

Global Case study: The effects of TRE on perceived stress, flourishing and chronic pain self-efficacy

Evaluation of TRE training using Standard TRE Protocol

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1 Introduction

Stress, depression, anxiety and trauma are widespread globally and most recently in 2020 (Shah et al., 2021), with the COVID-19 pandemic, these bio-psycho-social illnesses have increased exponentially. What is necessary in our current global community are effective stress reduction techniques that can be performed without the presence of a professional therapist, can be replicated easily with families, groups, organizations and large populations.

Improving the bio-psycho-social states of the individual implies increasing resiliency. That is, the ability of individuals to self-manage their physical and psycho-emotional states. However, in order to do this, we must access the full spectrum of mental and physical health of the human body. This would include the autonomic nervous system, respiratory system, and circulatory system, to name a few. Many of these body systems are researched and studied primarily in the fields of physiology in an attempt to provide somatic-based therapies for the reduction of stress and trauma symptoms.

Tension and Trauma Releasing Exercises (TRE[®]) is an innovative body-based technique that activates what is referred to as unclassified therapeutic tremors. Research is demonstrating that self-activated body tremors positively affect the full spectrum of both the mental and physical health of the person (Berceli et al., 2014). Additionally, since these tremors are an autonomic response of the nervous system, every individual has easy access to this down-regulating process. Therefore, it is easy to learn, people can learn do it at home, with their families or with their colleagues via the internet.

TRE FOR ALL is a not-for-profit organisation 501(c)(3) that provides TRE training and certification for those wanting to train TRE Providers, who in turn, teach TRE to their clients, people in the general community and within organizations. Due to COVID-19, TRE is increasingly being taught on-line through training programs for those who want to know how to guide others through this process safely and effectively. An official video of the exercise technique itself is also provided for free access via the internet for those who cannot afford the time, effort or finances to be trained to teach this technique (Berceli & Phillips, 2020).

TRE is a series of simple exercises that mildly stress and stretch specific myofascial patterns in the body which subsequently evokes a gentle tremoring response. In our current mental health models, shaking and tremoring is well recognized and documented in the DSM-5 (American Psychiatric Association, 2013). Tremors are associated with a number of mental health conditions such as panic attacks, social phobia, generalized anxiety disorder and post-traumatic stress. However, without any research of the potential therapeutic role body tremors might provide in the trauma recovery process, they continue to be pathologized and even medicated against.

Tremoring in the human body has been extensively researched from a pathological perspective such as Parkinson's tremors, essential tremors, and postural tremors (Günther et al., 2004; Koller et al., 1989;

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Wyne, 2005). There is a paucity of research on spontaneous tremors as a form of healthy down-regulation of the autonomic nervous system. Without a new neurological exploration in the literature, and medical and scientific research, we not only perpetuate a misunderstanding of this spontaneous trembling and shaking, but it is actually stigmatized as a negative experience of weakness. Medication is then offered as a way to stop this healthy spontaneous discharge of the human organism.

The self-activated neurogenic tremors evoked in the TRE process share a similarity with vibrational techniques found in numerous physiological studies (Bosco, Colli, et al., 1999; Cardinale & Bosco, 2003; Cardinale et al., 2005; Issurin & Tenenbaum, 1999). This possibly suggests both self-induced and mechanically induced tremors share a common therapeutic tremorigenic mechanism (Ndefo, 2015). In order to understand this tremor response in the human body, we must look to the scientific research in the field of physiology.

Vibration or shaking of the muscles for stress reduction is not a new concept. In the science of physiology, muscle vibration has a long history of research and practice. In the early 1900s Dr. John Harvey Kellogg was among the noted pioneers of mechanical vibration with the introduction of the vibrating chair, platform, and bar (M L H Arnold Snow, 1904). The purpose of Snow's seminal research was to call attention to the fundamental principles of mechanical vibration, the understanding of which was to enhance knowledge of the subject for medical practitioners. These initial, and somewhat primitive, mechanical vibrators were commonly prescribed by doctors for people who suffered anxiety, insomnia, irritability or nervousness. However, these machines were the fore runners of the current multimillion dollar industry of vibrating platforms, chairs, back, foot and neck massagers.

