Psychophysiological responses to a self-compassion meditation in trauma-exposed individuals

Submitted by Joanne Storr, to the University of Exeter

as a thesis for the degree of Doctor of Clinical Psychology, May 2015

I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature: ……..

Author's Declaration

The literature review was completed independently by the author. In terms of the empirical work, participants were recruited between August 2014 and January 2015 and data were collected jointly by the author and a Master's student, Kaitlyn Biehler. Her project utilised additional electroencephalography (EEG) measures for the project titled "The neural correlates of the self before and after a loving kindness meditation in those who have experienced psychological trauma". A total of $N = 56$ participants were tested by the author and Kaitlyn Biehler helped test roughly half of these. All other aspects of the study were completed by the author including ethics applications, recruitment, data entry, analysis, and write up.

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LITERATURE REVIEW

Cultivation of self-compassion and mental health. A review of the literature.

Trainee Name:	**Joanne Storr**
Primary Research Supervisor:	**Dr Anke Karl**
	Senior Lecturer, Mood Disorders Centre, University of Exeter
Secondary Research Supervisor:	**Professor Willem Kuyken**
	Professor of Clinical Psychology, University of Oxford

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CONTENTS

Abstract

This review focussed upon research on the role of self-compassion in psychological interventions within adult clinical populations. Twenty studies have been included within this review which met the criteria of considering self-compassion, compassion or loving-kindness and inclusion of an intervention within a clinical population.

There were two types of research identified: studies that used explicit approaches to enhance self-compassion and studies that assess components but do not directly facilitate changes in self-reported self-compassion. Therefore, a descriptive account of the articles was presented.

The review demonstrates that self-compassion can be cultivated in clinical populations but that therapeutic approaches not explicitly focussing on self-compassion can also be accompanied by increases in self-reported self-compassion. The conclusions that can be drawn from the review were limited by the deficit of large-scale randomised controlled trials (RCTs), the lack of control groups and more sophisticated experimental designs. Although results point to the positive psychopathological benefits of these interventions, experimental studies or treatment process research is required to uncover the mechanisms behind the benefits of self-compassion within clinical populations.

Keywords: Self-compassion, loving-kindness, Compassion, psychopathology

Introduction

Self-compassion is a relatively new construct described by Neff (2003) as having three components: mindfulness, loving-kindness and common humanity. Mindfulness is described as being able to take a non-judgmental perspective, neither classifying things as good or bad but seeing and accepting them just as they are. Loving-kindness is derived from Buddhism and refers to a mental state of unselfish and unconditional kindness to all beings. Common humanity is defined as considering suffering and personal inadequacy as part of the shared human experience rather than it being isolating and something that happens to just to one individual (Allen & Leary, 2010; Neff, 2011). Neff (2003) also indicated that self-compassion could be used as an emotion regulation strategy whereby negative feelings and experiences could be held in awareness with kindness, implying that these negative experiences could be a transformational experience or could be ameliorated. Self-compassion has been described to have many beneficial effects on mental health, well-being and feelings of social connectedness as well as physical health (Neff, Kirkpatrick, & Rude, 2007; Hutcherson, Seppala & Gross, 2008; Hofmann, Grossman & Hinton, 2011; Wei, Liao, Ku & Shaffer, 2011). There is a plethora of research recognising the role of avoidance, rumination, self-criticism and its negative relationship to self-compassion (Gilbert, 2000; Gilbert 2009; Gilbert, 2010a; Karl & Kuyken, 2010; Karl, Rabe, Zöllner, Maercker, & Stopa, 2009; Thompson & Waltz, 2008; Thompson & Waltz, 2010; Wei et al., 2011; Kuyken et al., 2010; Hutcherson et al., 2008; Allen & Leary, 2010; Barnard & Curry, 2011).

Although research on the construct is still in its infancy, self-kindness and self-compassion are thought to be the agent of change in many psychological treatments, such as Acceptance and Commitment Therapy (ACT), Dialectical

Behaviour Therapy (DBT), Mindfulness-Based Cognitive Therapy (MBCT; Kuyken et al., 2010) and Compassion-Focussed Therapy (CFT). These interventions involve varying elements of extending forgiveness, empathy, sensitivity, warmth, and patience to all aspects of oneself including one's actions, feelings, thoughts, and impulses (Gilbert & Irons, 2005; Neff, 2003; Linehan, 1993; Lab, Santos, & De Zulueta, 2008; Classen et al., 2011; Kearney et al., 2013; Reed & Enright, 2006; Knaevelsrud, Liedl, & Maercker, 2010). Interestingly though, they differ in the extent to which they directly use specific compassion-focused techniques. Whereas, MBCT, DBT and ACT teach mindfulness skills including acceptance, focussing on the moment and noticing one's internal and external state; CFT involves compassionate imagery, loving-kindness meditation, being kind to oneself, self-soothing and affiliation to the self as ways to regulate the threat system (Gilbert, 2010a; Appendix A).

In addition to the notion of individual differences in trait self-compassion being associated with differences in wellbeing and mental health problems, it has been acknowledged that self-compassion can be cultivated during psychological interventions. The mechanisms by which this happens are not yet fully understood but cultivation and its protective effect could be explained within Fredrickson's broaden-and-build theory (2001; 2004). The theory postulates that experiencing positive emotion can "broaden-and-build" one's thought-action repertoire enabling optimal well-being and blossoming. When individuals experience stressful situations their thought-action repertoire may be narrowed as quick, decisive responses are necessary for survival when the threat system is activated. In other words, experiencing positive emotion broadens one's awareness and encourages novel, varied, and exploratory thoughts and actions. Over time this builds resilience and a

broadening behavioural repertoire which enhances skills and resourcefulness. It has also been suggested that positive emotions might correct or undo after-effects of negative emotions, this is called the “undoing hypothesis” (Fredrickson & Losada, 2005). Self-compassion is an emotion regulation strategy believed to elicit positive emotion. Therefore, cultivating self-compassion could work because it leads to this “broadening” and “building” process. It is believed that these positive emotions have beneficial effects on mental health, cardiovascular activation and emotional arousal (Fredrickson & Levenson, 1998). Whilst the existing research is encouraging, there is to date no systematic review of the literature that answers to what extent self-compassion increases during psychological interventions with varying levels of explicit compassion-facilitating components.

Aims and Objectives

This review will outline the relevant literature that has examined self-compassion interventions in clinical populations that explicitly or implicitly enhance self-compassion and explore the current evidence for the mechanisms by which self-compassion facilitates psychiatric symptom reduction and improves well-being. The review will address the following questions:

1. Can self-compassion be cultivated within clinical populations; i.e., does it increase after interventions?

2. What are the effects on psychiatric functioning; i.e., is increased self-compassion associated with fewer symptoms and/or higher levels of wellbeing?

Methodology

Eligibility Criteria of Studies

This review considered all studies which conducted self-compassion, compassion or mindfulness interventions, including third-wave cognitive behavioural

therapy (CBT) interventions hypothesised to alter self-compassion independent of the direct inclusion of compassion-focussed techniques, with clinical populations. Studies were included if they had a clinical sample, which was determined by having a previous diagnosis, DSM criteria, being an outpatient within mental health services or scoring above cut-offs on diagnostic scales. Studies that had either an explicit compassion intervention or other interventions targeting related processes, such as mindfulness and self-criticism, were included if they measured self-compassion as part of the study. This would enable some reflection on whether compassion-focused approaches are necessary to increase self-compassion or if indirect processes, such as mindfulness (e.g., Kuyken et al., 2010), suffice.

The definition of self-compassion varied depending on study design and content of studies but in this review it was limited to the terms self-compassion, compassion and loving-kindness to ensure an objective review of available studies. Studies which were correlational, did not involve an intervention or were not conducted on clinical populations were excluded.

Study Design

A review of all literature on self-compassion, compassion and compassion-based meditation involving treatment or intervention was included and identified including case studies, RCTs, experimental and quasi-experimental designs[1].

Treatment Interventions

A range of treatment interventions and measures were included from mindfulness-based cognitive therapy, CFT, loving-kindness meditation (LKM), two-

[1] A quasi-experimental design is similar to an experimental design but contains no random assignment.

chair dialogue intervention, psychotherapy and CBT. See Appendix B for fuller description of all the interventions.

A range of outcome measures were used, due to the diversity of the populations, which precluded any statistical analysis of the reviewed articles. These measures ranged from symptom measures, cognitive reactivity and clinician-rated outcomes for achievement of therapeutic objectives.

Search Strategy

A review of the relevant literature was conducted in January 2015 by reviewing electronic databases for inclusion criteria in pertinent studies. The databases interrogated included EMBASE (1980 to present), PsychINFO (1806 to present) and Medline (1946 to present). Key search terms were used to find studies relevant for review. These included “self-compassion”, “compassion” or “loving-kindness” intersected with “treatment” or “intervention”. The search criteria was limited to articles within peer-reviewed journals with adult, human subjects to find all relevant articles relating to culivating self-compassion. Due to the small number of experimental studies Kirsten Neff’s and Paul Gilbert’s websites were also reviewed and two additional studies were identified.

Study selection.

From the initial search 289 articles were obtained following the removal of 1 duplicate. The article abstracts were screened, following the PRISMA guidelines as closely as possible, against inclusion criteria resulting in the removal of 256 articles. Thirty-three full-text articles were reviewed and their references were screened for other studies meeting criteria and two studies were found on Kirsten Neff’s website. Consequently, 20 articles were included in the review (Figure 1).

Data extraction.

The effective public health practice project (EPHPP) quality assessment tool was used to extract information about the studies and assess their strengths and weaknesses. The tool assesses six domains ranging from selection bias and design, to withdrawals and dropouts (Appendix C). The studies ranged from moderate to strong in their ratings. This requires for the study to have either no weak ratings or only one weak rating in any of these six domains. However, studies were not excluded on the basis of the assessment tool due to the small number of studies within the review.

A detailed summary of the sample and interventions are displayed in Table 1. More detailed information relating to the study design and methodology, intervention, measures, key findings and outcomes are included in Table 2.

Data synthesis.

A descriptive approach is employed within the review due to the range of designs and measures used in the studies. The aim will be to explore themes, patterns or commonalities and their relevance for further exploration of self-compassion within clinical populations (Centre for Reviews and Dissemination, 2009; Tacconelli, 2010).

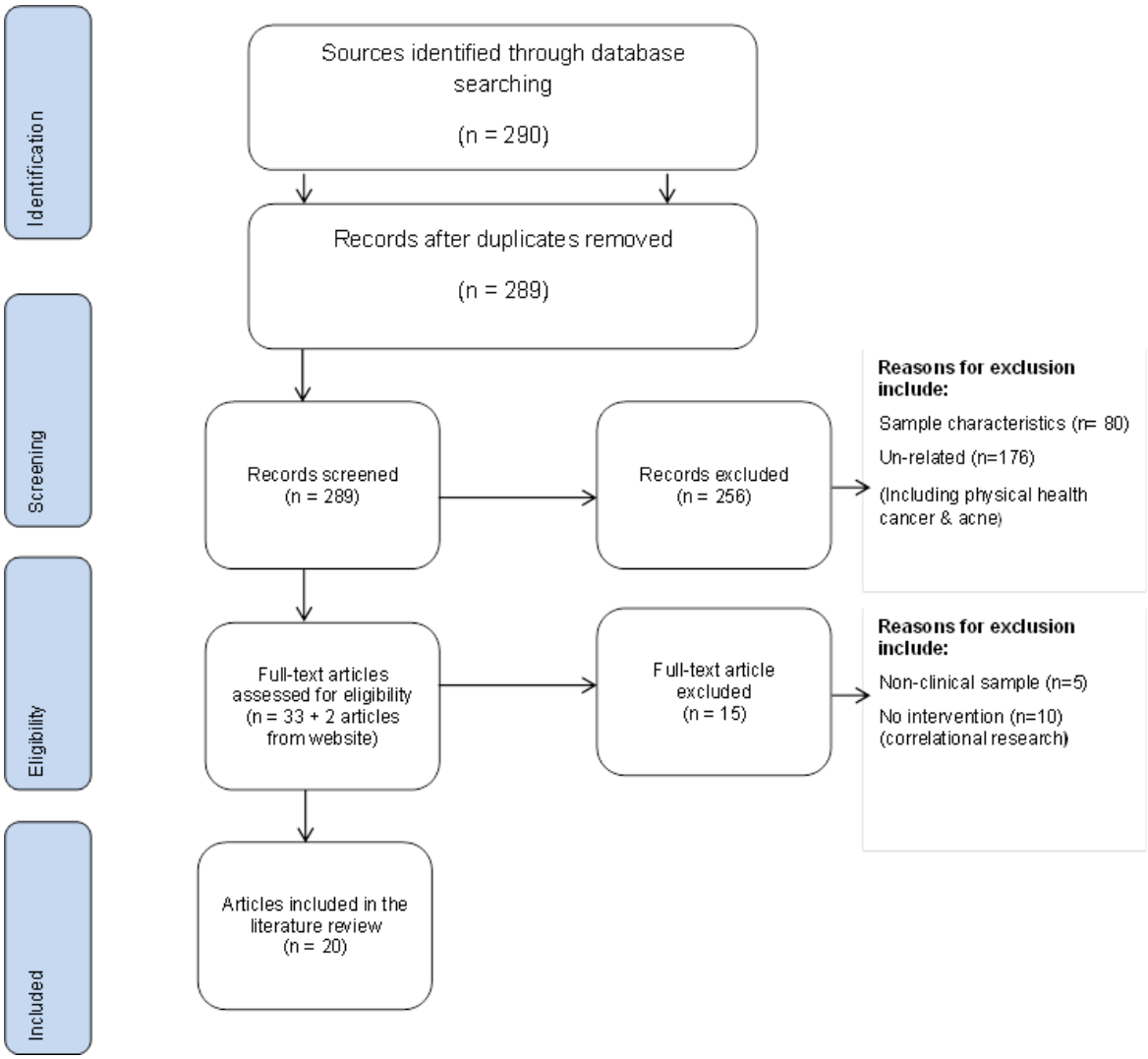

Figure 1. Flow diagram of procedures followed within the literature review

Search Results

Table 1
Summary of Articles under Review

Study	Country	Quality Assessment	No. of Participants	Diagnosis	Intervention
1. Diedrich, Grant, Hofmann, Hiller, & Berking (2014)	Germany	S	48	Depression (DSM-IV)	Depressed mood was induced on four occasions and 3 Emotion regulation strategies were employed (cognitive appraisal, acceptance & self-compassion)
2. Gale, Gilbert, Read, & Goss (2014)	UK	S	139; 99 included in analysis	Eating Disorder (DSM-IV)	CBT & CFT (16 week; 20 session programme)
3. Najavits et al., (2013)	USA	S	7	Post-traumatic stress disorder (PTSD) & gambling (DSM-IV)	Seeking safety therapy (individual & weekly; 6 months)
4. Kelly, Carter, & Borairi (2014)	Canada	S	97	Eating Disorder (DSM-IV)	Group psychotherapy, medical stabilization, nutritional rehabilitation, psycho-education (12 weeks)
5. Lucre, & Corten (2013).	UK	S	7	Personality Disorder (ICD-10)	CFT; formulation, psych education & compassionate mind training (16 weeks)
6. Kelly, Carter, Zuroff, & Borairi (2013)	Canada	M	74	Eating Disorder (DSM-IV)	CBT, group psychotherapy, psycho-education, nutritional rehabilitation (12 weeks)
7. Kearney et al., (2013)	USA	M	42	PTSD	Loving-kindness meditation (12 sessions)
8. Braehler et al., (2013)	UK	S	40	Schizophrenia spectrum disorder or bipolar disorder with psychotic features (ICD-10)	Group CFT comprised 16 sessions (2hr each, 1 x week).
9. Jazaieri, Goldin, Werner, Ziv, & Gross (2012)	USA	S	56	Social anxiety disorder (DSM-IV)	Mindfulness based stress reduction (MSBR) or aerobic exercise (8 weeks)
10. Judge, Cleghorn, McEwan & Gilbert (2012)	UK	S	27	Range of diagnoses	Group CFT comprised of 12-14 sessions (2hr each, 1 x week).
11. Brooks, Kay-Lambkin, Bowman, & Childs (2012).	Australia	S	77	Alcohol dependence (DSM-IV)	Counselling, detoxification, needle and syringe programmes, a diversional programme, pharmacotherapy, cannabis clinic & general practitioner medical management programmes
12. Johnson et al., (2011)	USA	S	18	Schizophrenia	LKM Group weekly (6 sessions & booster)
13. Schanche, Stiles, McCullough, Svartberg, & Nielsen (2011)	Norway	S	50	Cluster C personality disorders, (DSM–III–R).	RCT comparing a 40-session short-term dynamic psychotherapy with 40-session cognitive treatment
14. Kuyken et al., (2010)	UK	S	123	Depression (DSM-IV)	RCT comparing MBCT with maintenance antidepressants (mADM) (8 weekly session; 2 hours)
15. Eisendrath, Chartier, & McLane (2011).	USA	M	1	Treatment resistant depression (TRD)	8 week group based Mindfulness-based cognitive therapy (MBCT)
16. Shahar et al., (2012)	USA	S	9	Highly self-critical patients with depression and anxiety	Emotion-focussed two-chair dialogue intervention; 5-8 therapy sessions (1 hour)
17. Crane, Jandric, Barnhofer, & Williams (2010)	UK; study 1	S	25	Depression (DSM-IV)	8-week course of mindfulness-based cognitive therapy
18. Gilbert & Proctor (2006)	UK	M	6	Personality disorders/ chronic mood	12 two-hour sessions in compassionate mind training (CMT)
19. Laithwaite et al., (2009)	UK	M	18	Schizophrenia/ personality disorder	Recovery after Psychosis programme (10 weeks)
20. Beaumont, & Hollins Martin (2013)	UK	M	1	Trauma/ PTSD	8-week course of CMT & CBT in combination with EMDR

Note: Quality Assessment tool rating, W = weak, M = moderate, S = Strong.

Study Characteristics

The study information was collated and relevant information was extracted (Table 1). All the studies were on clinical samples but only 10 refer to the Diagnostic and Statistical Manual of Mental Disorders (DSM) and two to the International Statistical Classification of Diseases and Related Health Problems (ICD). Sample sizes ranged from 1 to 123 participants using a range of experimental designs; case studies, quasi-experimental designs and RCTs.

Most of the interventions lasted between 8-12 weeks in duration and all included elements of mindfulness or compassion. However, other CBT and psychotherapy approaches such as group psychotherapy and emotion-focussed two-chair dialogue intervention were included in some of the studies. Only three exceptions regarding length of treatment were noted. One involving a mood induction at four time points (1). One involving a 6-month seeking safety therapy (3), and another providing 40 sessions of intensive psychotherapy or cognitive treatment (13). Interventions ranged from group to individual psychotherapy.

Generally, interventions were well structured, giving detailed accounts of the literature and thorough descriptions of relevant components. However, focus upon self-compassion, compassion or loving-kindness was inconsistent across studies due to differences in study emphasis.

