Results of a series of mixed ANOVAs comparing time (pre- vs. post-test vs. follow-up) and treatment (in-person EFT vs. self-paced EFT).

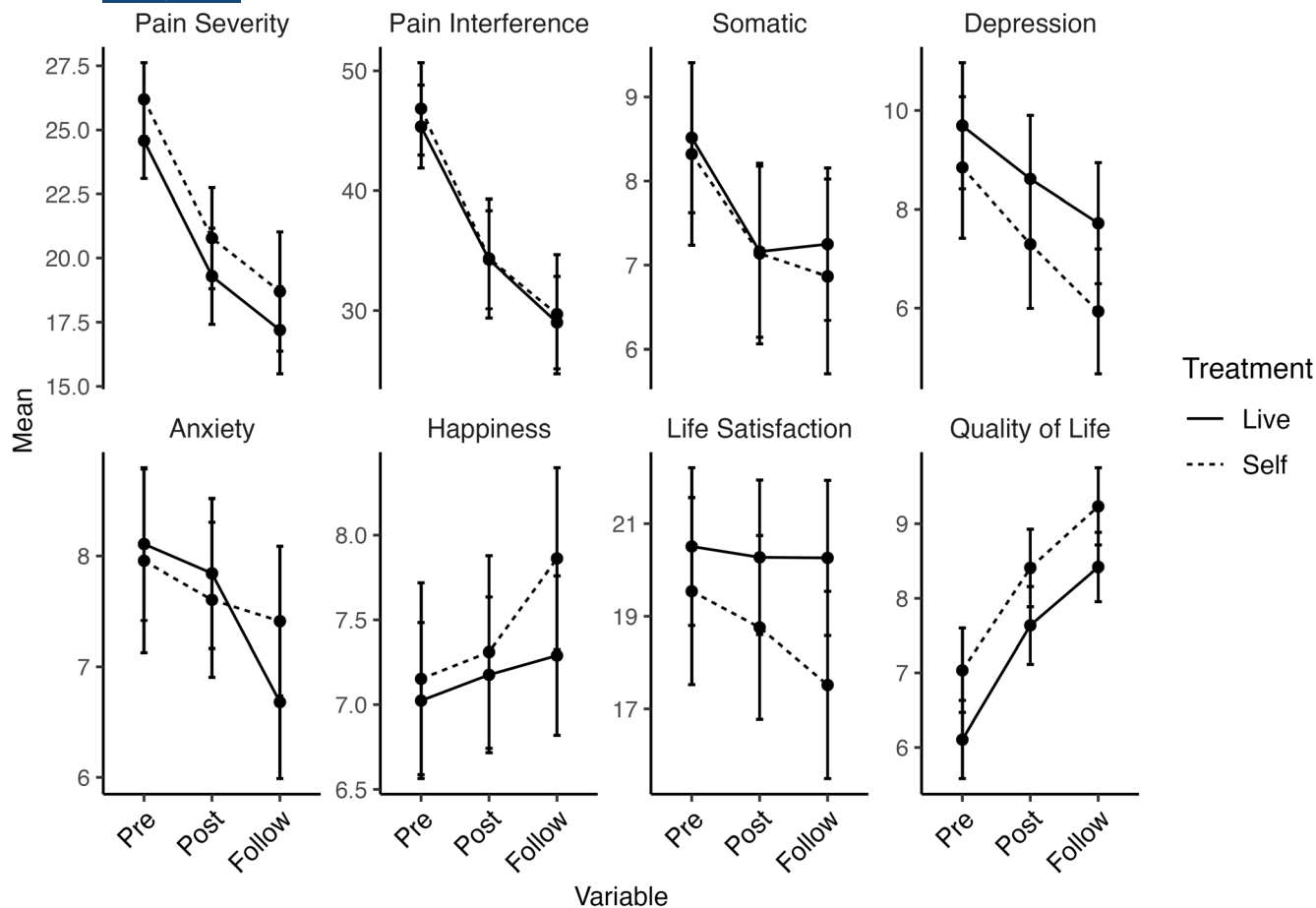
Outcome	Effect	df <sup>effect</sup>	df <sup>error</sup>	F	$\eta^2$	$\eta_p^2$	c1	c2
Pain severity	Time	2	116	40.24***	0.17	0.41		
	Treatment	1	58	0.70	0.01	0.01		
	Interaction	2	116	0.09	0.00	0		
Pain interference	Time	2	116	36.09***	0.13	0.38		
	Treatment	1	58	0.00	0.00	0.00		
	Interaction	2	116	0.56	0.00	0.01		
Anxiety	Time	2	66	1.37	0.01	0.04		
	Treatment	1	33	0.96	0.02	0.03		
	Interaction	2	66	1.24	0.00	0.04		
Depression	Time	2	116	5.32**	0.02	0.08		
	Treatment	1	58	0.38	0.00	0.01		
	Interaction	2	116	1.52	0.00	0.03		
Somatic	Time	2	118	5.42**	0.02	0.08		
	Treatment	1	59	0.12	0.00	0.00		
	Interaction	2	118	0.07	0.00	0.00		
Happiness	Time	2	110	2.80	0.01	0.05		
	Treatment	1	55	0.71	0.01	0.01		
	Interaction	2	110	0.82	0.00	0.01		
Life satisfaction	Time	2	110	2.52	0.00	0.04		
	Treatment	1	55	1.89	0.03	0.03		
	Interaction	2	110	0.34	0.00	0.01		
Quality of life	Time	2	116	33.66***	0.12	0.37		
	Treatment	1	58	3.90	0.05	0.06		
	Interaction	2	116	0.05	0.00	0.00		