Numerous studies demonstrated that low-amplitude and low-frequency mechanical stimulation of the neuromuscular system has positive effects on athletic performance (Bosco, Cardinale, et al., 1999; Elble, 2009; Lundeborg, 1984; Lundeborg et al., 1984). Over time vibrational therapy developed as a serious field of research known as Biomechanical Stimulation (Bosco, Cardinale, et al., 1999). Subsequently, it was used in physical therapy and rehabilitation programs to correct restricted body mobility, range of motion, the coordination of musculoskeletal and nervous systems and to increase the rate of healing injuries (Bosco et al., 2000). Biomechanical stimulation has evolved into the most recent form of vibrational therapy known as whole body vibration (WBV). Whole body vibration has been recently proposed as an exercise intervention because of its potential for increasing force generating capacity in the lower limbs (Bosco, Colli, et al., 1999). Kersch-Schindl et al. (Kersch-Schindl et al., 2001) have demonstrated that whole body vibrations can positively alter muscle blood volume. It has also been recognized by many professional athletic trainers that low-frequency vibration used as a training tool appears to increase muscle strength (Torvinen et al., 2002).

Some scant research on the potentially positive effects of spontaneous body tremors provides some insight that adding tremors to an exercise routine has a greater effect of reducing stress than using the exercise routine alone (Berceli, 2009; Lundeborg et al., 1984; Rittweger, 2010; Wysocki et al., 2011). The research into the effects of TRE have been increasing and TRE has shown promising results for improving quality of life for non-professional caregivers (Berceli et al., 2014), in reducing stress and burnout for high school teachers (Johnson & Naidoo, 2017), for the promotion of mental health in adolescents and their families (Amaral et al., 2018), for improving wellbeing in people with multiple

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sclerosis (Lynning et al., 2021, Available Online, February), those in the military with PTSD (Heath & Beattie, 2019), and in improving body awareness in the performing arts (Thommessen & Fougner, 2020).

As part of the global TRE community, Accredited TRE Trainers and TRE Providers were offered the opportunity to include their trainees or clients (cases) in a *Global Case Study Evaluation Project* to evaluate their training, or service provision.

2 Aim

The aim of this quality assurance project using the *Standard TRE Protocol*, was to evaluate the effects of TRE training on perceived stress, flourishing (or thriving) and chronic pain self-efficacy.

3 Design

This was a case study evaluation which involved aggregation of data from a variety of sources of community cases, worldwide (trainees and clients) who received TRE training.

4 Method

4.1 Participants and recruitment – Setting and population

TRE Trainers and TRE Providers (Providers) were invited to participate in the project. An introductory video explained the research process, and the directions, protocols and links to questionnaires were accessible through a password protected *TRE Research* DropBox. Providers were able to invite their trainees/clients to participate in the project by learning TRE in a 2-day or 3-day group workshop, or individual TRE session.

4.2 Inclusion criteria

Clients/trainees were to be at least 18 years of age, able to understand English to complete the questionnaires, be new to TRE (that is, have never done TRE before), or have had minimal TRE practice (e.g., through video, the TRE App., or through a family member), and consent to learning TRE and completing surveys.

4.3 Intervention: TRE training

Clients/trainees were to be taught TRE by a *Certified TRE Provider/Certified TRE Trainer*, using the *Standard TRE Protocol*.

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To ensure quality assurance, Providers were instructed to teach and follow the *Standard TRE Training Protocol*.

The *Standard TRE Training Protocol* includes learning TRE at a 2-day or 3-day group workshop, or a one-on-one TRE session. The technique consists of teaching a series of seven exercises designed to mildly stress and stretch the myofascial patterns in the body as a way of preparing the body for a gentle release of tension. The final exercise consists of laying on the floor in the ‘butterfly’ rest position with feet together and knees relaxed open (Figure 1).

Individuals are then guided to close the knees slowly in small increments. This simple procedure activates the tremor mechanism in the adductors. The trained TRE Provider then applies a series of individualized instructions on diverse postures or self-interventions that can be made to assist the tremor mechanism to move from the legs into the hips, spine, shoulders neck and arms. These interventions can be applied to the general population or are sometimes unique to the tension patterns of the specific individual. Clients and trainees were taught to perform the same technique during the TRE Training Program (Berceli, 2008; Berceli & Phillips, 2020).