Table 2
Study Methodology, Measures and Key Findings

Study	Study Design	Key Measures	Key Finding
1. **Diedrich, Grant, Hofmann, Hiller, & Berking (2014)**	Experimental; waitlist control	SCID; Visual analogue scale (VAS)	Reappraisal more effective in low depressed group (from baseline scores) and self-compassion better in the high-depressed group
2. **Gale, Gilbert, Read, & Goss (2014)**	Quasi-experimental Repeated measures; (pre/post)	EDE-Q, SEDS & CORE	The CBT/CFT intervention reduced binge eating and exercise. Bigger improvements in the Bulimia and ENDOS groups
3. **Najavits et al., (2013)**	Quasi-experimental Repeated measures; (pre/post)	SCS; MINI; GSAS, PCL-C; TSC-40; BSI	The seeking-safety intervention increased self-compassion and decreased PTSD symptoms
4. **Kelly, Carter, & Borairi (2014)**	Quasi-experimental Repeated measures; (pre/post)	EDE-Q, ESS, SCS	Greater increases in participants levels of self-compassion early in treatment had faster decreases in their feelings of shame over 12 weeks, even when controlling for their early change in eating disorder symptoms
5. **Lucre, & Corten (2013).**	Pre-randomised control trial; Mixed Quantitative & Qualitative	OAS, SBS, FSCRS, CORE, & DASS	There were significant changes on all CORE variables, well-being, risk, functioning, and problems after a CFT intervention
6. **Kelly, Carter, Zuroff, & Borairi (2013)**	Quasi-experimental Repeated measures; (pre/post)	EDE-Q; SCS-SF; ESS; FOC	Patients with lower self-compassion who were more fearful of being compassionate had a significantly poorer outcome than other combinations of baseline self-compassion and fear of self-compassion
7. **Kearney et al., (2013)**	Quasi-experimental Repeated measures; (pre/post)	LEC, SCS, FFMQ,PROMIS, PSS-I & CLS	Evidence of reduction in PTSD symptoms and depression by enhanced self-compassion
8. **Braehler et al., (2013)**	Randomised, open-label, blinded end point evaluation	PANAS, BDI-II, NRSS	Relative to TAU, in the CFT group increases in compassion; these were significantly associated with greater clinical improvement
9. **Jazaieri, Goldin, Werner, Ziv, & Gross (2012)**	RCT; Control group; Repeated measures (pre/post & 3 month follow-up)	SCS, LSAS-SR, BDI, PSS	Significant improvement in self-compassion and a significant reduction in social anxiety for the exercise treatment group compared to the untreated group
10. **Judge, Cleghorn, McEwan & Gilbert (2012)**	Quasi-experimental; Repeated measures pre/post; uncontrolled	FSCRS, FSCS, ISS, OAS	CFT may be particularly helpful for participants showing high baseline scores in external shame and depression.
11. **Brooks, Kay-Lambkin, Bowman, & Childs (2012).**	Quasi-experimental Repeated measures (pre/post)	SCS, OTI, DASS-21	Significant increase in self-compassion, mindfulness, common humanity & self-kindness, and significant decrease in self-judgement, isolation and over-identification
12. **Johnson et al., (2011)**	Pre-randomised control trial LKM vs Waitlist control	mDES;CAINS; TEPS; SWLS	Participants showed a large decrease in total negative symptoms and anhedonia as well as a sociality
13. **Schanche, Stiles, McCullough, Svartberg, & Nielsen (2011)**	RCT Control group Repeated measures (pre/post)	ATOS, SCL-90-R, IIP, MCMI-III	An increase in self-compassion significantly predicted a decrease in psychiatric symptoms, interpersonal problems, and personality pathology
14. **Kuyken et al., (2010)**	RCT Control group Repeated measures (pre/post & 15-month follow-up)	SCS, HRSD, KIMS, DAS	MBCT's effects were mediated by enhancement of mindfulness and self-compassion across treatment
15. **Eisendrath, Chartier, & McLane (2011).**	Case study (qualitative)	BDI only	BDI score decreased from 28 to 9 without any change in medication
16. **Shahar et al., (2012)**	Quasi-experimental; Repeated measures pre/post; uncontrolled	FSCRS, SCS, BDI, BAI, DEQ	Two-chair work was associated with reductions in self-criticism, anxiety symptoms and depressive symptoms, and increases in self-compassion and self-reassuring among clients presenting with high levels of self-criticism
17. **Crane, Jandric, Barnhofer, & Williams (2010)**	Control group Repeated measures (pre/post & 15-month follow-up)	MEPGAP; FFMQ	No significant difference between the groups in FFMQ change over the trial period, although mean change was in a positive direction in those allocated to MBCT and negligible in those allocated to TAU.
18. **Gilbert & Proctor (2006)**	Quasi-experimental Repeated measures(pre/post)	HADS, FSCS, FSCRS,	Significant reductions in depression, anxiety, self-criticism, shame, inferiority and submissive behaviour and increase in the participants' ability to self-soothe
19. **Laithwaite et al., (2009)**	Quasi-experimental Repeated measures(pre/post)	PANSS, Social Comparison Scale, SCS, BDI, OAS,	Improvement in depression, self-esteem, and rating of self compared with others, and a reduction in shame, and general psychopathology.
20. **Beaumont, & Hollins Martin (2013)**	Case study(qualitative)	SCS, IES-R, HADS, DES-II	Significant increases in self-compassion and reduction in self-criticism

Note: SCID = Structured Clinical Interview for DSM Disorders, EDE-Q = Eating Disorder examination questionnaire, SEDS = Stirling Eating Disorder Scales, CORE = Clinical Outcomes in Routine Evaluation, SCS = Self Compassion Scale, MINI = Mini International Neuropsychiatric Interview, GSAS = Gambling Symptom Assessment Scale, PCL-C = Posttraumatic Stress Disorder Checklist – Civilian Version, TSC-40 = Trauma Symptom Checklist-40, BSI = Brief Symptom Inventory, ESS = Experiences of Shame Scale, OAS = Other as Shamer Scale, SBS = Submissive Behaviour Scale, FSCRS = Forms of the Self-Criticizing/Attacking and Self-Reassuring Scale, DASS = Depression Anxiety and Stress Scale, SCS-SF = Self Compassion Scale – Short Form, FOC = Fear of Compassion, LEC = Life Events Checklist, FFMQ = Five Facet Mindfulness Questionnaire, PROMIS = Patient-Reported Outcomes Measurement Information System, PSS-I = Posttraumatic Symptom Scale - Interview Version, CLS = Compassionate Love Scale, PANSS = The Positive and Negative Syndrome Scale, BDI-II = Beck Depression Inventory II, NRSS = Narrative Recovery Style Scale, LSAS-SR = Liebowitz Social Anxiety Scale, BDI = Beck Depression Inventory, PSS = Perceived Stress Scale, FSCS = Functions of the Self-criticizing/ Attacking Scale, ISS = Internalised Shame Scale, OTI = Opiate Treatment Index, DASS-21 = Depression Anxiety and Stress Scale, mDES=Modified Differential Emotions Scale, CAINS = Clinical Assessment Interview for Negative Symptoms, TEPS = Temporal Experience of Pleasure Scale, SWLS = SWLS=Satisfaction with Life Scale, ATOS = Achievement of Therapeutic Objectives Scale, SCL-90-R = SCL-90 symptom inventory, IIP = Inventory of Interpersonal Problems, MCMI-III = Millon Clinical Multiaxial Inventory-III, HRSD = Hamilton Rating Scale for Depression, KIMS = Kentucky Inventory of Mindfulness Skills, DAS = Dysfunctional Attitudes Scale, BAI = Beck Anxiety Inventory, DEQ = Depressive Experiences Questionnaire, MEPGAP = Measure for eliciting positive future goals and plans, HADS – Hospital Anxiety and Depression Scale, PANSS = The Positive and Negative Syndrome Scale, IES-R = Impact of Events Scale-Revised, DES-II = Dissociative Experiences Scale II.

Study Methodology

Design and measures.

Four studies were RCTs (8, 9, 13, 14), and two were pre-randomised control trials and involved small samples sizes (5, 12). Although all studies describe randomised allocation of groups, the procedure of randomisation was not explicit in all of the studies. Only seven studies included a control group; two used a waiting control (1, 12), two used treatment as usual (TAU; 8, 17) and three included other groups (9, 13, 14).

All studies had a description of measures used and referred to them in detail, with the most commonly used measures being the Self-Compassion Scale (SCS; Neff, 2003), Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS) and Functions of Self-Criticizing/Attacking Scale (FSCS; Gilbert, Clarke, Hempel, Miles, & Irons, 2004). The majority of studies (i.e., 3, 4, 6, 7, 9, 11, 14, 16, 19, 20) measure self-compassion using Neff's scale, the SCS, which has 3 dimensions and six subscales. Neff's scale measures mindfulness (vs. over-identification), loving-kindness (vs. self-judgement), and common humanity (vs. isolation). The FSCRS and FSCS measure self-criticism as being negatively related with loving-kindness, mindfulness and common humanity using three subscales, two on self-criticism (inadequate self and hated self) and one on self-reassurance (reassure self; Gilbert et al., 2004; 10, 16, 18). Three studies (1, 8, 13) used clinician-rated scales or other scales, such as visual analogue scales, to assess self-compassion.

Seven studies, although they used compassion-focused therapies, had no formal measure of self-compassion but measured wellbeing (2, 5), mindfulness (15, 17), self-soothing (10, 18), and positive emotion and pleasure (12); all concepts that have been related to compassion or loving-kindness (Neff et al., 2007).

Change in self-compassion or psychopathology.

Twelve of the studies demonstrated significant increase in self-compassion over the course of the intervention (1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 16, 20), three revealed improvements in a related concept such as compassion, savouring positive experiences or self-soothing (10, 12, 18) and five discovered increased self-understanding and wellbeing (2, 5, 15, 17,19).

Although these findings vary in their quality due to design, use of different interventions and consequently the conclusions that can be extrapolated, they are promising. The most reliable results were established from the three RCTs which measured self-compassion as part of the design, used randomised control groups and had larger sample sizes than most of the other studies (9, 13, 14). These studies used measures with good reliability and validity and established the successful cultivation of self-compassion within clinical populations. Similarly, seven other studies (1, 2, 4, 6, 7, 8, 11) with less rigorous designs, such as pre-post quasi-experimental designs without a comparison group, which do not allow definitive causal inferences about the effects of the intervention, but with sample sizes between 40-99 participants also indicated significant differences in self-compassion pre-and-post intervention.

The other studies (3, 5, 10, 12, 15, 16, 17, 18, 19, 20) with fewer participant numbers, ranging from 1 to 27, indicated some reflection of a change in self-compassion or compassion. Despite the need for these findings to be taken with caution due to sample size, they were consistent with the more rigorous experimental designs, such as RCT designs (see Table 2) which allow causal inferences about the nature of the intervention and control for the possibility that other factors, not related to the intervention, are responsible for the difference

between the pre-test and post-test results (e.g., they randomise the assignment of individuals into groups).

Treatment intervention.

There were a range of interventions but all intended to improve psychiatric symptoms or self-compassion and the majority had the explicit aim of increasing self-compassion. Nine studies did not include specific compassion-based interventions (1, 3, 4, 6, 7, 11, 12, 13, 16) but all showed increases in self-compassion apart from one which indicated improved positivity (12).

The seven studies with control groups found surprisingly varied findings. Three indicated a significant increase in self-compassion as a result of a compassion-based intervention (1, 8, 14). Braehler et al. (2013) showed a significant increase in compassion resulting in greater clinical improvements in the group that received CFT relative to those who received TAU. Kuyken et al. (2010) showed a significant difference in self-compassion and mindfulness in the group receiving MBCT in comparison to those receiving anti-depressant medication. Dietrich et al. (2014) showed that an emotion-regulation strategy focussing on self-compassion was more effective in the highly depressed group than reappraisal or acceptance. In contrast, Jazaieri et al. (2012) indicated a significant improvement in self-compassion and reduction in social anxiety in the exercise group compared to the MSBR group. Schanche et al. (2011) demonstrated that although both interventions appeared to improve self-compassion there was no significant difference between short-term dynamic psychotherapy (an affect phobia treatment designed to improve self-compassion) and cognitive therapy. Crane et al. (2010) also showed no significant differences between the MBCT and TAU groups related to mindfulness.

Whilst the earlier studies indicate positive changes in self-compassion relating to the compassion-based interventions the latter studies appear to demonstrate that self-compassion can be cultivated through other implicit modes of action. For example, cognitive therapy and an aerobic exercise intervention could enable a focus on the present and self-kindness in more discrete ways.

Four other studies possibly lend credence to this argument (4, 6, 11, 16) and all showed an increase in self-compassion despite treatments having no explicit self-compassion interventions. The former studies (4, 6) included unspecified group psychotherapy, psycho-education and nutritional rehabilitation in a group of eating disorder clients. One study of alcohol dependency (11) involved a treatment programme including needle and syringe programmes, counselling, and detoxification. The other emotion-focussed two-chair dialogue intervention (16) focussed on treatment of highly self-critical clients with depression and anxiety. Despite none of these having specific elements focussed on improving self-compassion all resulted in significant increases in self-compassion post-intervention.

Self-compassion, and loving-kindness and symptom reduction.

Three RCTs discuss the relationship between self-compassion and psychiatric functioning (9, 13, 14). One reported an increase in self-compassion and significant decrease in social anxiety in the exercise group rather than the expected MBSR condition (9). Whereas, another identified that self-compassion significantly interacted with cognitive reactivity to predict depression scores (14). In addition, the third detailed how an increase in self-compassion significantly predicted a decrease in psychiatric symptoms, interpersonal problems, and personality pathology (13).

Similarly, four other studies (2, 4, 6, 7) with less rigorous designs but sufficient sample sizes also exemplified this relationship finding correlations between self-

compassion and symptom changes. Nevertheless, these findings do not allow interpretation that self-compassion leads to symptom reduction nor can they indicate if it was the compassion-focused element that led to changes in self-compassion and symptoms due to mixed therapy elements and the lack of treatment control groups.

Conclusions and Processes

In summary, it appears that self-compassion can be increased in clinical samples but what is less clear is whether this was a result of the compassion element of the interventions. Additionally, a range of complex interventions were used which made it challenging to assess with any certainty the helpful elements or whether the increase was a result of natural recovery in a supportive relationship.

Additionally, it would appear that interventions are more effective at increasing self-compassion within particular clinical presentations. Interpretations of the underlying mechanisms and processes by which self-compassion produces beneficial changes were varied across the studies given the heterogeneous clinical presentations and interventions. The processes that were discussed as being altered in association with self-compassion changes across studies were cognitive reactivity (14), reduction in self-criticism and shame (4, 10, 18, 19), increased acceptance, and self-soothing and kindness (11, 19). Additionally, some studies indicated increased emotional tolerance and resilience and the ability to experience more positive affect and lower anhedonia (12, 13, 16, 19). However, of these only three studies explicitly analysed mediation or moderation effects of self-compassion (4, 7, 14). In particular, these three studies followed recommendations by Kazdin (2007) applying statistical mediation in which the mediator is expected to change before the outcome changes. One study indicated that change in self-compassion, as measured by the SCS, significantly mediated changes in PTSD symptoms (PSS-

I) between baseline and post treatment (7). The second study revealed that patients who had larger early improvements in self-compassion had faster decreases in shame over 12 weeks (4). However, both these studies expressed the need for further research with sufficient power to explicate these relationships over time due to the use of multi-level modelling and lack of control groups. The third study (14) applied moderated mediation analysis with change in self-compassion as moderator (i.e., as a variable that changes the relationship between a predictor and an outcome), change in cognitive reactivity as mediator and depression symptoms as outcome. They found that post-treatment cognitive reactivity, the ease with which maladaptive cognitions or cognitive styles are triggered by mild (non-pathological) mood fluctuations, related less strongly to outcome (e.g., depressive symptoms) for participants who have shown greater improvements in self-compassion across the treatment period (14). The relative lack of studies systematically investigating the role of self-compassion change as a mediator or moderator suggests that more research is necessary to understand its role in altering psychopathology.

Consequently, it is uncertain whether self-compassion results in less experiential avoidance and increased acceptance or whether less avoidance and increased acceptance result in more self-compassion and positive beliefs following compassion-based interventions. Therefore, further research may be necessary to ascertain whether shame and self-criticism are causal mechanisms behind reduced negative self-appraisals and avoidance. In addition, it seems self-compassion could be associated with positive mood. Therefore, interventions changing mood (e.g., exercise, 9) might also be associated with positive change in self-compassion and this would be an interesting avenue of future investigation.

Discussion

Change in Self-Compassion or Psychopathology

This review aimed to examine (1) the evidence that self-compassion can be cultivated in clinical populations and (2) the evidence for an association between change in self-compassion and reduction in symptoms/increase in well-being. Support for both questions was found although the studies involved in the review were characterised by a large amount of heterogeneity in terms of psychopathology and focus on self-compassion. There is a growth of research reporting lower self-compassion within individuals with mental health difficulties and benefits that self-compassion can have upon increasing psychiatric health and mental well-being (Neff, 2003; Wei et al., 2011). It has been argued that cultivation of self-compassion acts in two possible ways. Firstly, by reducing chronic stress and associated physiological arousal; i.e., by influencing the biological stress axis, namely a reduction of cortisol release, leading eventually to improved immune system functioning, resulting in enhanced physical and mental health (Fan, Tang, Ma, & Posner, 2010; Rockliff, Gilbert, McEwan, Lightman, & Glover, 2008). Secondly, by cultivating calm and content positive affect and a sense of social connectedness (Gilbert, 2010b; Porges 2001). These disorder-unspecific, transdiagnostic mechanisms may explain why the cultivation of self-compassion can have a beneficial effect on different mental health conditions and act via different therapeutic approaches that facilitate an individual's ability to effectively self-soothe, engage in healthy social relationships and draw on social support.

This review provides support for the cultivation of self-compassion within clinical samples undergoing psychological interventions. However, the extent to which it was necessary to have explicit or implicit compassion-based interventions/

components to cultivate self-compassion is less well supported with some studies supporting this notion and others not. For instance, one study showed the efficacy of MBCT in raising self-compassion over antidepressants (14). However, others indicated that reported self-compassion remained unchanged, despite clinical improvement (17). It was suggested this may indicate differences in the self-reporting of the concept of self-compassion in populations who have lacked the experience of compassion from others during critical periods of their development (19). Furthermore, one study showed the effectiveness of aerobic exercise in increasing self-compassion over a MBSR programme (9). Potentially, this mixed picture of results suggests that interventions without explicit self-compassion components can increase self-compassion or associated components in a more indirect fashion.

Mechanisms

Overall, the studies show a positive reduction in psychiatric symptoms across a range of clinical populations. However, the mechanisms and relation of this with self-compassion remains rather more unclear. Additionally, some studies concentrated only on the moderating role of trait self-compassion whilst others focussed only on treatment-related self-compassion changes resulting in the mixed findings discussed.

In particular, components such as shame, fear of self-compassion and self-criticism were focussed on as aspects with which self-compassion was particularly adept at reducing, although the processes by which this was achieved were not fully explicable (5, 16). This again reinforces the importance of further research into the impact of self-compassion with different populations, particularly with alcoholism and

schizophrenia, where self-compassion appears less effective or the processes are less well understood (11, 19).

Generally, the findings suggest that mechanisms such as mindfulness, self-kindness, reduced self-criticism and self-judgement were important in psychiatric recovery. However, studies generally made inferences about relationships rather than giving clear definitive evidence of their relationship with self-compassion (Neff, 2008; 18).

Limitations

Despite all attempts at a thorough search of the evidence base it should be acknowledged that some studies may have been overlooked through definitions and limitations used within the search. Additionally, although PRISMA guidelines were followed as closely as possible, unfortunately it was not possible to have a second researcher to review the study selection.

This review contains a diverse range of results but most of the articles published indicated the usefulness of interventions on psychiatric symptoms or self-compassion. However, this could be suggestive of publication bias and lack of experimental research.

Within the studies there were a range of designs, interventions and measures which made it challenging to synthesise, statistically analyse and made power analysis unfeasible. The most common measures used were self-report and only two studies used clinician-rated measures to support findings (13, 19). One used a clinician-rated measure to assess the usefulness of two interventions upon self-compassion within a personality disorder population (13). The other suggested that differences found on self-compassion measures may be due to individual's understanding of the concept (19; Neff, 2003). It would seem that other measures

may be beneficial especially for individuals who have not had the opportunities to experience compassion from others during critical periods of their development. These findings indicate the importance of using other measures alongside self-report to endorse reliability, validity and to extrapolate findings.