\*\*\* $p < 0.001$ . \*\* $p < 0.01$ . \* $p < 0.05$ .

### 3.2.1 | Pain severity

There was a significant main effect of time, averaging across treatment condition ( $F_{2,116} = 40.24$ ,  $p < 0.001$ ,

$\eta_p^2 = 0.41$ ). Main effect contrasts revealed that pain severity was significantly lower at follow-up compared with pre-test, averaging across treatment (Mean difference = 4.06,  $p < 0.001$ ). There was no difference between post-test and



**FIGURE 4** Mean scores on each outcome variable for the sustained time and treatment effects.

follow-up. The treatment and interaction effects were not significant.

### 3.2.2 | Pain interference

There was a significant main effect of time, averaging across treatment condition ( $F_{2,116} = 36.09$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.38$ ). Main effect contrasts revealed that pain interference was significantly lower at follow-up compared with pretest, averaging across treatment (Mean difference = 16.61,  $p < 0.001$ ). There was no difference between post-test and follow-up. The treatment and interaction effects were not significant.

### 3.2.3 | Quality of life

There was a significant main effect of time, averaging across treatment condition ( $F_{2,116} = 33.66$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.37$ ). Averaging across treatment, main effect contrasts revealed that quality of life was significantly higher at follow-up compared with pretest (Mean difference = -2.33,

$p < 0.001$ ) and follow-up compared with post-test (Mean difference = -0.87,  $p = 0.04$ ). The treatment and interaction effects were not significant.

### 3.2.4 | Other outcome variables

None of the effects were significant for anxiety, depression, somatic symptoms, happiness or satisfaction with life.

### 3.2.5 | Prevalence of adverse childhood experiences

Descriptive statistics for the ACE variables are reported in [Table 7](#). Analyses indicated both groups had a significant amount of childhood adversity.

## 4 | DISCUSSION

What was evident in this sample was that it was a traumatized group suffering chronic pain. The mean ACE scores

**TABLE 7** Descriptive statistics for the adverse childhood experiences scale.

Variable	Self-paced			95% CI		In-person			95% CI	
	N	M	SD	Lower	Upper	N	M	SD	Lower	Upper
ACE	59	7.31	2.46	6.66	7.95	88	6.64	2.75	6.05	7.22

for both delivery styles (7.31 for self-paced, and 6.64 for the in-person group) support existing literature that indicates the harmful effects of ACE exposure for future chronic pain (Sherman et al., 2015; You et al., 2019). The link between ACEs and adult pain appears severe and they are particularly vulnerable with their psychological health.