To participate, the Provider must have assessed the client’s/trainee’s ability to self-regulate so they could practise TRE at home. Clients/trainees were requested to perform the full series of exercises and tremor time at home no more than 2-3 days per week (if they were able to do so in a self-regulating manner and it was not overwhelming). It was appropriate to reduce the number of times per week (frequency), and the amount of time they tremor (duration). Home practice was not to exceed 2-3 times per week, and not to exceed 10-15 minutes each time.

Prior to 2020, TRE was predominantly taught during individual sessions or group face-to-face workshops. However, with the event of the COVID-19 pandemic TRE was predominantly taught online.



Figure 1: Butterfly rest position (Written permission to reproduce was granted by this participant)

4.4 Ethical considerations: Consent and anonymity

As part of usual practice, TRE Providers gain a short medical history and written consent from trainees/clients who wish to participate in their training programs. The directions and protocol for inclusion in this case study involved explaining the nature of the project and gaining further consent for participation in the research project and completing the questionnaires. Providers were instructed to ensure that participation was voluntary. If participants only wanted to learn TRE, then they could do so, according to usual practice, without completing the questionnaires.

If they were completing the pre-training questionnaire online and clicked ‘No’ on the ‘*Consent and Release*’ page, they will be directed to a page that stated: “*Thank you for your time and interest in the study*”. They were taught TRE as usual. Further information was not collected.

Anonymity was assured because participants constructed their own client/trainee identification number (ID) by stating the initials of their Mother’s name and adding their own birth date (for example - Janet Bean born 5th March 1954 – Identification Number = JB05031954); they entered this in the designated box. Because all information collected was anonymous, individual TRE Provider client/trainee information was not available to Providers or the researcher. Only combined client/trainee information is reported. If the client/trainee wanted their own individual results they could complete a ‘*Request for*

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my own results' Form, giving their ID and contact details; only then could their individual results be extracted by the researcher. It was also explained that clients/trainees could withdraw from the study, up until the results had been analyzed (as these were completely anonymous and not able to be extracted after that time).

TRE Providers and participants will have access to the results once the findings are published on the *TRE Research Page* website (<https://traumaprevention.com/research/>).

This was an unfunded study; therefore, no funding was available to pay any participants, Providers or the researchers. Providers taught TRE as part of their usual practice.

4.5 Outcome measures

Demographic information was collected at baseline and included: gender, age group, and country. Outcome measures included: The Perceived Stress Scale (PSS-10) (Cohen et al., 1983) (Appendix One), the Flourishing Scale (FS) (Diener et al., 2009) (Appendix Two), and the Pain Self-Efficacy Questionnaire (PSEQ) (Nicholas, 2007) (Appendix Three).

The PSS is a 10-item, 5-point Likert scale self-report questionnaire designed to measure how unpredictable, uncontrollable, and overloaded participants perceived their lives to be (Cohen & Williamson, 1988). Overall score range is 0-40 with lower scores indicating less perceived stress. The FS is an 8-item, 7-point Likert self-report scale measuring respondent's self-perceived success in important areas such as relationships, self-esteem, purpose, and optimism. The scale provides a single psychological well-being score. Overall score range is 8-56, with higher scores indicating an improvement in flourishing, with more psychological resources and strengths. The PSEQ is a 10-item, 7-point Likert scale developed to assess the confidence people with ongoing pain have in performing activities while in persistent pain and covers a range of functions, including household chores, socializing, work, and coping with pain without medication. Overall score range is 0-60, with higher scores indicating increased self-efficacy related to pain.

4.6 Data collection

Participants completed the online measures prior to commencing TRE training (Time 1), 4-weeks post training (Time 2), and approximately 12-weeks post-training (Time 3).

The data collection commenced on 11th November 2019 and completed 9th October 2020. The pre-training survey (Time 1) was closed on 30th June 2020 (ACST); the 4-week post-training survey (Time 2) was closed on 6th August 2020 (ACST); and the 12-week post-training survey (Time 3) was closed on 9th October 2020 (ACST).