Synopsis and Future Implications

The review shows there is a growing evidence base for compassion-based interventions within the health service, which could potentially change the landscape of future interventions. Despite this the current review emphasises the lack of experimental studies and large clinical trials and the requirement for more research into the concept of self-compassion, symptom reduction and treatment interventions (Barnard & Curry, 2011). Key areas for further research are highlighted and the need for more robustly designed research into self-compassion and psychiatric symptom reduction is indicated.

For instance, the review emphasises a need for (1) use of the SCS/ self-report consistently as pre-mid-post measure (2) more use of RCT and experimental designs (3) comparisons between active compassion treatments vs more indirect (non-inferiority design) (4) and use of more objective measures in conjunction with self-report to strengthen analyses and conclusions which can be drawn from these (Kazdin & Nock, 2003).

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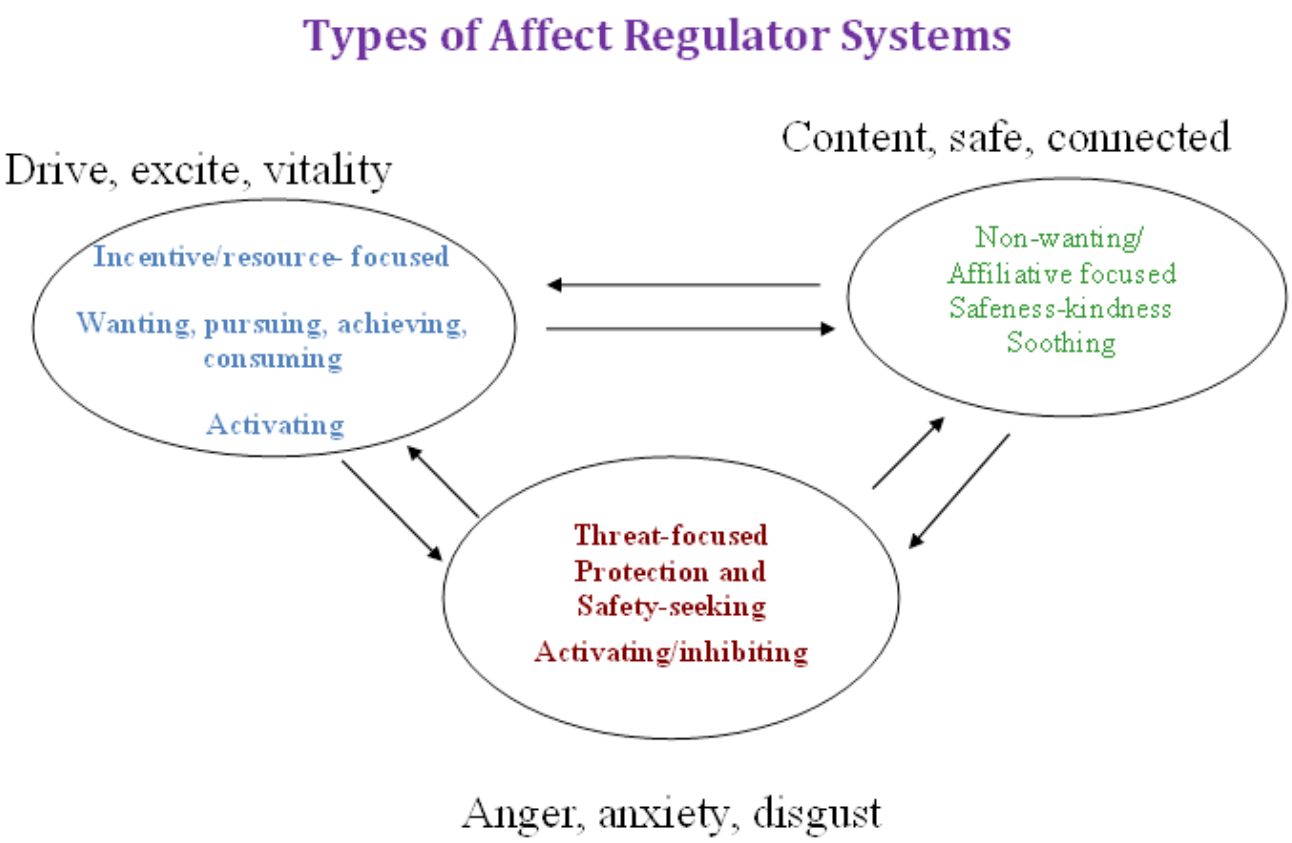
Appendices

Appendix A: An Adaption of Paul Gilbert's Three Circles Model (Gilbert, 2010a)



Appendix B: Summary of Interventions

Study	Intervention
Diedrich, Grant, Hofmann, Hiller, & Berking (2014)	**Emotion-regulation Techniques** Cognitive appraisal, acceptance & self-compassion used as emotion-regulation techniques when depressed mood is induced.
Gale, Gilbert, Read, & Goss (2014)	**Cognitive Behavioural Therapy (CBT) & Compassion-Focussed Therapy (CFT)** Combined intervention using a CBT-based approach and combining it with elements of CFT techniques.
Najavits et al., (2013)	**Seeking Safety Therapy** Seeking Safety is a present-focused therapy to help people attain safety from trauma/PTSD and substance abuse. This includes compassion, grounding and integrating the self amongst many others addressing interpersonal, cognitive and behavioural domains.
Kelly, Carter, & Borairi (2014)	**Cognitive-Behavioural Therapy (CBT)** Group psychotherapy, medical stabilisation, nutritional rehabilitation, psycho-education, relationships & sexuality, expressive arts, anxiety management, dialectical behaviour.
Lucre, & Corten (2013).	**Compassion-Focussed Therapy** Group programme by a cognitive-behavioural psychotherapist based on Paul Gilbert's compassionate mind therapy. There were three main components: formulation and psycho-education, compassionate mind therapy and planning for practice.
Kelly, Carter, Zuroff, & Borairi (2013)	**Cognitive-Behavioural Therapy (CBT)** Group psychotherapy, medical stabilisation, nutritional rehabilitation, psycho-education, relationships & sexuality, expressive arts, anxiety management, dialectical behaviour.
Kearney et al., (2013)	**Loving-Kindness Meditation** Loving-kindness meditation group programme designed to develop compassion and cultivate love.
Braehler et al., (2013)	**Compassion-Focussed Therapy (CFT)** Group CFT programme designed by the first author for use with psychosis based on the evolutionary model which incorporates the forensic group manual (Laithwaite et al., 2009), generic CFT, and mindfulness concepts.
Jazaieri, Goldin, Werner, Ziv, & Gross (2012)	**Mindfulness-Based Stress Reduction (MBSR)** Techniques such as meditation, gentle yoga (Hatha) and mind-body exercises (body scan) to help people cope with stress. **Aerobic exercise** A two month gym membership was given where intensity of exercise & heart-rate were monitored. Weekly gym session, with two individual and one group session.
Judge, Cleghorn, McEwan & Gilbert (2012)	**Compassion-Focussed Therapy (CFT)** Group CFT comprised of 12-14 sessions with a heterogeneous group of clients. The format of the group followed the procedures of explaining the evolutionary model, formulating client problems within the compassion-focused therapy model, introducing clients to the core practices of compassionate training, and using compassion based interventions to address core difficulties.
Brooks, Kay-Lambkin, Bowman, & Childs (2012).	General medical management programmes, a diversional programme, pharmacotherapy, cannabis clinic, detoxification, counselling, and needle and syringe programmes.
Johnson et al., (2011)	**Loving-Kindness Meditation** Loving-kindness meditation group programme designed to develop compassion and cultivate love.

Schanche, Stiles, McCullough, Svartberg, & Nielsen (2011**)**	**Affect Phobia Treatment** (short-term dynamic psychotherapy) Intervention to enable exploration of avoided affects, anxiety, shame, guilt or pain together with defensive behaviours and increase self-compassion which is based on the Triangle of Conflict. **Cognitive Treatment** Intervention to restructure or challenge critical core beliefs or schemas with the aim of transforming these into alternative and more adaptive beliefs.
Kuyken et al., (2010)	**Mindfulness-Based Cognitive Therapy (MBCT)** Group-based program focussing on formal exercises and informal practices of mindfulness meditations designed specifically for individuals with major depressive disorder.
Eisendrath, Chartier, & McLane (2011	**Mindfulness-Based Cognitive Therapy (MBCT)** Group-based program focussing on formal exercises and informal practices of mindfulness meditations designed specifically for individuals with major depressive disorder.
Shahar et al., (2012)	**Emotion-focussed Two-Chair Dialogue Intervention (EFT)** EFT is a marker-guided therapy using gestalt and experiential techniques, in which therapists apply particular interventions in response to specific client behaviours that naturally emerge in therapy. It is specifically aimed at resolving self-critical thinking. An empty chair is used to facilitate resolution and transformation of feelings.
Crane, Jandric, Barnhofer, & Williams (2010)	**Mindfulness-Based Cognitive Therapy (MBCT)** Group-based program focussing on formal exercises and informal practices of mindfulness meditations designed specifically for individuals with major depressive disorder.
Gilbert & Proctor (2006)	**Compassionate Mind Training** Intervention using compassionate self-monitoring, compassionate letter writing, compassionate imagery, letter writing, mindfulness, and self-compassion diary to explore self-critical rumination.
Laithwaite et al., (2009)	**Compassion-Focussed Therapy** Group programme by a cognitive-behavioural psychotherapist based on Paul Gilbert's compassionate mind therapy. There were three main components: formulation and psycho-education, compassionate mind therapy and planning for practice.
Beaumont, & Hollins Martin (2013)	**Cognitive Behavioural Therapy (CBT) & Compassion-Focussed Therapy (CFT)** Combined intervention using a CBT-based approach and combining it with elements of CFT techniques.

Appendix C: EPHPP Quality Assessment Tool

QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES

EPHPP
Effective Public Health Practice Project

COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?

1 Very likely
2 Somewhat likely
3 Not likely
4 Can't tell

(Q2) What percentage of selected individuals agreed to participate?

1 80 - 100% agreement
2 60 – 79% agreement
3 less than 60% agreement
4 Not applicable
5 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

B) STUDY DESIGN

Indicate the study design

1 Randomized controlled trial
2 Controlled clinical trial
3 Cohort analytic (two group pre + post)
4 Case-control
5 Cohort (one group pre + post (before and after))
6 Interrupted time series
7 Other specify _____
8 Can't tell

Was the study described as randomized? If NO, go to Component C.

No Yes

If Yes, was the method of randomization described? (See dictionary)

No Yes

If Yes, was the method appropriate? (See dictionary)

No Yes

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

C) CONFOUNDERS

(Q1) Were there important differences between groups prior to the intervention?

1 Yes
2 No
3 Can't tell

The following are examples of confounders:

1 Race
2 Sex
3 Marital status/family
4 Age
5 SES (income or class)
6 Education
7 Health status
8 Pre-intervention score on outcome measure

(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?

1 80 – 100% (most)
2 60 – 79% (some)
3 Less than 60% (few or none)
4 Can't Tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

D) BLINDING

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?

1 Yes
2 No
3 Can't tell

(Q2) Were the study participants aware of the research question?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown to be valid?

1 Yes
2 No
3 Can't tell

(Q2) Were data collection tools shown to be reliable?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?

1 Yes
2 No
3 Can't tell
4 Not Applicable (i.e. one time surveys or interviews)

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell
5 Not Applicable (i.e. Retrospective case-control)

RATE THIS SECTION	STRONG	MODERATE	WEAK	
See dictionary	1	2	3	Not Applicable

G) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell

(Q2) Was the consistency of the intervention measured?

1 Yes
2 No
3 Can't tell

(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?

4 Yes
5 No
6 Can't tell

H) ANALYSES

(Q1) Indicate the unit of allocation (circle one)

community organization/institution practice/office individual

(Q2) Indicate the unit of analysis (circle one)

community organization/institution practice/office individual

(Q3) Are the statistical methods appropriate for the study design?

1 Yes
2 No
3 Can't tell

(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?

1 Yes
2 No
3 Can't tell

GLOBAL RATING

COMPONENT RATINGS
Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

A	**SELECTION BIAS**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
B	**STUDY DESIGN**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
C	**CONFOUNDERS**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
D	**BLINDING**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
E	**DATA COLLECTION METHOD**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	
F	**WITHDRAWALS AND DROPOUTS**	**STRONG**	**MODERATE**	**WEAK**	
		1	2	3	Not Applicable

GLOBAL RATING FOR THIS PAPER (circle one):

1	STRONG	(no WEAK ratings)
2	MODERATE	(one WEAK rating)
3	WEAK	(two or more WEAK ratings)

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No Yes

If yes, indicate the reason for the discrepancy

1 Oversight
2 Differences in interpretation of criteria
3 Differences in interpretation of study

Final decision of both reviewers (circle one):

1 STRONG
2 MODERATE
3 WEAK

Appendix D: Journal of Abnormal Psychology – Instructions to Authors

Submission

Submit manuscripts electronically (in .rtf or .doc format) via the Manuscript Submission Portal.

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Sherryl H. Goodman, PhD
Editor, *Journal of Abnormal Psychology*
Department of Psychology
Emory University
36 Eagle Row
Atlanta, GA 30322

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EMPIRICAL PAPER

Psychophysiological responses to a self-compassion meditation in trauma-exposed individuals

Trainee Name:	**Joanne Storr**
Primary Research Supervisor:	**Dr Anke Karl**
	Senior Lecturer, Mood Disorders Centre, University of Exeter
Secondary Research Supervisor:	**Professor Willem Kuyken**
	Professor of Clinical Psychology, University of Oxford

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Abstract

Research has shown that a self-compassion meditation exercise in healthy individuals reduced negative affect, negative cognitions about the self and sympathetic arousal and also enhanced positive emotions and parasympathetic activity (Kirschner, Karl, & Kuyken, 2013).

Beneficial effects of self-compassion, i.e., being kind and considerate to one's self with the acknowledgement that pain cannot always be fixed or solved (Neff, 2003; Gilbert, 2009), for mental health and well-being have been previously demonstrated. This research tested the hypothesis that meditation can also be beneficial for individuals who survived psychological trauma and have post-traumatic stress disorder (PTSD), a disorder characterised by elevated physiological arousal and negative post-traumatic cognitions about the self. This study used self-report and physiological measures such as Heart-Rate (HR), Heart-Rate Variability (HRV), and Skin Conductance Level (SCL) in a trauma-exposed sample (*N* =56) with and without PTSD. It was revealed that both groups show significant meditation-induced reductions in state self-criticism and sympathetic arousal (HR, SCL). However, the study only found the expected pattern of significantly elevated state self-compassion and parasympathetic activation (HRV) induced by a self-compassion meditation in the non-PTSD group. This suggests that, interpreting these findings within Gilbert's three affect regulatory systems, a single self-compassion meditation was sufficient to reduce threat in all trauma survivors and to activate the safety system in the non-PTSD group but not to initiate safety and connectedness in PTSD patients.

Keywords: PTSD, self-compassion, loving-kindness, psychophysiology, emotion regulation

CONTENTS

Introduction

PTSD is a stress-related psychiatric condition with prevalence rates between 7-12% in the general population (Kessler, Berglund, Demler, Jin, & Walters, 2005). One in two people will suffer a traumatic event[2] and 10-25% of those traumatised will go on to develop post-traumatic symptoms (Barkay et al., 2012). Characteristically arising from these often life-threatening events is avoidance of reminders of the trauma, emotional numbing, hyper-vigilance, irritability and sleep disturbance (McNally, 2006). Additionally, recurrent and involuntary re-experiencing of the trauma through nightmares, sensory memories or intrusive negative cognitions are cardinal symptoms of the disorder described in the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV; American Psychiatric Association, [APA] 1994).

A number of models have been developed to understand the causes and factors maintaining PTSD (Brewin, 1989; Ehlers and Clark, 2000; Foa and Rothbaum, 1998; Janoff-Bulman, 1992). It is widely accepted that PTSD is associated with increased physiological arousal and vigilance to threat (Pole, 2007). A common supposition made by these theories is that the development of PTSD is a consequence of inefficient encoding of a traumatic event and negative appraisal, rather than solely exposure to the trauma itself. This leads to distortions in cognitions and the trauma memory whereby contextualisation and resolution of the memory trace is disrupted. These psychophysiological responses were thought to

[2] Whereby an individual has experienced or witnessed an event or series of events that involved an actual or threatened death, or serious injury, or a threat to the physical integrity of self or others" (American Psychiatric Association, 2000, p.200). This may include sudden personal injury or a serious accident, a physical assault, act(s) of abuse, witnessing the death or serious injury of another individual, news of an unexpected and sudden death or serious injury to a relative or friend, a rape, natural disaster, amongst others (Joseph, Williams, & Yule, 1997).

be a key mechanism within PTSD aetiology by which it was maintained (Tan, Dao, Farmer, Sutherland, & Gevirtz, 2011).

PTSD sufferers have also been found to have lower HRV than non-trauma exposed controls at baseline and throughout affective conditions. Additionally, autonomic dysregulation and decreased high-frequency HRV were found in PTSD. It was posited that the inability to downregulate from a state of hypervigilance was a result of hyperarousal of the sympathetic and profound reduction in the parasympathetic system, characteristic of the disorder, caused by the experience of trauma (Hauschildt, Peters, Moritz, & Jelinek, 2011; Blechert, Michael, Grossman, Lajtman, & Wilhelm, 2007). These bio-behavioural markers have been theorised to be indicators of emotion regulation and dysregulation.

Self-criticism and fear of compassion for the self is related to understanding the maintenance of shame and self-attacks and can be understood if we reflect on human threat-related processing (Gilbert & McGuire, 1998). Shame is the distressing fear that others hold negative thoughts about the person in their mind which can have social implications (Gilbert, 2000, Lee, 2009; Gilbert & Irons, 2005). This can lead people to feel lacking, damaged, and inadequate compared to others, believing that their “true” nature would be uncovered by those around them (Lee, 2009). The amygdala and limbic system are activated in cases of threat or fear. This often sparks one of two reactions, fight or flight, which are widely recognised and acknowledged responses to stress. However, it was also discovered that in situations where individuals may not have been able to flee or fight, other actions of protection can be observed known as freezing or dissociating (Lee, 2009). Our brains process internal and external threat stimuli, with the amygdala being highly sensitive to content and tone of speech. Self-critical thoughts relating to disgust and

being bad activate this same threat-response and are registered as highly threatening to the psychological integrity of the self, self-esteem and social status (Gilbert & Irons, 2005). Thus, our own evaluations produce similar threat responses to external attacks from others because we are capable of internalising attacks from others, such as perpetrators or abusive parents (Gilbert, 1989). However, the amygdala is also involved in the recognition of internal and external sources of safeness and is linked to the self-soothing system (Gilbert, 2000). Self-critical people often present with a delay in this recognition, cognitively and affectively, known as the “head/ heart lag”. For example, they may recognise that they are not bad, but still feel that they should be punished.

Neff (2003) identified three core areas of self-compassion: self-kindness, common humanity and mindfulness, and described it as taking a balanced perspective on one’s situation. Neff’s definition was developed from long standing Buddhist traditions and states that self-compassion is a multi-dimensional construct comprising of treating oneself with kindness, recognising one’s shared humanity and being mindful when considering negative aspects of oneself (Neff, 2003; Gilbert, 2009; Allen & Leary, 2010). Using this definition Neff describes self-compassion as relating to one’s self with kindness, care and holding one’s imperfections and inadequacies with that same kindness in a non-judgmental way (Neff, 2011).

Gilbert’s views of self-compassion arise from social mentalities theory and evolutionary theory, drawing on neurobiology, attachment and his work with clinical populations. Gilbert’s focus therefore seems to be on self-compassion as the antithesis to self-criticism and blame describing how this is related to the emotion regulation systems. Gilbert defines this as a process of self-to-self relating where tolerance, kindness and sympathy towards one’s distress are developed. He

describes this way of relating has tempering effects on self-criticism and blame through the process of self-reassurance and self-soothing (Gilbert & Proctor, 2006).