The per-protocol analysis indicated that pain severity and interference were significantly lower for EFT post-treatment, for both the in-person and self-paced groups, compared to the wait list. The somatic symptoms were significantly lower post-EFT across treatment conditions, and the quality-of-life scores were significantly higher. There were no significant differences for anxiety, depression, happiness or satisfaction with life.

For anxiety, all time points for both intervention styles, indicated mild levels of symptomology; thus, the EFT intervention may not have impacted this. When screening for anxiety disorders, a score of 8 or greater represents a reasonable cut-point for identifying probable cases of generalized anxiety disorder (Plummer et al., 2016). Only the in-person group had a mean score in this range pre-intervention ( $M=8.11$ ), the rest were mild. However, this group did report scores in the mild category from this point forward, indicating clinical improvement.

For depression too, there were clinical improvements. The in-person group indicated moderate levels of depressive symptoms pre-EFT and decreased to a mild level at post. This continued to improve in score at follow-up, staying in the mild category. For the self-paced group, all time points indicated a mild cut-off score and again still decreased over the post and follow-up periods staying in the mild range. Statistically the analysis did not indicate a difference; however, the clinical improvements are evident.

The happiness rating at baseline was actually high (7/10) and while it continued to improve across time for both delivery styles, may account for the lack of statistical significance. The satisfaction with life category was classified as 'neutral' for both delivery styles but again, while it did improve over time, may account for the lack of statistical significance. In this sample, happiness and satisfaction with life improved clinically but were not severe enough at baseline to show significant statistical improvement.

As predicted, results revealed no significant differences between the in-person versus self-paced online delivery for pain severity and interference, somatic symptoms and quality of life (but not the other four variables). These results appear promising as online

delivery has several advantages such as increased access to populations, reduced cost, increased convenience for patients and increased user and health provider control of the intervention (Griffiths et al., 2006; Marks et al., 2007). Those with chronic pain are often confronted with limited accessibility and availability of established treatments, which makes internet-based delivery highly desirable (Lin et al., 2017; van Beugen et al., 2014). The treatment outcomes for pain and some psychological well-being did not differ between the in-person and self-paced formats and highlights that online programmes may be part of the solution for chronic pain patients. These programmes can reach individuals who face barriers to in-person care and offer flexible scheduling that can improve adherence. Additionally, they are more scalable and can serve a larger number of patients simultaneously, while reducing costs related to travel and resources. This shift could enhance access to care, optimize resource use and better accommodate patients' preferences and needs. This study offers support for the development and use of online EFT treatment for chronic pain without compromising treatment outcomes.

The sustained effect of clinical EFT was partially supported in this study. There was a significant difference in pain severity and interference from baseline to 6-month follow-up for both intervention styles, indicating the post treatment effects were maintained. There was also no difference between the two styles of delivery. The individual's subjective experience of pain severity affects their ability to function in daily life. The findings in the current study are largely consistent with previous research where Brattberg (2008) reported a significant improvement in pain following an 8-week EFT intervention compared to the wait-list group in a sample of 26 women diagnosed with fibromyalgia. Similarly, Stapleton et al. (2017) found a significant reduction in pain following a brief 4-h EFT intervention.

There was also a significant improvement in quality of life across both interventions, from pre to follow-up and post to follow-up, indicating this variable continued to improve over time. There were also no differences between the styles of delivery. While there were no further statistically significant differences for anxiety, depression, somatic symptoms, happiness and satisfaction with life, mean scores did continue to decrease over follow-up. Chronic pain has been reported to significantly interfere

with daily functioning which has a profound effect on an individual's quality of life (Blyth et al., 2001; Karapetyan & Manvelyan, 2017). It stands to reason that a significant reduction in pain severity may have led to an improvement in quality of life by decreasing pain interference and improving self-efficacy in performing daily activities. Future research could investigate the magnitude of this effect on each variable via a mediation analysis.