4.7 Data analysis

Demographic data were analyzed using descriptive statistics. Due to non-normal distribution, non-parametric statistics were conducted. The Wilcoxon Signed Rank Test of statistical significance was used to analyse the differences in T1 (Time 1) and T2 (Time 2) matched pairs survey scores ($n=22$),

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and between T1 and T3 (Time 3) matched pairs survey scores ($n=17$). The Friedman test was used to analyze the differences across the three repeated measures for T1, T2, T3 ($n=14$).

5 Results

5.1 Demographics

After removing consent only responses, a total of 51 participants completed the pre-training survey (T1). Of those, 22 participants (43%) completed both the pre (T1) and 4-week-post TRE training survey (T2), 17 participants (33%) completed the pre-training (T1) and 12-week-post survey (T3) (i.e. they did not complete the 4-week survey), and 14 participants (27%) completed all three surveys (T1, T2, T3). Demographic information was collected prior to commencing TRE training. Table 1 provides demographic information for those participating at the three time points.

The majority of respondents were female and in the 41 to 60 age group. Those who completed both the pre-and 4 week-post training survey were mainly from the United Kingdom (UK) ($n=9$), United States of America (USA) ($n=4$) and Australia ($n=3$). The majority who completed all three surveys were from the UK ($n=8$). This may be primarily due to the surveys for this study being available in the English language only. However, it is important to note for future research that these questionnaires are available in a number of languages.

At commencement of the study 58.8% of participants carried out care practices other than TRE. A diverse range of care practices were reported including, trauma therapy, yoga, Pilates, massage, walking/running, swimming, mindfulness, meditation, psychotherapy, Eye Movement Desensitization and Reprocessing (EMDR), sound healing, dance, Emotional Freedom Technique (EFT), Breathwork, acupuncture, massage, Hakomi therapy, resonance repatterning (energy work), homoeopathy, naturopathy, Nature Bathing, Qi Gong, writing for self-reflection, Internal Family Systems (IFS), Feldenkrais, applied kinesiology, Gentle Bioenergetics, reflexology, and craniosacral therapy.

A variety of illnesses were reported by 35.3% of participants, the most common being: musculoskeletal conditions, depression, posttraumatic stress disorder (PTSD), anxiety, cardiac conditions, asthma, autoimmune disease, gastrointestinal conditions, and chronic pain.

The majority of participants (56.9%) had not done TRE before and of those who had, most had learnt through group workshops or one-on-one sessions. Others were introduced to TRE in a variety of ways, mostly through webinars, friends, personal trainers, or yoga teachers. Some participants reported they had heard about TRE through their interest in bioenergetics and body psychotherapy, through YouTube/Google/Internet search for trauma interventions or experienced tremors during yoga practices.

Of those who had done TRE before (43.1%), the majority continued to practice an average of 3 times since learning, with four reporting practice more regularly from 5 to 40 times prior to the current training they were about to begin. Most of the respondents (76.5%) were not TRE trainees.

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Table 1. Participant demographics: Gender, Age, Country

	Pre-Training Responses <i>n=51 (%)</i>	4-Weeks Post Training Responses <i>n=22 (%)</i>^a	12-Weeks Post Training Responses <i>n=17 (%)</i>^b	12-Weeks Post Training Responses <i>n=14 (%)</i>^c
Gender				
Female	39 (76.5)	17 (77.3)	14 (82.3)	11 (78.6)
Male	11 (21.6)	4 (18.2)	2 (11.8)	2 (14.3)
Nonbinary	1 (2.0)	1 (4.5)	1 (5.9)	1 (7.1)
Age Group (Years)				
21-30	4 (7.8)	2 (9.1)	1 (5.9)	1 (7.1)
31-40	5 (9.8)	2 (9.1)	1 (5.9)	1 (7.1)
41-50	16 (31.4)	9 (41.0)	6 (35.3)	6 (42.9)
51-60	18 (35.3)	6 (27.3)	8 (47.0)	5 (35.7)
61-70	8 (15.7)	3 (14.0)	1 (5.9)	1 (7.1)
Country (Alphabetical)				
Australia	11 (22)	3 (14.0)	3 (17.6)	0
Canada	1 (2)	0	0	0
Czech Republic	1 (2)	1 (4.5)	1 (5.9)	1 (7.1)
Germany	1 (2)	0	0	0
Peru	1 (2)	1 (4.5)	1 (5.9)	1 (7.1)
Poland	1 (2)	0	0	0
Russian Federation	1 (2)	1 (4.5)	1 (5.9)	1 (7.1)
Serbia	2 (4)	2 (9.1)	2 (11.8)	2 (14.3)
Slovenia	2 (4)	0	0	0
South Africa	1 (2)	1 (4.5)	1 (5.9)	1 (7.1)
United Kingdom	10 (20)	9 (41.0)	8 (47.0)	8 (57.1)
United States of America	19 (37.3)	4 (18.2)	0	0