Gilbert's definition of self-criticism within a threat mode of emotion regulation and self-compassion within the contentment mode allows specific predictions not only in self-report but also physiological correlates; i.e., self-compassion being characterised by lower physiological arousal as measured by reduced HR and SCL and increased parasympathetic activation as measured by higher HRV (Rockliff, Gilbert, McEwan, Lightman, & Glover, 2008). The contentment system is compatible with the three positive subscales of Neff's SCS scale (self-kindness, common humanity, mindfulness); the threat system is compatible with the three negative subscales (self-judgement, isolation, over-identification).

There is still some debate regarding the components of self-compassion as both Neff and Gilbert use broad definitions and some of their research focusses on its absence rather than presence. However, they both agree that it is distinct from self-esteem as self-esteem has an evaluative element whereas self-compassion does not. Although there still remains a lack of clarity around the concept and how it is helpful within clinical populations, a common denominator of both Neff's and Gilbert's definitions is the emphasis on adaptive kindness-based self-regulation in times of distress. Using psychophysiological measures may therefore improve understanding of self-compassion.

Few studies have investigated the cognitive or physiological processes of self-compassion. However, there is evidence that self-compassion is negatively associated with shame, self-criticism, rumination, avoidance, thought suppression, anxiety, and depression, and positively associated with healthy psychological functioning, including life satisfaction and social connectedness (Kok et al., 2013;

Karl & Kuyken, 2010; Karl, Rabe, Zöllner, Maercker, & Stopa, 2009; Thompson & Waltz, 2010; Barnard & Curry, 2011; Neff, Kirkpatrick, & Rude, 2007). These studies argue that self-compassion may be protective because it prevents maladaptive thought processes that expend individuals' attentional resources, serve avoidance and thus prevent adaptive strategies and processing. It is hypothesised that self-compassion should lead to more balanced autonomic nervous system functioning, through a reduction of cortisol release and improved immune system, leading to enhanced physical and mental health (Fan, Tang, Ma, & Posner, 2010; Rockliff et al., 2008).

Despite the findings on self-compassion it is uncertain whether individuals who develop PTSD have low levels of trait self-compassion before a subsequent trauma and whether this can be a contributing factor to the development of PTSD symptoms. Alternatively, individuals who develop PTSD may have high levels of trait self-compassion pre-trauma, but their ability to be self-compassionate is impacted upon by the traumatic event.

Two studies have directly examined the relation between self-compassion and PTSD. In a cross-sectional study on students a link was found between self-compassion and reduced avoidance symptoms of PTSD, but not with overall PTSD symptom severity (Thompson & Waltz, 2008). They proposed this may be explained by increases in natural exposure to emotional experiences and an associated reduction in PTSD symptoms.

A second study showed that self-compassion was negatively associated with total PTSD symptom severity (Kearney et al., 2013). Participants completed a 12-week loving-kindness meditation course designed to facilitate feelings of compassion and kindness for the self and others. Participants reported increases in self-

compassion and decreases in PTSD symptoms post-treatment and at 3-month follow-up. Additionally, changes in self-compassion mediated the reduction in PTSD symptoms at post-treatment and 3-month follow-up. Thus, prior research indicates that self-compassion has theoretical relevance for understanding the development and maintenance of PTSD.

More recently, Hiraoka, Meyer, Kimbrel, DeBeer, Gulliver and Morrisette (2015) found self-compassion was associated with baseline PTSD symptoms and predicted symptoms at 12-months, after accounting for combat exposure and baseline PTSD severity.

These findings extend prior research (Thompson & Waltz, 2008) by showing an association between self-compassion and each PTSD symptom cluster as defined in the DSM-IV, and that self-compassion is not limited to an association with avoidance symptoms. In addition, they suggest further research to explicate whether low self-compassion may represent a pre-trauma risk factor for PTSD following trauma exposure.

Ehlers and Clark (2000) presented a model with which to understand PTSD symptomatology (Figure 1). They described that maintenance of symptoms can be due to negative appraisal of the trauma, its sequelae or self-denigration which impacts on interpretation of the current threat and consequently on strategies for managing the threat or symptoms. High levels of trait self-compassion could be linked to an individual's core beliefs and is known to improve wellbeing and resilience (Wei, Liao, Ku, & Shaffer, 2011). Therefore, cultivating self-compassion could act on cognitive processing and appraisals, which in turn could aid resilience and processing of trauma. Compassion meditation, such as loving kindness

meditation (LKM) can induce self-compassion (Hutcherson, Seppala, & Gross, 2008; Hofmann, Grossman & Hinton, 2011).

Kirschner et al. (2013) developed a paradigm to scrutinise these facilitative effects of self-compassion in a healthy population. They suggest that activating a self-compassionate state leads to a “broadening” mindset, which facilitates more positive self-perceptions and mediates individual techniques to build resilience. Additionally, Kirschner et al. (2013) describe the tempering effects that self-compassion can have on depressive symptomatology in relation to physiological reactivity. Self-compassion is an emotion regulation strategy believed to elicit positive emotion. Cultivating self-compassion could work because it leads to a “broadening” and “building up” process. It is believed that these positive emotions have beneficial effects on mental health, cardiovascular activation and emotional arousal (Fredrickson & Levenson, 1998).

Using the broadening paradigm developed by Kirschner et al. (2013) one could hypothesise that self-compassion would empower an individual to interrupt this cycle. Thereby, allowing the individual to process the physical and psychological facets of the traumatic memory and build a more resilient response.

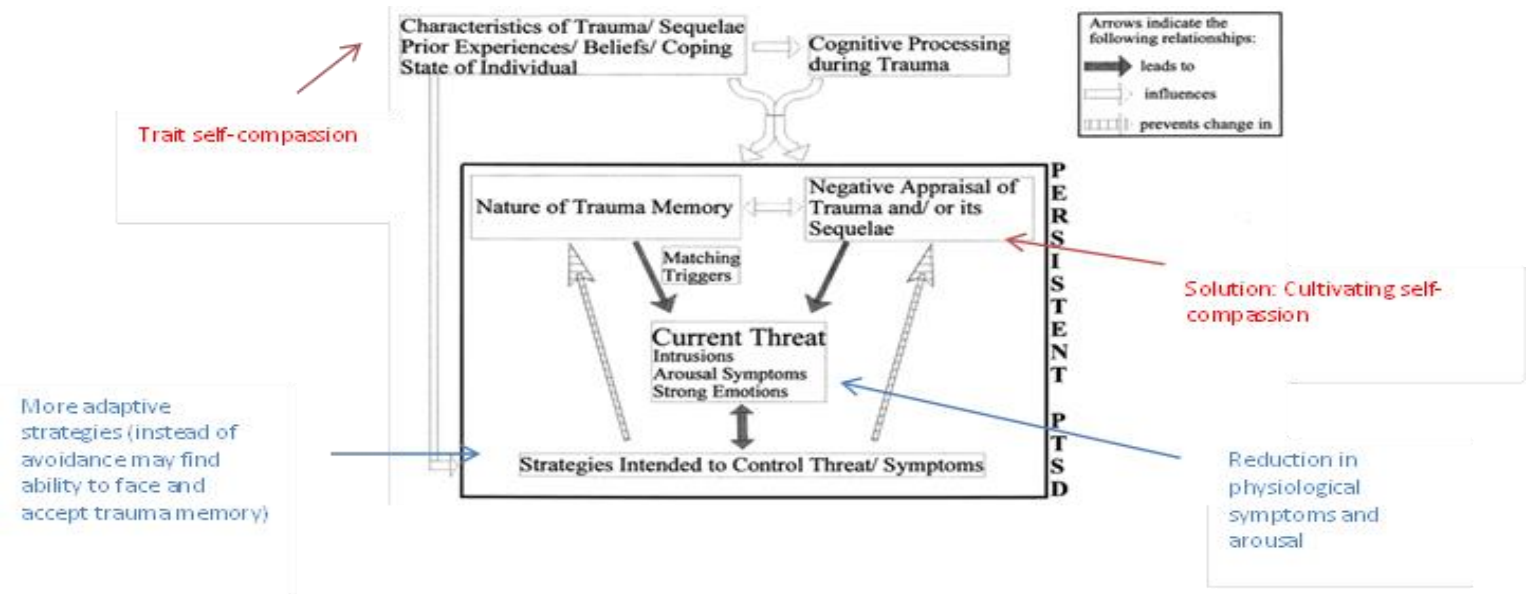

Figure 1. Diagram adapted from Ehlers and Clark’s model of PTSD (2000). Areas self-compassion is believed to affect (red) and expected outcomes of self-compassion (blue).

Self-compassion training over a number of sessions has been found to reduce self-critical appraisal, self-blaming, negative thoughts and avoidance strategies enabling a kind perspective towards oneself (Kuyken et al., 2010; Najavits et al., 2013; Kearney et al., 2013; Beaumont, & Hollins Martin, 2013; Pineles et al., 2011; Benotsch et al., 2000; Aubert-Khalfa, Roques, & Blin, 2008, Thompson & Waltz, 2008).

These studies indicate research on the role of self-compassion in the treatment of PTSD is warranted, as it is currently unclear if (a) changes in self-compassion might be a mechanism of change in existing treatments for PTSD; (b) self-compassion interventions for PTSD are efficacious as stand-alone treatments or if they should be used as an adjunct to existing empirically supported treatments; and (c) shorter interventions are useful for individuals with PTSD (d) there are physiological reactions, such as those found within Kirschner's paradigm (i.e., decrease in sympathetic arousal and increase in parasympathetic activity) that would explicate the effects of self-compassion on individuals with PTSD further.

It is recommended to include a trauma-exposed but non-symptomatic control group; this is preferable over a non-traumatised control group because it allows for the control of trauma exposure (Schnurr et al., 2007; Cloitre et al., 2012). It has been reported that individuals who have suffered trauma may be more resilient than those who have not (Harvey, 2007) and thus are an interesting control group in their own right. Therefore, it was hypothesised the non-PTSD group may have higher levels of trait self-compassion and possibly greater ability to cultivate self-compassion during one exposure (Lee et al., 2013).

Current Study, its Aims and Rationale

Previous research indicates that self-compassion has theoretical relevance for understanding the development and maintenance of PTSD (Thompson & Waltz, 2008, Kearney et al, 2013, & Hiraoka et al., 2015).

The aim of this experimental study was to establish whether self-compassion could be cultivated in trauma survivors with and without PTSD via a single session of meditation.

By exploring physiological reactions during the meditation and changes in pre-to-post scores on self-reported happiness, state self-compassion and state self-criticism this study would hope to establish how or why self-compassion may be useful for those experiencing symptoms of PTSD.

An exploratory analysis was also presented aiming to establish if factors, such as trait self-compassion, trait self-criticism and fear of compassion, moderated the relationship between group and change in state self-compassion and state self-criticism.

Research Questions and Hypotheses

1. **Does a single self-compassion induction increase positive emotions and parasympathetic activation and reduce negative emotion and sympathetic arousal as indicated by:**
    a. **Increased self-reported state self-compassion, happiness, and HRV?**
    b. **Reduced state self-criticism, SCL, and HR in trauma survivors in both groups?**

It was anticipated that self-compassion could be cultivated in trauma-survivors with and without PTSD as demonstrated by previous research in this field

(Thompson & Waltz, 2008; Kearney et al., 2013). It was hypothesised this would be indicated by increased reported happiness, state self-compassion and HRV and decreased SCL, HR and self-criticism, similar to findings with healthy and depressed participants (Kirshener et al., 2013) and findings on self-criticism and HRV (Rockliff et al., 2008).

2. **Do the effect sizes for these pre-to-post changes differ between the PTSD and non-PTSD group?**

As described earlier the non-PTSD group were hypothesised to have more resilience and have higher levels of self-compassion and potential to cultivate self-compassion (Lee et al., 2013).

Exploratory hypothesis 3 (see Appendix A).

Method

Design

This study used a 2x2 mixed factorial design, with a between-subject factor of group and a within-subjects factor of time. The independent variables are trait self-compassion and PTSD symptomatology; the dependent variables are self-reported state self-compassion, self-criticism, happiness, fear of compassion, HR, HRV, and SCL. Participants were assigned to groups depending on their PTSD Checklist – Civilian version (PCL-C) score, which was completed at the end of testing (Blanchard, Jones-Alexander, Buckley & Forneris, 1996).

Participants

Inclusion/exclusion criteria.

Participants were included if they had a history of trauma fulfilling criterion A of the DSM-IV (APA, 1994). Participants were assessed for current symptoms of PTSD according to the DSM-IV criteria using the PCL-C. There were no restrictions placed on age, gender or traumatic event experienced other than meeting DSM-IV criteria A and being over 18 years of age (APA, 1994).

Exclusion criteria included (a) a diagnosis of schizophrenia, another psychotic disorder, or bipolar disorder; (b) a trauma that happened less than 6 months ago; (c) recent initiation or discontinuation of psychiatric medications treatment (i.e., within the last 3 months); (d) taking cardiovascular medication; (e) heart problems (e.g., heart disease, pacemakers, shunts or stents); or (f) those with neurological conditions or brain tumours were also excluded from taking part as this may have affected EEG measurements.

Recruitment.

Participants were recruited from two mental health trusts, GP surgeries, and the University of Exeter. A priori sample size estimations indicated a sample size of 55 participants would be needed to answer all hypotheses (see Appendix B for more detailed information). Recruitment was based on an opt-in system, where participants contacted the researcher after seeing posters, leaflets, or advertisements.

A total of 68 participants were telephone screened after showing interest in the study, of these 56 participants met eligibility criteria (Figure 2).

A final sample size of 56 participants was included in the analyses (11 males, 45 females; *M*age = 30.98 (*SD*, 15.42), age range; 18-80 years). All participants reported a history of trauma with 23 in the PTSD group (41.1%) and 33 in the non-PTSD group (58.9%).

Ethical approval for this study was granted by the University of Exeter, School of Psychology Ethics Committee, local trusts, and the National Health Service National Research Ethics Service (14/SW/0055). Additionally, all materials were developed in collaboration with the Lived Experiences Group.

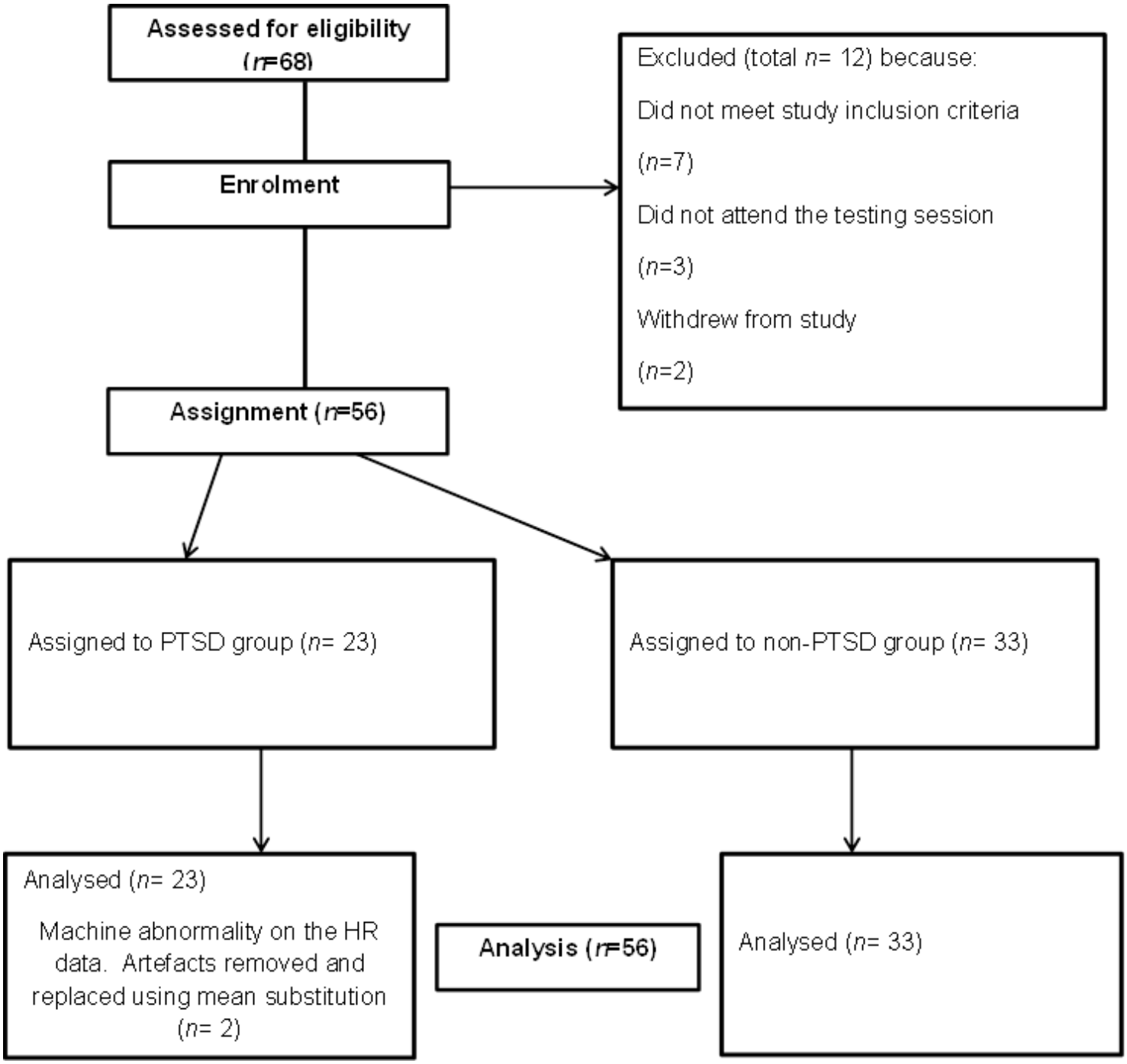

Figure 2. Diagram of participant flow through the study.

Measures and Materials

Screening Measure.

Screening interview: A tool constructed for telephone screening for inclusion/exclusion criteria, and collection of demographic and trauma information.

Symptom Measures.

The PTSD Checklist – Civilian version (PCL-C; Blanchard et al., 1996), is a standardised self-report rating scale for PTSD comprising of 17 items that correspond to the key symptoms of PTSD, and was used to assess symptomology, according to DSM-IV criteria. It was administered to participants after completing the procedure so as to not influence the physiological and self-report measures. The PCL-C is highly correlated (r = .93) with the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995). Caseness was determined using scores >44 on the PCL-C (Blanchard et al., 1996).

Published Cronbach's α=.94-.97; Current study α= .91.

Depression, Anxiety and Stress Scales (DASS; Brown, Chorpita, Korotitsch, & Barlow, 1997), used to assess levels of comorbid anxiety, depression and stress. The DASS is a 42-item questionnaire which uses a four-point Likert scale. It includes three self-report scales designed to measure the depression, anxiety and stress.

Published Cronbach's α=.89-.96; Current study α= .92-.96.

Trait Measures.

Self-Compassion Scale – Short form (SCS-SF; Raes, Pommier, Neff & Van Gucht, 2011), was used as a screening tool of self-compassion but also as a measure following the self-compassion induction to ascertain stability of the measure and any changes in trait self-compassion as a result of the meditation. It is a 12-item

self-report measure using a five-point Likert scale for participants to indicate how they typically act towards themselves during difficult times. Scores are from a total of 60; higher scores indicate a greater amount of self-compassion.

Published Cronbach's *α*=.86; Current study *α*= .89 - .91.

Forms of Self-Criticism/Self-Reassuring Scale (FSCRS; Gilbert, Clarke, Kempel, Miles, & Irons, 2004), was used to assess self-criticism levels. This is a 22-item scale which assesses participants' thoughts and feelings about themselves during a perceived failure using a four-point Likert scale. Two subscales measure forms of self-criticising and one subscale measures tendencies to be reassuring to oneself.