As mentioned, anxiety and depression symptomatology was mild at both post-EFT and follow-up, and while clinical improvement was indicated, there were no statistical improvements. Happiness (7/10) remained stable throughout both styles of delivery and at follow-up. The somatic symptoms did decrease from pre to post the EFT intervention but were also mild in severity at baseline. This may explain the lack of difference at follow-up. Importantly both delivery styles resulted in these low ratings. Satisfaction with life was scored as 'neutral' for both delivery styles and it did still improve over time.

In summary, the results suggest that both styles of delivery led to significant improvements in pain severity and interference, as well as quality of life over time, with the most pronounced improvements observed at the follow-up assessment. However, the treatment and interaction effects were not significant, indicating that the in-person intervention did not lead to significantly greater improvements compared to the self-paced condition.

#### 4.1 | Limitations

Although the research demonstrates significant results, the study has limitations. Because participants were allowed to indicate attendance preference (in-person or self-paced), the randomisation may not have been without bias. However, two data integrity checks (outlined in the results) did indicate that there were no differences between the groups. First, there was a significantly higher proportion of women to men participating in the intervention. While chronic pain affects a higher proportion of women than men around the world (Australian Institute of Health and Welfare, 2020), the study's sample may not be a true representation of the population. Second, the current study investigated a multitude of chronic pain conditions collectively. However, there are several different types of chronic pain, each with their own biological and psychological influences (AIHW, 2020). As such, the current study did not investigate the effectiveness of EFT on specific chronic pain conditions. Future research would benefit from investigating the effectiveness of EFT on individual types of chronic pain to ascertain whether the effectiveness of EFT varies with different chronic pain conditions. Finally, the present study lacked power at the

6-month follow-up due to missing data. However, this was addressed in an intention-to-treat analysis and was consistent with the per-protocol analyses.

Ultimately the 'fit-for-analysis' to the various arms of the trial favoured allocation to the treatment group (versus control) and to the live group over the self-paced arm. This asymmetry is not trivial, and loss to follow-up can greatly affect the strength of a trial's findings (Dumville et al., 2006). While the attrition was addressed with the intention-to-treat analysis, this bias must be acknowledged.

This study measured and analysed multiple comparisons and although the Bonferroni correction was used (known to be conservative), testing many null hypotheses in a single study results in an increased probability of detecting a significant finding just by chance. Baseline differences between the EFT groups and waitlist controls were examined to determine whether any variables should be used as covariates in subsequent analyses. However, there were no differences, and ultimately the endpoints were specified a priori in the clinical trial protocol (ACTRN12620000585921). To this end, results should be considered tentative and further research conducted.

## 5 | CONCLUSIONS

Despite these limitations, the findings of the current study offer early promise in improving pain, and quality of life for chronic pain sufferers; and online self-paced delivery may achieve similar outcomes to a therapist-led session. Chronic pain is a major global healthcare crisis making effective pain management strategies of high importance (Pain Australia, 2019). However, there are several disadvantages inherent in current traditional treatments of chronic pain. By investigating the effectiveness of EFT on improving sufferers' pain and psychological well-being, the current study adds to the growing body of literature presenting EFT as a potentially effective pain management strategy with very little downside. Furthermore, the present study provides support for online intervention to improve access and cost, without compromising treatment outcomes.

### AUTHOR CONTRIBUTIONS

This study was designed by P.S. The trial was delivered by M.S. and M.M. and coordinated by P.S. The data were analysed by C.W., N.U. and T.O., and the results were critically examined by P.S. P.S. had a primary role in preparing the manuscript, which was edited by C.W., N.U. and T.O. All authors have approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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## CONFLICT OF INTEREST STATEMENT

The first author may be compensated for keynote/workshop presentations on the topic examined due to expertise. No other author declares a conflict.

## DATA AVAILABILITY STATEMENT

Data will be made available on request.

## ORCID

Peta Stapleton  <https://orcid.org/0000-0001-9916-7481>

Matthew Blanchard  <https://orcid.org/0000-0001-5557-8617>

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