^a Pre training and 4-week post TRE training demographics - matched pairs.

^b Pre-training and 12-week post TRE training demographics - matched pairs.

^c Pre-training, 4-week, and 12-week post TRE training demographics - matched pairs across all time points.

5.2 Outcome measures

Overall descriptive results for each of the outcome measures: PSS, FS and PSEQ are provided in Table 2. Median and interquartile ranges are shown due to non-normal distribution of results. There was an overall improvement in perceived stress (decrease in scores), flourishing (increase in scores), and pain self-efficacy (decrease in scores).

Table 2. Overall survey results: Median and Interquartile Range (IQR)

	Pre-training <i>n=51</i>	4-weeks post-training <i>n=22</i>	12-weeks post training <i>n=17</i>
	Median (IQR) ^a	Median (IQR) ^a	Median (IQR) ^a
PSS ^b	17 (13 - 24)	15.5 (10.75 – 19.25)	11 (8-17.5)
FS ^c	46 (39 - 49)	47 (42.5 – 49.25)	48 (44 – 55.5)
PSEQ ^d	47 (39-56)	47.5 (41 – 52.5)	54 (46.5 – 58.5)

^a Interquartile range

^b PSS=Perceived Stress Scale. Overall score range 0-40 (lower scores indicate less perceived stress)

^c FS=Flourishing Scale. Overall score range 8-56 (higher scores indicate an improvement in flourishing, with more psychological resources and strengths)

^d PSEQ=Pain Self-Efficacy Questionnaire. Overall score range 0-60 (higher scores indicate increased self-efficacy related to pain)

The Wilcoxon Signed Rank Test was conducted to analyze statistical significance between pre/4-week post (T1 & T2) and pre/12-week post (T1 & T3) scores.

When comparing T1 and T2 matched pairs ($n=22$), the Wilcoxon Signed Rank Test revealed a statistically significant reduction in perceived stress (PSS) ($z = -2.137, p = .03$), with a medium effect size ($r = -0.46$). The median PSS score decreased (improved) from 18 (T1) to 15.5 (T2). There was no statistically significant change on the Flourishing Scale (FS) ($z = -1.84, p = .07$), however, there was a medium effect size ($r = -0.39$), with small increase (improvement) in median scores from 46 (T1) to 47 (T2), indicating practical significance. There was no statistically significant difference in Pain Self-Efficacy scores (PSEQ) ($z = -.71, p = .478$), however, there was a small effect size ($r = -0.03$), indicating practical significance. The median PSEQ from T1 increased (improved) from 45.5 to 47.5 at T2.

When comparing T1 and T3 matched pairs ($n=17$), the Wilcoxon Signed Rank Test revealed a statistically significant reduction in perceived stress (PSS) ($z = -2.305, p = .02$), with a medium effect size ($r = -0.56$). The median PSS score decreased (improved) from 15 (T1) to 11 (T3). When comparing T1 and T3 matched pairs, there was a statistically significant increase in flourishing (FS) ($z = -3.046, p = .002$), with a large effect size ($r = -0.74$). The median FS score increased (improved) from

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46 (T1) to 48 (T3). While there was no statistically significant change on the Pain Self-Efficacy scores (PSEQ) ($z = -1.656, p = .09$), there was a medium effect size ($r = -0.40$), with an increase (improvement) in median scores from 50 (T1) to 54 (T3), indicating practical significance post-training.