Published Cronbach's *α*=.86 - 90; Current study *α*= .74 - .95 (Inadequate self = .93, Reassure self - .88, Hated self = .89).

Fear of Compassion subscales (FOC; Gilbert, McEwan, Matos, & Rivis, 2011), were used to assess fears of feeling compassion. They consist of three subscales: fear of compassion for self, fear of compassion from others and fear of compassion for others. Fear of compassion for the self consists of 17 items; fear of compassion from others is made up of 15 items; and fear of compassion for others comprises of 13 items. The items are rated using a five-point Likert scale.

Published Cronbach's *α*=.78 - .87; Current study *α*= .86 - .95.

Psychophysiological Measures.

Physiological measures: HR and SCL were used as measures of sympathetic arousal and HRV as a measure of parasympathetic activation.

SCL was recorded using a BIOPAC SCL100C amplifier and a skin resistant transducer (TSD203) from the middle phalanx of the first and ring finger of the

participant's non-dominant hand at a sampling rate of 500 Hz with a low pass filter of 1.0 Hz.

HR and HRV were determined from the electrocardiogram (ECG; Berntson et al., 1997). ECG was recorded continuously, using standard procedures, from below the participant's right collar bone and one to the participant's left side, underneath the ribcage using a BIOPAC ECG100C amplifier at a sampling rate of 1 kHz with a low pass filter of 35 Hz and a high pass filter of .5 Hz.

Experimental State Measures.

Mood measures: This is a computerised task used by Kirschner et al. (2013) comprising of 13 items, with items being rated using visual analogue scales (VAS; 0-100). This was used to assess pre and post meditation mood. Three scales were used to answer the hypotheses: happiness, state self-compassion and self-criticism.

Mood Neutralisation Task.

Mood neutralisation task: Participants were instructed to slowly read each of the statements silently to themselves and then spend 8 minutes concentrating on the objects and locations listed. Whilst they read the statements they were instructed to use their imagination and concentration to visualise each item (Nolen-Hoeksema & Morrow, 1993).

Experimental tasks.

Compassion induction.

The meditation script was developed by Kirschner et al. (2013) in collaboration with an experienced mindfulness teacher and delivered via headphones. The script lasted approximately 12 minutes and focussed on compassion towards others initially and then on to directing the compassion toward oneself. All participants listened to the same script whilst their individual psychophysiological measurements were recorded.

Procedure

Individuals initially took part in a screening telephone interview to determine study eligibility where they were asked to disclose brief details about the nature of their traumatic experience and health-related information, such as medications and previous heart problems.

Eligible participants were then invited for the experimental session which took part in the Washington Singer Laboratories, at the University of Exeter and received a pack with an information sheet, consent form and questionnaires (SCS-SF, DASS, FSCRS & FOC).

On the day of testing, after giving written informed consent, participants were taken into the lab and fitted with the recording equipment and given verbal instructions of the experimental tasks that they would be participating in whilst the EEG (not analysed within this dissertation), ECG and SCL measures were being recorded (Figure 3).

At the beginning and the end of the experimental procedure, participants were asked to complete a self-referential task using the “Me/Not-Me” response task

(Markus, 1977) not reported here but discussed in a related MSc dissertation (see the author's declaration).

Participants then completed mood state measures and baseline measurements lasting 2 minutes for the EEG measurements by opening and closing their eyes. Following this they were again asked to rate their mood.

Participants then listened to the compassion induction, before providing post-meditation mood state ratings and another 1 minute baseline measurement.

After the tasks requiring psychophysiological measurements were finished participants were asked to answer the PCL-C and post SCS-SF. Following this they completed a mood neutralisation task and were then de-briefed. Participants were either refunded for travel expenses or were awarded course credits.

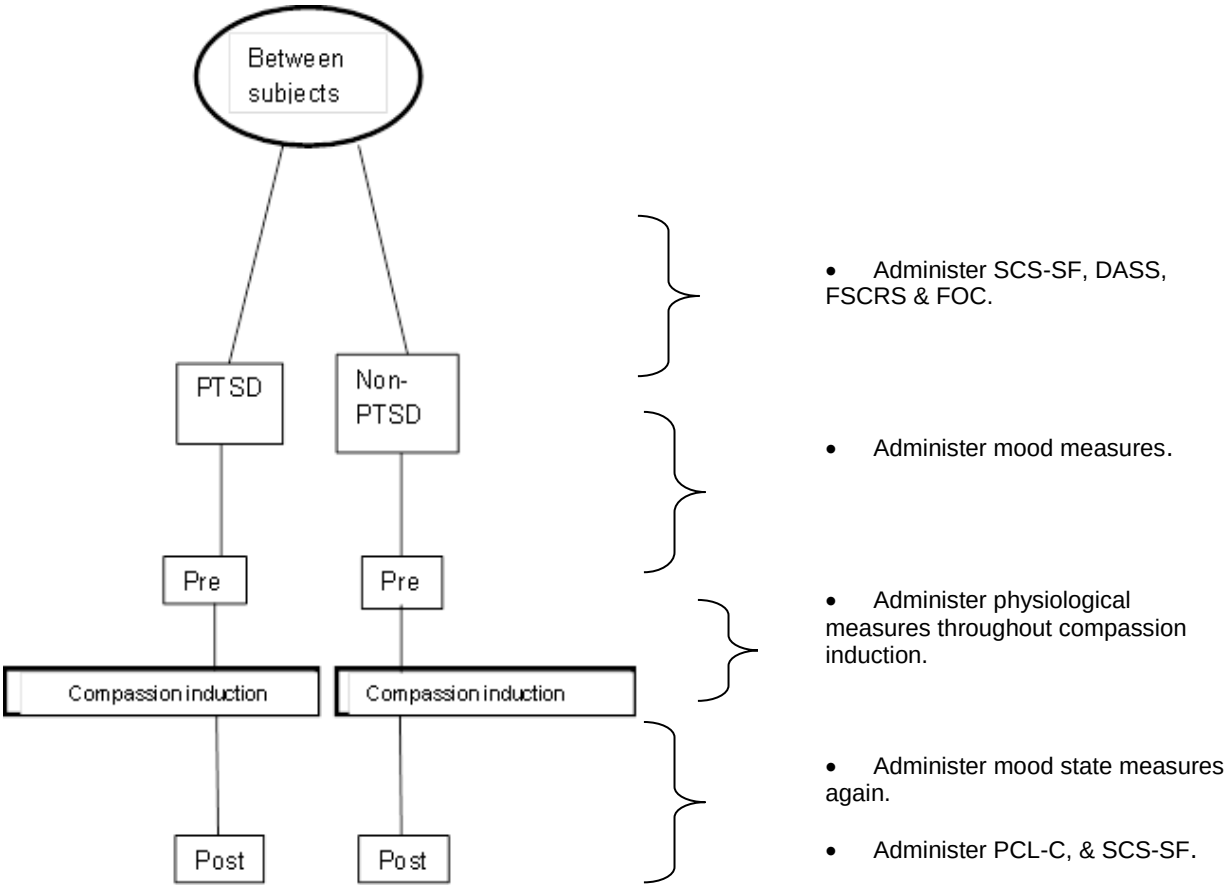

Figure 3. Diagram to show a visual representation of the research design and points of analysis.

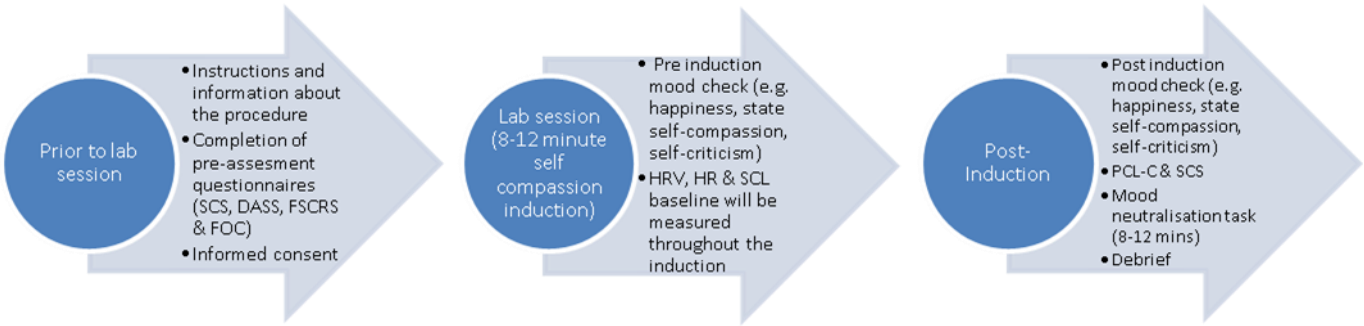

Figure 4. Diagram showing the experimental testing procedure.

Data Analysis

Physiological Data Pre-Processing

Heart rate (HR).

The HR determination in beats per minute was based on a semi-automatic R-wave detection algorithm implemented in the software AcqKnowledge (Version 4.1., BIOPAC Systems Inc.). Raw ECG data were filtered applying a FIR bandpass filter between .5 and 35 Hz and 8000 coefficients. Artefact detection (i.e., noisy, missing or ectopic beats) and removal was performed using a template correlation and interpolation from the adjacent R-peaks (Solem at al., 2006; Berntson, Quigley, Jang, & Boysen, 1990; Berntson & Stowell, 1998). The interpolation procedure was applied for less than 5% of the ECG data. Mean HR in beats per minute were then extracted from the R-waves for each data section, in particular 2 minutes of resting/ baseline, for the meditation and one minute post meditation. For the meditation, mean HR values were determined for the duration of the 12 minute meditation in one minute segments. A minute prior to the meditation start was used as a baseline. To determine the HR responses to the meditation, this baseline was subtracted from each minute of the meditation HR value and change in HR from the baseline was then determined for each minute.

Heart rate variability (HF-HRV; as index of parasympathetic activation).

HRV was determined from the artifact-free ECG (see above) by calculating a time series of the R-peaks and submitting it to a fast Fourier transformation that calculates the power spectrum of the R-R interval variation in a given time window (Berntson et al., 1997; Malik et al., 1996). Of particular interest was the frequency range between .15 Hz and .4 Hz (high frequency, HF). This high frequency band of HRV is generally considered a marker of parasympathetic input. Mean HF-HRV were then extracted for each data section using the same process as used with the HR.

Skin conductance level (SCL) (as measure of sympathetic arousal).

Mean SCL, maximum SCL values and minimum SCL values were extracted for the same time windows and a range correction as recommended was applied to each data section for each participant to give a mean SCL corrected for individual differences (Lykken, Rose, Luther & Marley, 1996). The formula for this was: Corrected SCL = (SCL mean - SCL min) / (SCL max - SCL min).

Data Preparation

All the data were checked for entry errors, artefacts, missing data, univariate and multivariate outliers before normality, sphericity and homogeneity checks were performed. There were two multivariate outliers within the self-report state measures. Therefore, the results are reported with and without these outliers.

No data transformation was performed but outliers were Winsorised[3] (Field, 2013). ANOVA has been found to be insensitive to moderate deviations from

[3] Z-scores were calculated and those values which were above 3.29 were Winsorised.

normality but normality and homogeneity were established before running parametric analyses (Glass, Peckham, & Sanders, 1972; Lix, Keselman, & Keselman, 1996).

Results

Sample Characteristics and Analyses

Descriptive statistics were calculated for continuous (Table 1) and nominal (Table 2) demographic variables, questionnaire data and baseline variables. In order to answer hypotheses, mixed ANOVAs or repeated measures ANOVAs were used with time as the within-subjects factor and group as the between-subjects factor. For self-report measures there were two time points (pre and post meditation) and for the physiological data there were 12 time points (one response for every minute of the meditation). Where pre-requisitions for ANOVA were violated (normality, variance homogeneity) non-parametric tests such as Wilcoxon signed-ranks, Mann-Whitney U and Friedman's ANOVA were applied. Tables 3 and 4 show means, standard deviations, and within, between and interaction effects. Table 5 shows effect sizes for pre-to-post changes by group.

Table 1

Mean Scores for Continuous Variables and Group Comparisons

Variable	***N*** **N=56**	**Total sample** ***M (SD)***	**Min/Max scores**	**Non-PTSD** ***n*=33 *M* (SD)**	**PTSD** ***n*=23 *M* (SD)**	**Test statistic for group differences (*t* or *U*)**	***df***	***p***
Age	56	30.98 (15.42)	18/ 80	31.42 (14.32)	30.35 (17.20)	*U* = 330.50	54	.412
DASSDEP	56	11.57 (9.99)	0/ 37	7.91 (8.16)	16.83 (10.17)	*U* = 191.00	54	.002**
DASSANX	56	10.25 (9.18)	0/ 37	7.45 (2.10)	15.70 (8.78)	*U* =137.00	54	.001**
DASSSTR	56	17.91 (11.19)	0/ 42	14.27 (9.71)	23.13 (11.30)	*U* =218.00	54	.007**
SCS (Pre Score)	56	32.50 (10.10)	15/ 59	35.88 (10.42)	27.65 (7.46)	*t* = 3.25	54	.002**
SCS (Post Score)	56	33.86 (10.02)	16/ 59	37.97 (9.94)	27.96 (6.75)	*t*= 4.20	54	.001**
PCL-C	56	41.18 (14.22)	17/ 74	31.12 (6.77)	55.61 (8.32)	*t* = -12.11	54	.001**
FSCRS (Scale 1)	56	43.91 (11.79)	21/ 71	39.12 (8.40)	50.78 (12.70)	*t* = -3.86	35.23	.001**
FSCRS (Scale 2)	56	29.21 (21.23)	0/ 75	19.21 (14.74)	43.57 (21.10)	*U* = 130.50 *t* = -4.78	54 36.61	.001** .001**
FOC (Scale 1)	56	16.98 (8.37)	2/ 35	13.30 (6.81)	22.26 (7.64)	*t* = -4.61	54	.001**
FOC (Scale 2)	56	16.91 (12.22)	0/ 45	10.61 (8.79)	25.96 (10.77)	*U* = 92.50	54	.001**
FOC (Scale 3)	56	19.66 (14.64)	0/ 57	12.00 (10.43)	30.65 (12.79)	*U* = 99.50	54	.001**

Note.* $p < .05$, ** $p < .01$. DASSDEP = Depression scale of the Depression Anxiety and Stress Scale, DASSANX = Anxiety scale of the Depression Anxiety and Stress Scale, DASSSTR - Stress scale of the Depression Anxiety and Stress Scale SCS = Self-Compassion Scale, PCL-C = PTSD Checklist – Civilian, FSCRS = Forms of Self-Criticism/ Attacking and Self- Reassurance Scale, FOC = Fear of Compassion Scale.

Table 2

Percentages for Demographic Information and Group Comparisons

Variable	*N* *N*=56	Non-PTSD control group *n*=33	PTSD group *n*=23	Test statistic for group differences (χ^2)	*df*	*p*
Sex	Male=11 (19.6%) Female=45 (80.4%)	Male=7 (21.2%) Female=26 (78.8%)	Male=4 (17.4%) Female=19 (82.6%)	.13	1	.723
Marital Status	Single=42 (75%) Married=14 (25%)	Single=24 (72.7%) Married=9 (27.3%)	Single=18 (78.3%) Married=5 (21.7%)	.22	1	.638
Occupation	Employed=15 (26.8%) Unemployed=3 (5.4%) Student=36 (64.3%) Retired=2 (3.6%)	Employed=12 (36.4%) Unemployed=1 (3%) Student=19 (57.6%) Retired=1 (3%)	Employed=3 (13%) Unemployed=2 (8.7%) Student=17 (73.9%) Retired=1 (4.3%)	4.19	3	.241
Education	Standard=40 (71.4%) Higher=16 (28.6%)	Standard=21 (63.6%) Higher=16 (36.4%)	Standard=19 (82.6%) Higher=4 (17.4%)	2.39	1	.122
Medication	No=42 (75%) Yes=14 (25%)	No=28 (84.8%) Yes=14 (15.2%)	No=14 (60.9%) Yes=9 (39.1%)	4.16	1	.041*
PTSD Caseness	Non PTSD=33 (58.9%) PTSD=23 (41.1%)	-	-	-	-	
Trauma type (Type I or II)	Type I=42 (75%) Type II=14 (25%)	Type I=25 (75.8%) Type II=8 (24.2%)	Type I=17 (73.9%) Type II=6 (26.1%)	.03	1	.875
Nature of trauma (accidental or interpersonal)	Accidental=19 (33.9%) Interpersonal=32 (57.1%) Both=5 (8.9%)	Accidental=15 (45.5%) Interpersonal=16 (48.5%) Both=2 (6.1%)	Accidental=4 (17.4%) Interpersonal=16 (69.6%) Both=3 (13%)	4.94	2	.085
Meditation	No=39 (69.6%) Yes=17 (30.4%)	No=25 (75.8%) Yes=8 (24.2%)	No=14 (60.9%) Yes=9 (39.1%)	1.42	1	.233
Handedness(left or right)	Right=51 (91.1%) Left=5 (8.9%)	Right=29 (45.5%) Left=4 (12.1%)	Right=22 (95.7%) Left=1 (4.3%)	1.01	1	.316

Note. * $p < .05$, ** $p < .01$. *Education:* Standard = A-levels/GNVQ; Higher= Degree, *Medication:* Psychotropic medication (not recently changed), *PTSD caseness:* Determined by self-report, PCL-C: Non-PTSD= no diagnostically significant symptoms; PTSD: diagnostically significant PTSD symptoms, *Trauma type:* Type I trauma is considered to be a single traumatic event such as a fire, or single rape episode. Type II is considered to be a repeated, prolonged trauma such as extensive child abuse (Terr, 1991), *Nature of trauma:* Accidental[4] trauma or interpersonal trauma[5].

[4] Considered to be an experience brought about through no purposeful intent.
[5] "Family and intimate partner violence…violence between individuals who are unrelated…child abuse, violence, random acts of violence, rape, or sexual assault by strangers, and violence in institutional settings...sudden bereavement" (World Health Organization, 2002, p. 14).

Psychophysiological Results

Meditation-related psychophysiological responding was tested in three ways: First, total mean responses across the whole 12 minute meditation (calculated as the mean physiological activity during the minute prior to the meditation subtracted from the mean physiological activity during the whole meditation) were analysed for group differences using independent *t*-tests or Mann-Whitney U (overall mean physiological responses). Secondly, a 2x2 ANOVA with mean physiological activity pre-and post-meditation as within-subjects factor and group as between-subjects factor was conducted (pre-post absolute physiological activity, Table 3 & 4). Lastly, a 2x12 ANOVA with group as between-subjects factor and time as a within-subjects factor (response per minute for each of the 12 minutes of meditation) was conducted (mean physiological responses over time, Figures 7, 8 & 9).

Hypothesis 1a

It was predicted that self-compassion can be cultivated in trauma survivors in both groups, PTSD and non-PTSD. Therefore, a significant main effect of time denoting a pre-to-post increase in happiness, state self-compassion, trait self-compassion and HRV was expected.

State happiness. There were two multivariate outliers so analyses were run with and without those cases. Results for the full dataset can be found below[6]. There was a significant main effect of time for happiness ratings as a result of the meditation, F (1, 52) = 5.13, p = .028, $\eta\rho^2$ = .090 and there was a significant effect of group on happiness, F (1, 52) = 9.00, p = .004, $\eta\rho^2$ = .148. In addition, there was a

[6] When the multivariate outliers were included in the analyses there was a significant main effect of time for happiness ratings as a result of the meditation F (1, 54) = 7.30, p = .009, $\eta\rho^2$ = .119 and there was a significant effect of group on happiness F (1, 54) = 6.65, p = .013, $\eta\rho^2$ = .110 but there was no group by time interaction F (1, 54) = 1.97, p = .166, $\eta\rho^2$ = .035.

significant group by time interaction, F (1, 52) = 4.08, p = .049, $\eta\rho^2$ = .073 (Figure 5). Post-hoc tests exploring the interaction indicated that the difference between groups was only significant in the post meditation scores for happiness, t (52) = 3.47, p = .001, d = .96. Furthermore, whereas for the PTSD group the self-reported ratings in happiness did not significantly differ pre-to-post meditation, F (1, 20) = .20, p = .89, $\eta\rho^2$ = .001, the non-PTSD group showed significantly enhanced happiness after the meditation as compared to before the meditation, F (1, 32) = 13.86, p = .001, $\eta\rho^2$ = .302.

Figure 5. Time by Group interaction for self-reported happiness. Error bars depict standard error of mean**.** VAS = visual analogue scale (0-100).

State self-compassion. There were two multivariate outliers so analyses were run with and without those cases. Results for the full dataset can be found below[7]. Due to violation of normality, non-parametric tests were run for this variable. Mann-Whitney's U test revealed a significant effect of group on state self-compassion before the meditation, U = 203.50, p = .011, z = -2.538, r = .35, and

[7] When the multivariate outliers were included in the analyses there was a significant effect of group on kindness to oneself before the meditation U = 225.00, p = .010, z = -2.574 and after the meditation U = 121.00, p < .001, z = -4.308. Wilcoxon's rank test revealed a significantly increased state self kindness post as compared to pre-meditation, Z = -3.57, p < .001. Repeating the rank test per group yielded that for the PTSD group this effect did not hold, Z = -.55, p = .584, whereas for the non-PTSD group the self-reported ratings of kindness to self pre-to-post meditation did significantly differ Z = -.14, p = .001.

after the meditation, $U = 121.00$, $p < .001$, $z = -4.004$, $r = .54$ (Table 4). Wilcoxon's signed-rank test revealed significantly increased state self-compassion post as compared to pre-meditation, $Z = -3.94$, $p < .001$, $r = .54$. Repeating the rank test per group yielded that for the PTSD group this effect did not hold, $Z = -1.03$, $p = .305$, $r = .22$, whereas for the non-PTSD group the self-reported ratings of state self-compassion pre-to-post meditation did significantly differ, $Z = -4.14$, $p < .001$, $r = .72$. The latter result indicates a possible group by time interaction for state self-compassion suggesting that non-PTSD but not PTSD participants reported enhanced self-compassion following the meditation.

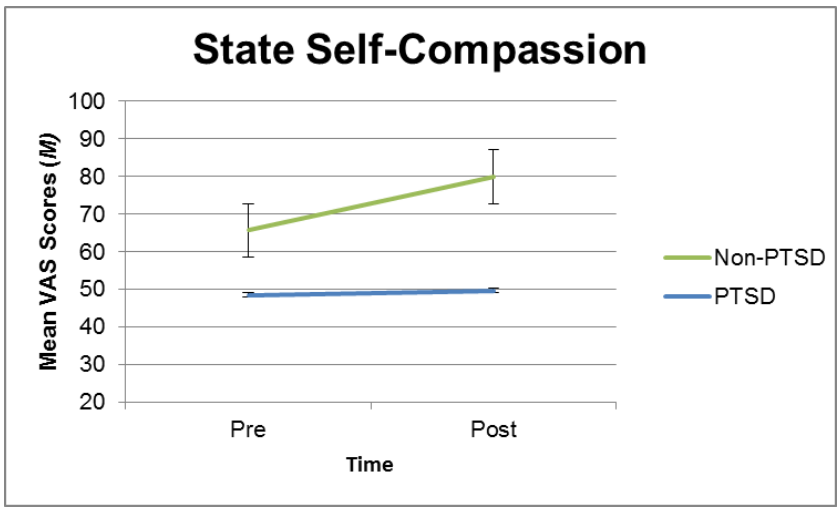

Figure 6. Time by Group interaction for state self-compassion. Error bars depict standard error of mean. VAS = visual analogue scale (0-100).

Trait self-compassion (SCS).

Although there was a significant effect of group for trait self-compassion, F (1, 54) = 15.39, $p < .001$, $\eta\rho^2 = .222$, there was no effect of time, F (1, 54) = 2.21, $p = .143$, $\eta\rho^2 = .039$, or time by group interaction, F (1, 54) = 1.23, $p = .273$, $\eta\rho^2 = .022$ (Table 3). This indicates that although trait self-compassion scores were higher in the non-PTSD group these scores were not significantly changed by the meditation intervention.

Heart-rate variability (HRV).

When calculating the mean psychophysiological change over the total 12 minute meditation there were no significant effects of group for HRV, $U = 347.00$, $p = .588$, $z = -.541$, $r = .07$. In addition, there were no significant effects of time for pre-to-post meditation physiological change for HRV, $Z = -.008$, $p = .993$, $r = .001$. HRV was then analysed throughout the 12 minute meditation (Table 4). A non-parametric Friedman test of differences among repeated measures was conducted and indicated a significant change over the 12 minute meditation, $\chi^2 (11) = 35.75$, $p < .001$. Wilcoxon tests used to follow up this finding revealed some significant differences between some minutes of the meditation (Appendix A). Mann-Whitney U tests revealed no significant differences between the two groups at any minute. Repeating the Friedman test per group yielded a significant effect for time for the non-PTSD group, $\chi^2 (11) = 21.49$, $p = .029$, but not for the PTSD group, $\chi^2 (11) = 17.63$, $p = .091$. The latter result indicates a possible group by time interaction for HRV suggesting that non-PTSD but not PTSD participants experienced some change in HRV during the meditation[8].

[8] non-parametric tests do not have a recognised test for considering interactions. Therefore, this inference should to be considered with caution.

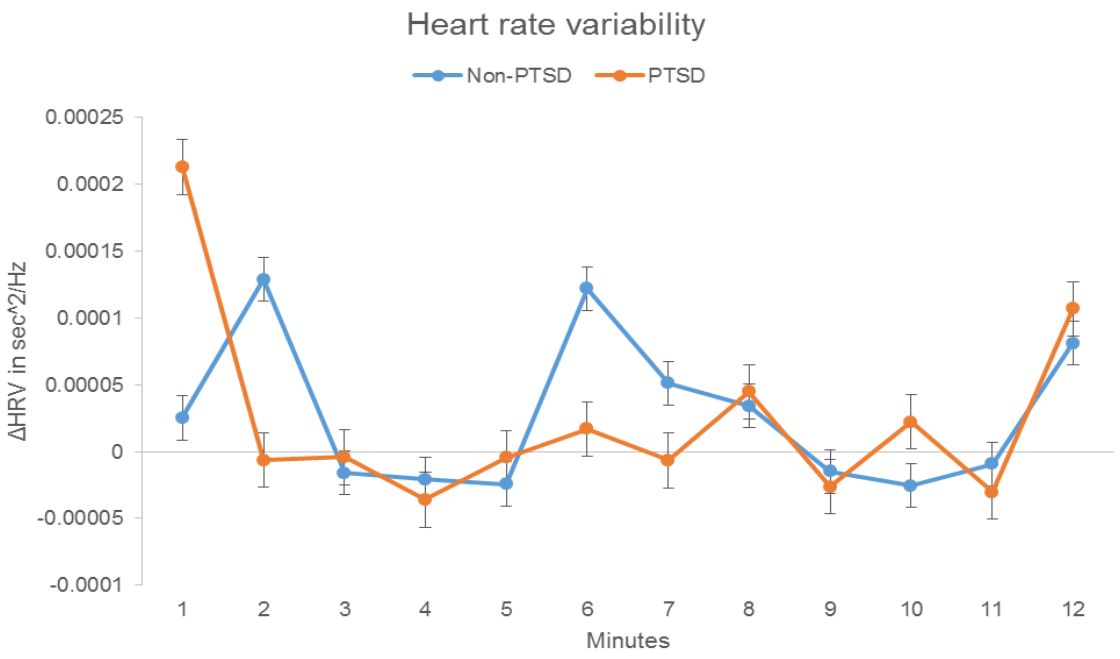

Figure 7. Mean and standard errors for heart-rate variability throughout the meditation in each group.

Summary for Hypothesis 1a

It was predicted that self-compassion can be cultivated in trauma survivors in both groups. Therefore, a significant main effect of time representing a pre-to-post increase in happiness, state self-compassion, trait self-compassion and HRV was expected. Significant main effects of time were found for happiness, state self-compassion and HRV (throughout the meditation) but not for trait self-compassion. This indicates that hypothesis 1a was partially confirmed as pre-to-post meditation increases were only found for the non-PTSD group.

Hypothesis 1b

Additionally, it was predicted that both groups would show reduced pre-to-post state self-criticism, HR and SCL.

State self-criticism.

There were two multivariate outliers so analyses were run with and without those cases. Results for the full dataset can be found below[9]. There was a significant effect of time, F (1, 52) = 13.54, p = .001, $\eta\rho^2$ = .207, suggesting individuals become less self-critical after the meditation. There was also a significant effect of group, F (1, 52) = 15.36, p < .001, $\eta\rho^2$ = .228, with those in the PTSD group reporting more self-criticism than those in the non-PTSD group (Table 3). However, there was no significant group by time interaction, F (1, 52) = 0.53, p = .470, $\eta\rho^2$ = .010, indicating that although both groups reported reduced self-criticism this was not significantly different in either group.

Heart-rate (HR).

When calculating the mean psychophysiological change over the total 12 minute meditation there were no significant effects of group for HR, t (54) = .43, p = .673, d = .12. In addition, there were no significant effects of time for pre-to-post physiological change for HR, F (1, 54) = .65, p = .423, $\eta\rho^2$ = .012. HR was also then analysed throughout the 12 minutes. Mauchly's test indicated that the assumption of sphericity had been violated, $\chi^2(65) = 185.27$, p < .001, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (ε = 0.63) indicating there was an effect of time, F (6.90, 372.83) = 4.66, p < .001, $\eta\rho^2$ = .080,

[9] There was a significant effect of time suggesting individuals become less self-critical after the meditation F (1, 54) = 10.047, p = .003, $\eta\rho^2$ = .157. There was also an effect of group with those in the PTSD group reporting more self-criticism than those in the non-PTSD F (1, 54) = 16.991, p < .001 $\eta\rho^2$ = .239. However, there was no group by time interaction F (1, 54) = 0.598, p = .443, $\eta\rho^2$ = .011.

with minutes 2, 4, 5, and 9 being significantly smaller than minutes 1, 7 and 12 (Appendix B). However, there was no significant effect of group, F (1, 54) = .20, p = .661, $\eta\rho^2$ = .004 or interaction, F (6.90, 372.83) = .988, p = .439, $\eta\rho^2$ =.018 (Figure 8).

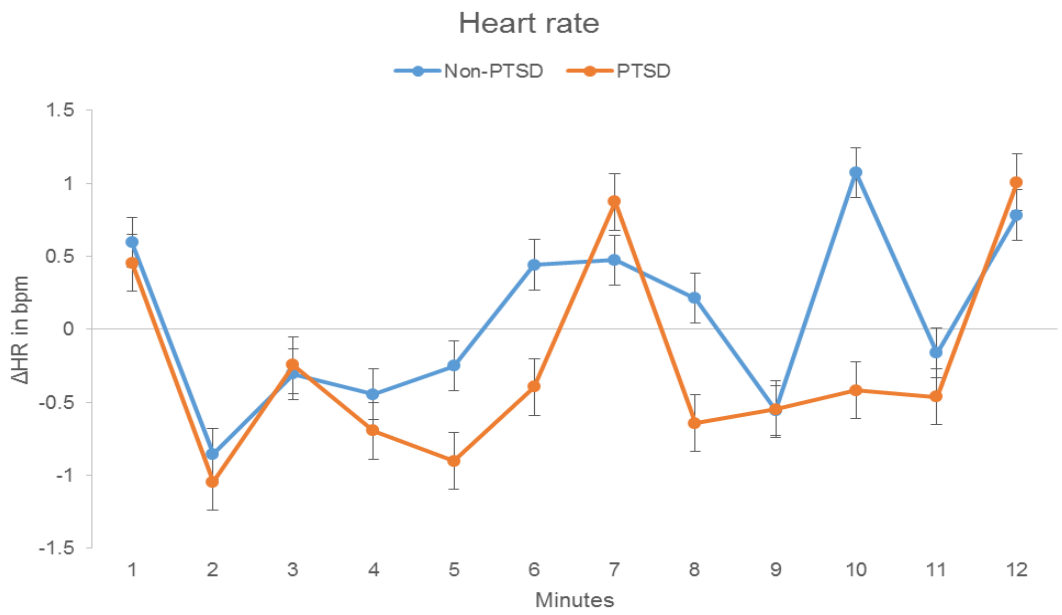

Figure 8. Mean and standard errors for heart-rate throughout the meditation in each group.

Skin conductance level (SCL).

When calculating the mean psychophysiological change over the total 12 minute meditation there were no significant effects of group, SCL, t (54) = -.80, p = .429, d = .22. There was a significant main effect of time for SCL, F (1, 54) = 23.58, p < .001, $\eta\rho^2$ = .304, indicating that during the meditation SCL significantly reduced across all participants (Table 3). There were no group or interaction effects.

SCL was then analysed throughout the 12 minute meditation. Mauchly's test indicated that the assumption of sphericity had been violated, $\chi^2(65) = 702.17$, p < .001, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (ε = 0.28) and this yielded a significant effect of time, F (3.09,

166.64) = 22.04, $p < .001$, $\eta\rho^2 = .029$, with minutes, 4, 5, 6, 9, 10 and 11 being significantly smaller than minutes 1 and 2 (Appendix A). However, there was no significant effect of group, F (1, 54) = .67, $p = .417$, $\eta\rho^2 = .012$, or interaction effect, F (3.09, 166.64) = .55, $p < .657$, $\eta\rho^2 = .010$ (Figure 9).

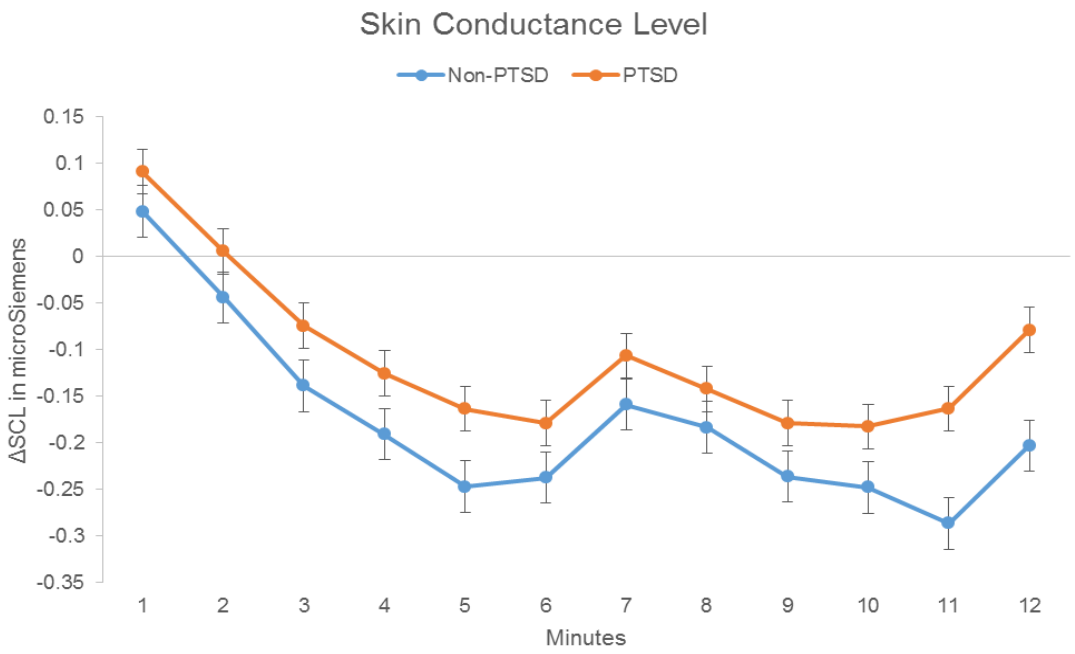

Figure 9. Means and standard errors for skin conductance level throughout the meditation in each group.

Summary for Hypothesis 1b

It was predicted that trauma survivors would show reduced pre-to-post state self-criticism, SCL and HR. Significant main effects of time were observed for self-criticism and SCL (pre-to-post and throughout the 12 minutes) and for HR (throughout the 12 minutes) indicating that hypotheses 1b was confirmed.

Table 3

State Measure Means, SDs, Group Comparisons and Effect Sizes for Parametric Tests

State measure	**PTSD Group (*n* =23)**		**Non-PTSD Group (*n*=33)**		**Within-subjects main effect of time**				**Between-subjects main effect of group (PTSD vs. Non-PTSD)**				**Group by time interaction**			
	PRE *M*(SD)	POST *M*(SD)	PRE *M*(SD)	POST *M*(SD)	Test Statistic (*F*)	*df*	*p*	ηp^2	Test Statistic (*F*)	*df*	*p*	ηp^2	Test Statistic (*F*)	*df*	*p*	ηp^2
Happy	54.43 (18.74)	55.10 (24.67)	63.58 (19.56)	75.27 (18.03)	5.13	1, 52	.028*	.090	9.00	1, 52	.004**	.148	4.08	1, 52	.049*	.073
Self-critical	63.38 (23.70)	55.14 (30.92)	38.91 (26.28)	26.61 (24.36)	13.54	1, 52	.001**	.207	15.36	1, 52	.001**	.228	0.53	1, 52	.470	.010
SCS	27.65 (7.46)	27.95 (6.75)	35.88 (10.42)	37.97 (9.94)	2.21	1, 54	.143	.039	15.39	1, 54	.001**	.222	1.23	1, 54	.273	.022
HR	72.56 (8.82)	72.82 (9.74)	71.95 (10.32)	70.72 (9.76)	.65	1, 54	.423	.012	.28	1, 54	.602	.005	1.52	1, 54	.224	.027
SCL	.58 (.22)	.39 (.19)	.56 (.17)	.34 (.21)	23.58	1, 54	<.001**	.304	1.20	1, 54	.277	.022	.09	1, 54	.762	.002

Table 4

State Measure Means, SDs, Group Comparisons and Effect Sizes for Non-Parametric Tests

State measure	**PTSD Group (*n* =23)**		**Non-PTSD Group (*n*=33)**		**Within Group Effect**			**Between-Group Effect (Pre)**				**Between-Group Effect (Post)**			
	PRE *M*(SD)	POST *M*(SD)	PRE *M*(SD)	POST *M*(SD)	Test Statistic (*Z*)	*p*	*r*	Test Statistic (*U*)	*p*	*z*	*r*	Test Statistic (*U*)	*p*	*z*	*r*
State self-compassion	48.57 (23.17)	53.00 (24.53)	65.70 (22.33)	79.94 (13.97)	-3.94	.001**	.54	203.50	.011**	-.2.54	.35	121.00	.001**	-4.00	.54
HRV[10]	1.34 (1.44)	1.85 (2.43)	1.25 (1.66)	2.01 (3.86)	-.008	.993	.001	309.50	.244	-1.17	.16	274.00	.079	-1.76	.24

Note. Higher scores indicate increased affiliation whereas lower scores indicate decreased affiliation with the item. Self-report items were rated on a percentage scale. *p<*.05.**p<.01.

[10] These values are corrected to E-04

Hypothesis 2

Hypothesis 2 predicted that non-PTSD trauma-exposed controls would show significantly greater pre-to-post changes in state and physiological measures than the PTSD group.

Interactions. Table 3 indicated that for pre-to-post measures only happiness had a significant time by group interaction indicating that only the non-PTSD but not the PTSD group scores increased significantly as a result of the meditation. However, non-parametric tests on HRV (throughout the 12 minutes) and state self-compassion are suggestive of interactive effects, also only revealing significant increases for the non-PTSD group.