A Friedman Test was conducted to analyze if there were differences in perceived stress, flourishing, and pain self-efficacy across the three timepoints (T1, T2, T3; matched pairs $n=14$). The results indicate that there were no statistical differences in perceived stress across the three time points $\chi^2(2) = 4.19, p = .12$, however there was a decrease (improvement) in median scores from 18 (T1) to 15 (T2) to 13.5 (T3). There was a statistically significant improvement in flourishing $\chi^2(2) = 11.62, p = .003$; median scores increased (improved) from 44 (T1), to 47 (T2 and T3). There were no statistically significant differences in pain self-efficacy $\chi^2(2) = 4.84, p = .089$, however there was an increase (improvement) in median scores from 40 (T1), to 45.5 (T2), to 53 (T3).

6 Discussion and conclusion

Descriptive statistics showed an overall improvement in perceived stress (decrease in scores), flourishing (increase in scores), and pain self-efficacy (decrease in scores).

Further analyses showed there was a statistically significant decrease in perceived stress at 4-weeks following TRE training. There was no statistically significant difference in flourishing or pain self-efficacy, however there was a medium effect size in flourishing measures and a small effect size in pain self-efficacy measures, indicating clinical significance. There was a statistically significant decrease in perceived stress and increase in flourishing from pre-training to 12-weeks post training. While there no statistically significant improvement in pain self-efficacy at 12-weeks post training, there was a medium effect size indicating clinical significance. This is particularly important because most of the results were collected in 2020 in the middle the COVID-19 pandemic.

These results support the results of the founder, Dr David Berceci, an international trauma therapist, in teaching TRE to large populations, across nine countries, in times of mass trauma such as war, political violence, and national disaster (Berceci, 2010). There is a growing body of English literature research into the effects of TRE on groups such as people with multiple sclerosis (Lynning et al., 2021), the military (Heath & Beattie, 2019), and in improving body awareness for performance (Thommessen & Fougner, 2020).

Additional research into TRE as a potentially therapeutic process, might not only destigmatize our natural trembling response but actually support the therapeutic potential of body tremors. It is worth exploring if this natural body tremor can address the underlying problem of continued anxiety and stress after the traumatic event has ended. It is well recognized that the body's inability to fully down-regulate the high stimulation of the nervous system is the missing link in our current efforts to prevent post-traumatic stress and accumulative trauma. As highlighted by Barratt, Stephens, and Palmer (2018) in relation to posttraumatic stress disorder, there is a need for innovative therapies focusing on calming and wellbeing techniques because only one third of people recover fully while 30-40% gain no benefit

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from current evidence-based treatments (Barratt et al., 2018). For this reason, it seems imperative that the sciences of psychology and physiology should explore the etiology and potential therapeutic value of neurogenic tremors. Additional research is needed to explore the effects of the spontaneous and involuntary tremor mechanism and if it discharges the high surge of adrenaline, releasing neuro-muscular bracing, down-regulating the autonomic nervous system and restoring the human organism to a calm and relaxed state.

7 Limitations and Strengths

This was primarily a quality assurance case study evaluating the effects of TRE training with Providers following the Standard Protocol, therefore there was no control group.

Participants were self-selecting, using self-reporting measures, and the majority were female. We acknowledge the small sample size and suggest much of this may have been due to distraction of Providers and participants with the more pressing focus on the pandemic during this time (2020). However, this makes generalization of results to the wider population difficult. Furthermore, the surveys for this study were only in the English language which may also have contributed to the low completion rates.

Results of this study and other TRE observational pre/post-intervention studies show the positive effects of TRE, and are valuable for providing the evidence, rationale, and inclusion in grant applications for funding for a TRE randomized controlled trial (RCT).

Longitudinal studies, with an active control group are recommended for future research into the effects of TRE. TRE studies are currently underway for example, using more objective measures such as the effect of TRE on heart rate variability.

Furthermore, ongoing research needs to be evaluated by researchers external to the TRE community.

8 Acknowledgements

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Appendix One

Perceived Stress Scale

The questions ask you about your feelings and thoughts **during the last month**. In each case, indicate by circling *how often* you felt or thought a certain way.