Effect sizes. Table 5 shows that there were larger effects sizes for pre-to-post change within the non-PTSD group than within the PTSD group across all the variables tested in hypothesis 2. Whereas in the non-PTSD group effect sizes ranged from medium to large (with exception of HRV), effect sizes in the PTSD group were mainly small (with exception of SCL and self-criticism, which were medium).

Table 5

Within-Subject Effect Sizes for the Pre-Post Changes per Group

Measure	Non-PTSD Group	PTSD Group
Happiness	$\eta\rho^2 = .302$	$\eta\rho^2 = .023$
State self-compassion	$\eta^2 = .519$	$\eta^2 = .013$
HRV	$\eta^2 = .002$	$\eta^2 = .002$
Trait Self-compassion	$\eta\rho^2 = .109$	$\eta\rho^2 = .003$
Self-criticism	$\eta\rho^2 = .287$	$\eta\rho^2 = .074$
HR	$\eta\rho^2 = .069$	$\eta\rho^2 = .004$
SCL	$\eta\rho^2 = .363$	$\eta\rho^2 = .256$

Note. η_p^2= partial eta square as indicator of effect size where 0.0099 constitutes a small effect, 0.0588 a medium effect and 0.1379 a large effect (Cohen, 1988). Please note for consistency, effect sizes (η^2) for non-parametric tests were calculated from *z* scores. However this should be taken with some caution due to the difficulties interpreting effect sizes when using non-parametric tests.

Summary of Hypothesis 2

This hypothesis was explored by (a) testing the significance of time by group interactions and (b) determining effect sizes for the pre-to-post differences for each group. Findings indicated significant group by time interactions for HRV (throughout the 12 minutes), happiness and state self-compassion but these were only significant for the non-PTSD group. The non-PTSD group generally showed larger effect sizes for pre-to-post change in response to the meditation. Therefore, there were mixed results related to this hypothesis with some predictions being supported, thus this hypothesis was also partially confirmed.

Discussion

The aim of this study was to investigate whether self-compassion meditation acts to increase levels of self-compassion and HRV, and decrease self-criticism, SCL and HR, in a trauma-exposed sample. The study also examined whether individual differences in trait self-compassion, fear of self-compassion and trait self-criticism moderate the association between state self-compassion change, state self-criticism change and group.

This is the first study to examine the effect of exposure to meditation on psychophysiology, self-compassion and self-criticism in a trauma-exposed clinical sample. In the sample as a whole, a significant effect on time was found for happiness, state self-compassion, self-criticism, HR, HRV and SCL, consistent with previous research in non-clinical samples (Rockliff et al., 2008; Kirschner et al., 2013). This study found only state changes but not trait changes over time and baseline changes in SCL but no baseline changes in HR or HRV. Although, conceptually the distinction between state and trait is not easy and the measurement tools used make it difficult to ascertain these differences with any certainty. When investigated further, changes in state measures of happiness, self-compassion, and HRV were only significant for the non-PTSD group. State self-criticism reduced significantly across both time and group. Whereas, state self-compassion showed there was a significant interaction. This indicates that the results in this study support suggestions self-compassion and self-criticism are not necessarily on a single continuum, oscillating between the two, but are essentially distinct entities (Falconer et al., 2014).

In other words, the relationship between self-criticism and self-compassion appears to be more complex than simply self-compassion rises and self-criticism

goes down and vice versa. These findings appear to lend support to Falconer's supposition that although both concepts are closely related they appear to be distinct and therefore change independently of one another.

Although the association between PTSD and fear of compassion has not been tested before, an association between PTSD and trait self-compassion has been found (Kearney et al., 2013) and one would hypothesise those who are less fearful of compassion/ less self-critical may have higher levels of self-compassion (Gilbert et al., 2012). Additionally, as this study predicted, and has been found in previous research using student and clinical samples, higher trait self-compassion was associated with lower PTSD symptomatology (Thompson & Waltz, 2008; Kearney et al., 2013).

No significant moderation effects of trait self-compassion, self-criticism and fear of compassion on the association between having PTSD and state self-report changes were found within this sample. However, levels of all these traits explained significant levels of statistical variance over and above symptom status in the change in state self-compassion as a result of the meditation. Furthermore, unsurprisingly, levels of trait self-criticism predicted levels of change in state self-criticism.

Although the relationship should be interpreted with caution; it was hypothesised from previous research (Rockliff et al., 2008; Pole, 2009; Lutz, Greischar, Perlman & Davidson, 2009; Kok et al., 2013) that high frequency HRV is a recognised measure of parasympathetic activity, whereas SCL and HR are often associated with sympathetic arousal related to elevated levels of threat, stress and anxiety. Therefore, the reduction in sympathetic arousal this study found in both groups appears to be in keeping with previous research that self-compassion is associated with lower levels of perceived threat and physiological arousal, a state

often incongruous with PTSD (Kearney et al., 2013; Rockliff et al., 2008). These findings seem to be commensurate with theoretical understandings of self-compassion and autonomic functioning suggesting that within the non-PTSD group the meditation appears to reduce the threat response and activate the contented, safety and connectedness system as indicated by reduced sympathetic and increased parasympathetic activity (e.g., reduced HR and SCL and significant changes in HRV; Gilbert, 2010; Porges, 2001). Whereas, it appeared that for the PTSD group the meditation lowered sympathetic arousal (e.g., reduced the threat response) but did not increase parasympathetic activity (e.g., no significant changes in HRV).

There was an interesting visual effect within the psychophysiological data at minute seven, with rises in HR and SCL when the meditation script requests for the compassion to be turned toward the self. Although this effect was not statistically significant across all 12 minutes and should be interpreted with caution, due to effect sizes on some of the psychophysiological data and inability to determine causality, it may be of interest to explore further if individuals who show this increase also have higher levels of self-criticism or lower levels of self-compassion.

The sample in the current study is different from previous research in terms of education and levels of interpersonal trauma (Kirshener et al., 2013). In the paradigm used in this study the social engagement or attachment system may have been activated and as such a history of interpersonal trauma may have a specific impact as compared to perhaps an accidental/non-interpersonal trauma. Therefore, response to self-compassion meditation may be experienced differently within this sample.

Interpersonal trauma, especially at a young age, may impact on the attachment system and therefore ability of those participants with disturbed attachments to benefit from compassion-based meditation for two reasons: (1) they may not have a fully formed concept of compassion (Laithwaite et al., 2009), (2) they may have not experienced secure attachments and compassion-focused work may reactivate the attachment system revealing unprocessed emotions or difficult memories (Rockliff et al., 2011).

Some aspects particularly relevant to sexual trauma and sexual abuse are high levels of shame and self-criticism (Lee, 2009). The findings from the current study indicated that self-criticism reduced across all participants and scores were significantly different across group. However, there were no interaction effects for self-criticism and group. It would seem plausible that one may expect that high levels of shame may correlate with self-criticism and PTSD (Gilbert & Proctor, 2006). This study unfortunately did not measure shame but future research measuring shame would be interesting as rumination and negative cognitions of shame and self-blame have been associated with PTSD (Michael, Halligan, Clark & Ehlers, 2007; Gilbert & Irons, 2005).

Interestingly research investigating self-compassion and self-criticism using a virtual reality paradigm indicated that although observation of self-compassionate responses decreased self-criticism, the additional experience of embodiment, using a first-person perspective, increased felt self-compassion (Falconer et al., 2014). This experience of embodiment may suggest why the meditation was enough to reduce the threat system in both groups but was not enough to access the content, safe and connected system when individuals were symptomatic for PTSD (Gilbert, 2010; Lee, James, & Gilbert, 2013). This is especially pertinent when we consider

some in the PTSD group reported finding directing compassion toward the self challenging. One could postulate that they were finding it more demanding to gain this first-person perspective to achieve total compassion toward the self.

Falconer et al. (2014) also discuss unsurprisingly that those in the observation condition tended to have lower body ownership and agency than those in the first-person perspective. When considering experiences of trauma and how clients describe feeling ‘out of control’ this is an interesting finding and may have further implications with respect to acceptance and regaining the capacity to feel connected, physically and mentally, to one’s self again. This is especially relevant when you have dissociative symptoms or sexual abuse trauma where disconnection of these two elements may have been functional for survival. It may be that this is a stepped process and that the threat system needs to be reduced prior to further therapeutic recovery.

Fredrickson’s broaden and build paradigm was considered as a possible mechanism through which experiencing increased positive affect may reduce negative self-critical appraisals and increase ability to process the facets of the trauma memory thereby decreasing PTSD symptoms (Ehlers & Clark, 2000). Due to both groups self-criticism decreasing as a result of the meditation in the current study it may be surmised that repetition may be needed for the experience of these positive emotions to correct or ‘undo’ the after-effects of negative emotions and for those with PTSD to be able to take that first-person perspective, to self-soothe and direct compassion and kindness to themselves (Fredrickson & Losada, 2005; Falconer et al., 2014).

Limitations, Accomplishments and Future Research Recommendations

This study had some limitations which may have affected the results. Due to recruitment challenges within clinical populations, this study only achieved enough statistical power to ascertain medium to large effects sizes associated with the meditation within this sample.

A broad recruitment inclusion criterion was utilised, advertising for individuals who have experiences which fall into DSM-IV criteria but under the broad category of a 'trauma' (Joseph, Williams & Yule, 1997; APA, 1994). This heterogeneity made it difficult to ascertain whether the findings between groups and individuals were due to differences in the type of trauma they experienced. Further research focussing on one type of trauma or on emotion over or under modulation to uncover whether there are trauma-dependent differences in self-compassion or alternative reasons why trauma-exposed individuals may find cultivating self-compassion difficult would be a useful endeavour (Lanius et al., 2010).

The PCL was used to ascertain group allocation. Although this measure is as robust as it can be for self-report this could have led to misjudgement of symptoms and misallocation (Blanchard et al., 1996). Consequently, this may have resulted in some false positives and false negatives when allocating into the different groups. Clinician-rated measures may have been really helpful to elucidate symptoms and reduce allocation errors. However, due to funding and time limitations for DClinPsy research it was not possible to conduct the CAPS (Blake et al., 1995).

To conclude, for the reasons stated above there are limitations to using self-report within clinical populations who have varying understandings of self-compassion. For this reason other approaches to measure these concepts more accurately, such as those suggested above, may be lucrative to finding more

effective treatments for those suffering mental health difficulties. This study not only used self-report and physiological data but also corroborated the patterns expected based on theoretical understandings of self-compassion and physiological activity (Gilbert, 2010; Porges, 2001).

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Expanded Appendices

Appendices

This section includes information supplementing the main manuscript. Information not included in the main manuscript is provided here.

Appendix A: Supplementary Results Section.

This section includes information supplementing the results section of the main manuscript. Information not included in the main manuscript is provided here.

Appendix A1. Exploratory Hypothesis 3

3. **Do trait self-compassion, self-criticism, fear of self-compassion moderate the association between group and change in state self-compassion and self-criticism?**

Negative cognitions, higher levels of rumination and self-compassion have been associated with PTSD (Karl et al., 2009; Gilbert, 2009; Thompson & Waltz, 2008; Kearney et al., 2013). Kearney et al. (2013) demonstrated changes in self-compassion mediated the reduction in PTSD symptoms. Kirschner et al. (2013) showed that increased self-criticism moderated effects of self-compassion meditation in healthy controls. Gilbert et al. (2012) provide evidence that levels of self-criticism are highly positively correlated with fear of compassion. Therefore, it was hypothesised that trait self-compassion, trait self-criticism, fear of self-compassion may moderate the association between group and change in state self-compassion and state self-criticism.

Hypothesis 3

Hypothesis 3 predicted that individual differences in trait self-compassion, trait self-criticism and fear of compassion would moderate the association between state self-compassion and self-criticism change and group.

Moderation Analyses

Prerequisites for regression analyses, such as normality of residuals, and multicollinearity were checked. Residualised gain scores, as validated index of pre-post change which controls for variance in initial pre-scores, were calculated as the difference between the actual post-meditation score and the expected post-meditation score (calculated by a regression of post-score on pre-score; Hoffmann, 2004; Speckens, Ehlers, Hackmann & Clark, 2006, Steketee & Chambless, 1992).

After centring trait self-compassion, fear of compassion, self-criticism and computing the interaction terms between group and respective moderators (Aiken & West, 1991), two predictors and the interaction were entered into a hierarchical regression model with two steps for all three moderators in turn.

State self-compassion change as outcome.

Significant zero-order correlations were revealed between state self-compassion change and group, trait self-compassion, trait self-criticism and fear of compassion (Table 7). Three separate regression models were tested with group, moderators (levels of trait self-compassion, trait self-criticism and fear of self-compassion, respectively) and a group by moderator interaction term predicting state self-compassion change. All models emerged as significant at Step 1 (main effect of predictor and moderator) but no significant increase in explained variance at Step 2 after adding the interaction term was observed.

Testing trait self-compassion as moderator. Results indicated that both being in the PTSD group (β = -.43, p < .01) and having lower levels of trait self-compassion (β = -.35, p =.01) were significantly, independently associated with change in state self-compassion but the interaction term was not significantly associated with change in self-compassion.

Testing trait self-criticism as moderator. Similarly, both being in the PTSD group (β = -.51, p <.01) and reporting higher levels of trait self-criticism (β = .45, p <.01) were significantly associated with change in state self-compassion but the interaction term was not significantly associated with change in self-compassion.

Testing fear of compassion to self as moderator. Finally, change in state self-compassion was significantly associated with being in the PTSD group (β = -.65, p <.01) and with higher levels of fear of compassion to self (β = .56, p <.01) but

again, the interaction term was not significantly associated with change in self-compassion.

Table of Zero-Order Correlations

	Δ State Self-Compassion (RGS)			**Δ State Self-Criticism (RGS)**		
Independent/Moderator Variables	**Trait self-compassion**	**Trait self criticism**	**FOC for self**	**Trait self-compassion**	**Trait self criticism**	**FOC for self**
Group	-.291*	-.291 *	-.291*	.043	.043	.043
Trait-compassion	-.178	-	-	.115	-	-
Trait self-criticism	-	.197	-	-	-.273*	-
FOC for self	-	-	.155	-	-	-.118
Trait Self compassion x Group	-.099	-	-	.183	-	-
Trait self-criticism x Group	-	.115	-	-	-.175	-
FOC for self x Group	-	-	.035	-	-	-.122

Note. *p <.05.

State self-criticism change as outcome.

One significant zero-order correlation revealed a significant association between state self-criticism change and levels of trait self-criticism (Table 7). One significant regression model emerged indicating levels of state self-criticism change were significantly predicted by levels of trait self-criticism (Appendix B).

Testing trait self-compassion as moderator. Results indicated no significant associations or interaction.

Testing trait self-criticism as moderator. Results indicated that reporting lower levels of trait self-criticism (β = -.39, p = .012) were significantly associated with greater change in state self-criticism but the interaction term was not significantly associated with change in self-criticism.

Testing fear of compassion to self as moderator. Results indicated no significant associations or interaction.

Summary of Hypothesis 3

The moderation analyses indicated there were no moderation effects. Four significant regression models emerged, indicating levels in state self-compassion change were influenced by levels of state self-compassion, state self-criticism and fear of self-compassion. In addition, state self-criticism change was influenced by levels of state self-criticism. Therefore, the hypothesis was partially confirmed (refer moderation tables).

Appendix A2. Moderation Tables

Linear Regression Models Examining the Moderating Influence on State Self-Compassion Change in Response to Meditation

	Δ State Self-Compassion (RGS)								
Independent/ moderator variables	Trait self-compassion as moderator			Trait self-criticism as moderator			Fear of compassion as moderator		
	β	*t*	*p*	β	*t*	*p*	β	*t*	*p*
Group	-.43	-3.20	.002**	-.51	-3.70	.001**	-.65	-4.29	.001**
Trait Self compassion	-.35	-2.61	.012**	-	-	-	-	-	-
Trait Self-criticism	-	-	-	.45	3.24	.002**	-	-	-
Trait FOC to self	-	-	-	-	-	-	.56	3.74	.001**
Group x Trait self compassion	-.14	-.89	.38	-	-	-	-	-	-
Group x Trait Self-criticism	-	-	-	-.16	-.74	.461	-	-	-
Group x FOC to self	-	-	-	-	-	-	-.18	-.90	.374
R^2 (step 1)		.19			.24			.28	
R^2 (step 2)		.20			.24			.29	
F (df; Step 1)		6.17 (2, 53)			8.18 (2, 53)			10.06 (2, 53)	
F (df; Step 2)		4.36 (3, 52)			5.59 (3, 52)			6.95 (3, 52)	
P (step 1)		.004**			.001**			.001**	
P (step 2)		.008**			.002**			.001**	
ES (F^2; step 1)		.23			.31			.39	
ES (F^2; step 2)		.25			.31			.41	

Note. *N* = 56; ES = effect size, * = *p* <.05, ** = *p* <.01,

Linear Regression Models Examining the Moderating Influence on State Self-Criticism Change in Response to Meditation

	Δ State Self-Criticism (RGS)								
Independent/ moderator variables	Trait self-compassion as moderator			Trait self-criticism as moderator			Fear of compassion as moderator		
	β	*t*	*p*	β	*t*	*p*	β	*t*	*p*
Group	.11	.72	.476	.23	1.57	.122	.20	1.12	.266
Trait Self compassion	.16	1.07	.291	-	-	-	-	-	-
Trait Self-criticism	-	-	-	-.39	-2.61	.012**	-	-	-
Trait FOC to self	-	-	-	-	-	-	-.24	-1.39	.170
Group x Trait self compassion	.23	1.32	.192	-	-	-	-	-	-
Group x Trait Self-criticism	-	-	-	.16	.69	.492	-	-	-
Group x FOC to self	-	-	-	-	-	-	-.10	-.44	-.661
R^2 (step 1)		.02			.12			.04	
R^2 (step 2)		.06			.12			.04	
F (df; Step 1)		.62 (2, 53)			3.47(2, 53)			1.02(2, 53)	
F (df; Step 2)		1.00 (3, 52)			2.45 (3, 52)			.73(3, 52)	
P (step 1)		.542			.038*			.369	
P (step 2)		.400			.074			.537	
ES (F^2; step 1)		.02			.14			.04	
ES (F^2; step 2)		.06			.14			.04	