Identification Number: **Please use your own 'Identification Number' based on the example: 1) Initials of your mother's name and 2) your date of birth (for example - Janet Bean born 5th March 1954 – Identification Number = JB05031954) and enter in the space below.**

Identification Number: _____ Date _____

Before TRE

4 weeks After TRE

12 Weeks After TRE

0=Never; 1=Almost Never; 2=Sometimes; 3=Fairly Often; 4=Very Often

	Question					
1	How often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2	How often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3	How often have you felt nervous and "stressed"?	0	1	2	3	4
4	How often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5	How often have you felt that things were going your way?	0	1	2	3	4
6	How often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7	How often have you been able to control irritations in your life?	0	1	2	3	4
8	How often have you felt that you were on top of things?	0	1	2	3	4
9	How often have you been angered because of things that were outside of your control?	0	1	2	3	4
10	How often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

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The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 386-396.

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Appendix Two

Flourishing Scale

Below are 8 statements with which you may agree or disagree.

Using the 1–7 scale below, indicate your agreement with each item by indicating that response for each statement.

Identification Number: **Please use your own 'Identification Number' based on the example: 1) Initials of your mother's name and 2) your date of birth (for example - Janet Bean born 5th March 1954 – Identification Number = JB05031954) and enter in the space below.**

Identification Number: _____ Date _____

Before TRE *4 weeks After TRE* *12 Weeks After TRE*

- 1=Strongly disagree
 2=Disagree
 3=Slightly disagree
 4=Neither agree nor disagree
 5=Slightly agree
 6=Agree
 7=Strongly agree

	Question							
1	I lead a purposeful and meaningful life	1	2	3	4	5	6	7
2	My social relationships are supportive and rewarding	1	2	3	4	5	6	7
3	I am engaged and interested in my daily activities	1	2	3	4	5	6	7
4	I actively contribute to the happiness and well-being of others	1	2	3	4	5	6	7
5	I am competent and capable in the activities that are important to me	1	2	3	4	5	6	7
6	I am a good person and live a good life	1	2	3	4	5	6	7
7	I am optimistic about my future	1	2	3	4	5	6	7
8	People respect me	1	2	3	4	5	6	7

Reference:

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2009). New measures of well-being: Flourishing and positive and negative feelings. *Social Indicators Research*, 39, 247-266.

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Appendix Three

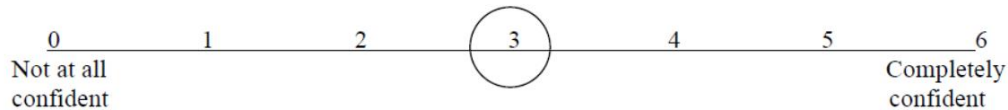
PAIN S-E QUESTIONNAIRE (PSEQ)

Nicholas (1989)

NAME: _____ DATE: _____

Please rate how **confident** you are that you can do the following things at present, despite the pain. To indicate your answer circle one of the numbers on the scale under each item, where 0 = not at all confident and 6 = completely confident.

For example:



Remember, this questionnaire is not asking whether or not you have been doing these things, but rather **how confident you are that you can do them at present, despite the pain**.

	0	1	2	3	4	5	6
	Not at all confident						Completely confident
1. I can enjoy things, despite the pain	0	1	2	3	4	5	6
2. I can do most of the household chores (e.g. tidying -up, washing dishes, etc.), despite the pain	0	1	2	3	4	5	6
3. I can socialise with my friends or family members as often as I used to do, despite the pain.	0	1	2	3	4	5	6
4. I can cope with my pain in most situations	0	1	2	3	4	5	6
5. I can do some form of work, despite the pain. ("work" includes housework, paid and unpaid)	0	1	2	3	4	5	6
6. I can still do many of the things I enjoy doing, such as hobbies or leisure activities, despite the pain	0	1	2	3	4	5	6
7. I can cope with my pain without medication.	0	1	2	3	4	5	6
8. I can still accomplish most of my goals in life, despite the pain	0	1	2	3	4	5	6
9. I can live a normal lifestyle, despite the pain	0	1	2	3	4	5	6
10. I can gradually become more active, despite the pain	0	1	2	3	4	5	6

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