Note. N = 56; ES = effect size, * = *p* <.05, ** = *p* <.01

Appendix A3. Table of Wilcoxon Tests for HRV

Wilcoxon tests across the 12 Minutes of the Meditation for HRV

Time	Min1		Min2		Min3		Min4		Min5		Min6		Min7		Min8		Min9		Min10		Min11		Min 12	
	Z	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*
Min1	-	-	-1.51	.131	-3.43	.001**Ş	-2.09	.037*	-2.69	.007**	-1.35	.176	-.87	.383	-.17	.864	-.69	.488	-1.19	.230	-.43	.666	-2.42	.015*
ES (*r*)	-	-	-.20		-.46		-.28		-.36		-.18		-.12		-.02		-.09		-.16		-.06		-.32	
Min2	-1.51	.131	-	-	-2.19	.029	-0.94	.348	-1.22	.221	-0.51	.613	-0.06	.954	-0.31	.757	-0.50	.619	-0.68	.498	-0.08	.935	-2.42	.015*
ES (*r*)	-.20		-	-	-.29		-.12		-.16		-.07		.01		-.04		-.07		-.09		-.01		-.32	
Min3	-3.43	.001**Ş	-2.19	.029	-	-	-1.81	.07	-1.22	.221	-1.99	.047*	-2.49	.013*	-1.85	.064	-1.88	.06	-1.28	.20	-2.80	.005**	-2.42	.015*
ES (*r*)	-.46		-.29		-	-	-.24		-.16		-.26		-.33		-.25		-.25		-.17		-.37		-.32	
Min4	-2.09	.037	-0.94	.348	-1.81	.07	-	-	-0.34	.732	-0.87	.387	-1.29	.195	-1.24	.215	-0.44	.66	-0.63	.53	-1.21	.227	-2.42	.015*
ES (*r*)	-.28		-.13		-.24		-	-	-.05		-.12		-.17		-.17		-.06		-.08		-.16		-.32	
Min5	-2.69	.007**	-1.22	.221	-1.22	.221	-0.34	.732	-	-	-0.81	.415	-1.44	.151	-1.88	.06	-1.79	.074	-1.44	.15	-1.75	.079	-2.42	.015*
ES (*r*)	-.36		-.16		-.16		-.05		-	-	-.11		-.19		-.25		-.24		-.19		-.23		-.32	
Min6	-1.35	.176	-0.51	.613	-2.00	.047*	-0.87	.387	-0.82	.415	-	-	-0.15	.883	-0.46	.648	-0.29	.775	-0.55	.585	-1.40	.161	-2.42	.015*
ES (*r*)	-.18		-.07		-.27		-.12		-.11		-	-	-.02		-.06		-.04		-.07		-.19		-.32	
Min7	-0.87	.383	-0.06	.954	-2.49	.013*	-1.30	.195	-1.44	.151	-0.15	.883	-	-	-0.33	.744	-0.64	.525	-0.78	.434	-0.36	.72	-2.42	.015*
ES (*r*)	-.12		-.01		-.33		-.17		-.19		-.02		-	-	-.04		-.09		-.10		-.05		-.32	
Min8	-0.17	.864	-0.31	.757	-1.85	.064	-1.24	.215	-1.88	.06	-0.46	.648	-0.33	.744	-	-	-0.11	.909	-0.14	.89	-0.27	.788	-2.42	.015*
ES (*r*)	-.02		-.04		-.25		-.17		-.25		-.06		-.04		-	-	-.01		-.02		-.03		-.32	
Min9	-0.69	.488	-0.50	.619	-1.88	.06	-0.44	.66	-1.79	.074	-0.29	.775	-0.64	.525	-0.11	.909	-	-	-0.12	.903	-0.27	.788	-2.42	.015*
ES (*r*)	-.09		-.07		-.25		-.06		-.24		-.04		-.09		-.01		-	-	-.02		-.04		-.32	
Min10	-1.20	.23	-0.68	.498	-1.28	.20	-0.63	.53	-1.44	.15	-0.55	.585	-0.78	.434	-.14	.89	-0.12	.903	-	-	-1.02	.308	-2.42	.015*
ES (*r*)	-.16		-.09		-.17		-.08		-.19		-.07		-.10		-.02		-.02		-	-	-.14		-.32	
Min11	-0.43	.666	-0.08	.935	-2.80	.005**	-1.21	.227	-1.75	.079	-1.40	.161	-0.36	.72	-0.27	.788	-0.27	.788	-1.02	.308	-	-	-2.42	.015*
ES (*r*)	-.06		-.01		-.37		-.16		-.23		-.18		-.05		-.04		-.04		-.14		-	-	-.32	
Min12	-0.82	.415	-1.88	.06	-3.57	<.001**Ş	-3.28	.001**Ş	-3.24	.001**Ş	-2.64	.008**	-1.86	.063	-2.23	.026*	-1.80	.073	-2.15	.031*	-0.64	.525	-	-
ES (*r*)	-.11		-.25		-.48		-.44		-.43		-.35		-.25		-.30		-.24		-.29		-.09		-	-

Note. *= $p<.05$, ** = $p<.01$, Ş = significant at $p = .05$ level after correction for multiple comparisons, ES (*r*) = effect size.

Wilcoxon tests across the 12 Minutes of the Meditation for HRV in the non-PTSD Group

Time	**Min1**		**Min2**		**Min3**		**Min4**		**Min5**		**Min6**		**Min7**		**Min8**		**Min9**		**Min10**		**Min11**		**Min 12**	
	Z	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*	*Z*	*p*
Min1	-	-	-.99	.321	-2.30	.022	-1.60	.110	-1.94	.053*	-1.03	.304	-.56	.574	-.26	.796	-.19	.851	-1.56	.118	-.38	.701	-1.85	.064
ES (*r*)	-	-	-.17		-.40		-.28		-.34		-.18		-.10		-.05		-.03		-.27		-.07		-.32	
Min2	-.99	.321	-	-	-1.46	.145	-.35	.728	-1.40	.161	-.83	.406	-.12	.908	-.22	.823	-.37	.714	-.88	.376	-.060	.950	-1.85	.064
ES (*r*)	-.17		-	-	-.25		-.06		-.24		-.14		-.02		-.04		-.06		-.15		-.01		-.32	
Min3	-2.30	.022*	-1.46	.145	-	-	-1.94	.053*	-.65	.512	-.58	.561	-2.01	.044*	-1.22	.221	-1.89	.059*	-.63	.526	-2.49	.013*	-1.85	.064
ES (*r*)	-.40		-.25		-	-	-.34		-.11		-.10		-.35		-.21		-.33		-.11		-.43		-.32	
Min4	-1.60	.110	-.35	.728	-1.93	.053*	-	-	-.83	.406	-.06	.950	-.78	.437	-1.19	.235	-.38	.701	-.01	.993	-.63	.526	-1.85	.064
ES (*r*)	-.27		-.06		-.34		-	-	-.14		-.01		-.14		-.21		-.07		-.002		-.11		-.32	
Min5	-1.94	.053*	-1.40	.161	-.65	.514	-.83	.406	-	-	-.37	.714	-.53	.598	-1.64	.102	-1.51	.131	-.40	.694	-.96	.339	-1.85	.064
ES (*r*)	-.34		-.24		-.11		-.14		-	-	-.06		-.09		-.29		-.26		-.07		-.17		-.32	
Min6	-1.03	.304	-.83	.406	-.58	.561	-.06	.950	-.37	.714	-	-	-.15	.879	-.51	.611	-.99	.321	-.37	.714	-1.74	.081	-1.85	.064
ES (*r*)	-.18		-.14		-.10		-.01		-.06		-	-	-.03		-.09		-.17		-.06		-.30		-.32	
Min7	-.56	.574	-.12	.908	-2.01	.044*	-.78	.437	-.53	.598	-.15	.879	-	-	-.12	.908	-.38	.701	-.78	.437	-1.01	.313	-1.85	.064
ES (*r*)	-.10		-.02		-.35		-.14		-.09		-.03		-	-	-.02		-.07		-.14		-.18		-.32	
Min8	-.26	.796	-.22	.823	-1.22	.221	-1.19	.235	-1.64	.102	-.51	.611	-.12	.908	-	-	-.13	.893	-.55	.586	-.38	.701	-1.85	.064
ES (*r*)	-.05		-.04		-.21		-.21		-.29		-.09		-.02		-	-	-.02		-.10		-.07		-.32	
Min9	-.19	.851	-.37	.714	-1.89	.059*	-.38	.701	-1.51	.131	-.99	.321	-.38	.701	-.13	.893	-	-	-.53	.598	-.33	.741	-1.85	.064
ES (*r*)	-.03		-.06		-.33		-.07		-.26		-.17		-.07		-.02		-	-	-.09		-.06		-.32	
Min10	-1.56	.118	-.88	.376	-.63	.526	-.01	.993	-.39	.694	-.37	.714	-.78	.437	-.55	.586	-.53	.598	-	-	-1.51	.131	-1.85	.064
ES (*r*)	-.27		-.15		-.11		-.002		-.07		-.06		-.14		-.10		-.09		-	-	-.26		-.32	
Min11	-.38	.701	-.06	.950	-2.49	.013**	-.63	.526	-.96	.339	-1.74	.081	-1.01	.313	-.38	.701	-.33	.741	-1.51	.131	-	-	-1.85	.064
ES (*r*)	-.07		-.01		-.43		-.11		-.17		-.30		-.18		-.07		-.06		-.26		-	-	-.32	
Min12	-.63	.526	-1.06	.288	-2.69	.007**	-2.48	.013**	-2.60	.009**	-2.67	.008**	-1.72	.085	-2.05	.041*	-1.08	.280	-1.80	.073	-.47	.636	-	-
ES (*r*)	-.11		-.18		-.47		-.43		-.45		-.46		-.30		-.36		-.19		-.31		-.08		-	-

Note. *= *p*<.05, ** = *p*<.01, Ș = significant at *p* = .05 level after correction for multiple comparisons, ES (*r*) = effect size.

Wilcoxon tests across the 12 Minutes of the Meditation for HRV in the PTSD Group

Time	**Min1**		**Min2**		**Min3**		**Min4**		**Min5**		**Min6**		**Min7**		**Min8**		**Min9**		**Min10**		**Min11**		**Min 12**	
	Z	*p*	Z	*p*	Z	*p*	Z	*p*	Z	*p*	Z	*p*	Z	*p*	Z	*p*	Z	*p*	Z	*p*	Z	*p*	Z	*p*
Min1	-	-	-1.16	.248	-2.65	.008**	-1.43	.153	-1.95	.052*	-1.03	.301	-.70	.484	-.06	.951	-.97	.330	-.09	.927	-.12	.903	-1.43	.153
ES (*r*)	-	-	-.24		-.55		-.30		-.41		-.21		-.15		-.01		-.20		-.02		-.03		-.30	
Min2	-1.16	.248	-	-	-1.61	.107	-1.00	.316	-.46	.648	-.15	.879	-.09	.927	-.18	.855	-1.16	.248	-.09	.927	-.15	.879	-1.43	.153
ES (*r*)	-24		-	-	-.33		-.21		-.10		-.03		-.02		-.04		-.24		-.02		-.03		-.30	
Min3	-2.65	.008**	-1.61	.107	-	-	-.58	.563	-.82	.412	-2.16	.031*	-1.49	.136	-1.46	.144	-.67	.503	-1.16	.248	-1.46	.144	-1.43	.153
ES (*r*)	-.55		-.34		-	-	-.12		-.17		-.45		-.31		-.30		-.14		-.24		-.30		-.30	
Min4	-1.43	.153	-1.00	.316	-.58	.563	-	-	-.40	.693	-1.37	.171	-1.13	.260	-.58	.563	-.06	.951	-.97	.330	-1.10	.274	-1.43	.153
ES (*r*)	-.30		-.21		-.12		-	-	-.08		-.29		-.24		-12		-.01		-.20		-.23		-.30	
Min5	-1.95	.052*	-.46	.648	-.82	.412	-.40	.693	-	-	-.82	.412	-1.34	.181	-1.03	.301	-.97	.330	-1.64	.101	-1.61	.107	-1.43	.153
ES (*r*)	-.41		-.10		-.17		-.08		-	-	-.17		-.28		-.21		-.20		-.34		-.34		-.30	
Min6	-1.03	.301	-.15	.879	-2.16	.031*	-1.37	.171	-.82	.412	-	-	-.15	.879	-.40	.693	-.61	.543	-.18	.855	-.21	.831	-1.43	.153
ES (*r*)	-.21		-.03		-.45		-.29		-.17		-	-	-.03		-.08		-.13		-.04		-.04		-.30	
Min7	-.70	.484	-.09	.927	-1.49	.136	-1.13	.260	-1.34	.181	-.15	.879	-	-	-.40	.693	-1.13	.260	-.37	.715	-.64	.523	-1.43	.153
ES (*r*)	-.15		-.02		-.31		-.24		-.28		-.03		-	-	-.08		-.24		-.08		-.13		-.30	
Min8	-.06	.951	-.18	.855	-1.46	.144	-.58	.563	-1.03	.301	-.40	.693	-.40	.693	-	-	-.03	.976	-.15	.879	-.03	.976	-1.43	.153
ES (*r*)	-.01		-.04		-.30		-.12		-.21		-.08		-.08		-	-	-.01		-.03		-.01		-.30	
Min9	-.97	.330	-1.56	.248	-.67	.503	-.06	.951	-.97	.330	-.61	.543	-1.13	.260	-.03	.976	-	-	-.30	.761	-.61	.543	-1.43	.153
ES (*r*)	-.20		-.33		-.14		-.01		-.20		-.13		-.24		-.001		-	-	-.06		-.13		-.30	
Min10	-.09	.927	-.09	.927	-1.16	.248	-.97	.330	-1.64	.101	-.18	.855	-.37	.715	-.15	.879	-.30	.761	-	-	-.18	.855	-1.43	.153
ES (*r*)	-.02		-.02		-.24		-.20		-.34		-.04		-.08		-.03		-.06		-	-	-.04		-.30	
Min11	-.12	.903	-.15	.879	-1.46	.144	-1.10	.274	-1.61	.107	-.21	.831	-.64	.523	-.03	.976	-.61	.543	-.18	.855	-	-	-1.43	.153
ES (*r*)	-.03		-.03		-.30		-.23		-.34		-.04		-.13		-.01		-.13		-.04		-	-	-.30	
Min12	-.52	.605	-1.55	.121	-2.40	.016*	-2.19	.029*	-1.95	.052*	-1.00	.346	-.94	.346	-1.13	.260	-1.52	.128	-1.19	.236	-.30	.761	-	-
ES (*r*)	-.11		-.32		-.50		-.46		-.41		-.21		-.20		-.24		-.32		-.25		-.06		-	-

Note. *= *p*<.05, ** = *p*<.01, Ș = significant at *p* = .05 level after correction for multiple comparisons, ES (*r*) = effect size.

Appendix A4. Pairwise Comparisons for each minute of the HR data

Pairwise Comparisons (HR)						
(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	1.476*	.363	.010	.179	2.773
	3	.801	.408	1.000	-.654	2.257
	4	1.095	.461	1.000	-.549	2.740
	5	1.101	.494	1.000	-.661	2.864
	6	.468	.413	1.000	-1.006	1.941
	7	-.148	.401	1.000	-1.581	1.285
	8	.739	.456	1.000	-.890	2.368
	9	1.077	.496	1.000	-.695	2.850
	10	.197	.505	1.000	-1.608	2.001
	11	.837	.472	1.000	-.850	2.524
	12	-.371	.488	1.000	-2.115	1.373
2	1	-1.476*	.363	.010	-2.773	-.179
	3	-.675*	.184	.038	-1.333	-.017
	4	-.381	.298	1.000	-1.446	.684
	5	-.375	.278	1.000	-1.366	.617
	6	-1.008*	.275	.038	-1.992	-.025
	7	-1.624*	.323	.000	-2.777	-.471
	8	-.737	.340	1.000	-1.951	.478
	9	-.399	.351	1.000	-1.653	.855
	10	-1.279	.374	.078	-2.614	.055
	11	-.639	.400	1.000	-2.067	.789
	12	-1.847*	.458	.012	-3.483	-.211
3	1	-.801	.408	1.000	-2.257	.654
	2	.675*	.184	.038	.017	1.333
	4	.294	.235	1.000	-.546	1.134
	5	.300	.242	1.000	-.565	1.165
	6	-.334	.275	1.000	-1.317	.650
	7	-.949	.313	.247	-2.068	.169
	8	-.062	.314	1.000	-1.184	1.060
	9	.276	.342	1.000	-.946	1.498
	10	-.605	.359	1.000	-1.887	.677
	11	.036	.415	1.000	-1.446	1.517
	12	-1.172	.441	.682	-2.747	.403
4	1	-1.095	.461	1.000	-2.740	.549
	2	.381	.298	1.000	-.684	1.446
	3	-.294	.235	1.000	-1.134	.546
	5	.006	.242	1.000	-.857	.869
	6	-.627	.303	1.000	-1.708	.453

	7	-1.243*	.343	.042	-2.466	-.020
	8	-.356	.341	1.000	-1.575	.863
	9	-.018	.358	1.000	-1.298	1.262
	10	-.899	.385	1.000	-2.272	.475
	11	-.258	.390	1.000	-1.652	1.136
	12	-1.466	.450	.129	-3.074	.142
5	1	-1.101	.494	1.000	-2.864	.661
	2	.375	.278	1.000	-.617	1.366
	3	-.300	.242	1.000	-1.165	.565
	4	-.006	.242	1.000	-.869	.857
	6	-.634	.289	1.000	-1.666	.399
	7	-1.249*	.291	.005	-2.288	-.210
	8	-.362	.321	1.000	-1.510	.786
	9	-.024	.308	1.000	-1.125	1.077
	10	-.905	.322	.458	-2.055	.246
	11	-.264	.422	1.000	-1.771	1.243
	12	-1.472	.480	.221	-3.185	.241
6	1	-.468	.413	1.000	-1.941	1.006
	2	1.008*	.275	.038	.025	1.992
	3	.334	.275	1.000	-.650	1.317
	4	.627	.303	1.000	-.453	1.708
	5	.634	.289	1.000	-.399	1.666
	7	-.616	.282	1.000	-1.623	.392
	8	.272	.301	1.000	-.804	1.347
	9	.609	.311	1.000	-.500	1.719
	10	-.271	.396	1.000	-1.685	1.143
	11	.369	.392	1.000	-1.032	1.771
	12	-.838	.432	1.000	-2.381	.705
7	1	.148	.401	1.000	-1.285	1.581
	2	1.624*	.323	.000	.471	2.777
	3	.949	.313	.247	-.169	2.068
	4	1.243*	.343	.042	.020	2.466
	5	1.249*	.291	.005	.210	2.288
	6	.616	.282	1.000	-.392	1.623
	8	.887	.303	.329	-.195	1.969
	9	1.225*	.332	.034	.041	2.409
	10	.345	.356	1.000	-.928	1.617
	11	.985	.395	1.000	-.426	2.396
	12	-.223	.489	1.000	-1.970	1.525
8	1	-.739	.456	1.000	-2.368	.890
	2	.737	.340	1.000	-.478	1.951
	3	.062	.314	1.000	-1.060	1.184
	4	.356	.341	1.000	-.863	1.575

	5	.362	.321	1.000	-.786	1.510
	6	-.272	.301	1.000	-1.347	.804
	7	-.887	.303	.329	-1.969	.195
	9	.338	.301	1.000	-.736	1.412
	10	-.543	.353	1.000	-1.805	.719
	11	.098	.344	1.000	-1.130	1.326
	12	-1.110	.478	1.000	-2.819	.598
9	1	-1.077	.496	1.000	-2.850	.695
	2	.399	.351	1.000	-.855	1.653
	3	-.276	.342	1.000	-1.498	.946
	4	.018	.358	1.000	-1.262	1.298
	5	.024	.308	1.000	-1.077	1.125
	6	-.609	.311	1.000	-1.719	.500
	7	-1.225*	.332	.034	-2.409	-.041
	8	-.338	.301	1.000	-1.412	.736
	10	-.881	.375	1.000	-2.221	.460
	11	-.240	.356	1.000	-1.512	1.032
	12	-1.448	.481	.263	-3.167	.271
10	1	-.197	.505	1.000	-2.001	1.608
	2	1.279	.374	.078	-.055	2.614
	3	.605	.359	1.000	-.677	1.887
	4	.899	.385	1.000	-.475	2.272
	5	.905	.322	.458	-.246	2.055
	6	.271	.396	1.000	-1.143	1.685
	7	-.345	.356	1.000	-1.617	.928
	8	.543	.353	1.000	-.719	1.805
	9	.881	.375	1.000	-.460	2.221
	11	.640	.412	1.000	-.829	2.110
	12	-.567	.445	1.000	-2.155	1.021
11	1	-.837	.472	1.000	-2.524	.850
	2	.639	.400	1.000	-.789	2.067
	3	-.036	.415	1.000	-1.517	1.446
	4	.258	.390	1.000	-1.136	1.652
	5	.264	.422	1.000	-1.243	1.771
	6	-.369	.392	1.000	-1.771	1.032
	7	-.985	.395	1.000	-2.396	.426
	8	-.098	.344	1.000	-1.326	1.130
	9	.240	.356	1.000	-1.032	1.512
	10	-.640	.412	1.000	-2.110	.829
	12	-1.208	.439	.530	-2.774	.359
12	1	.371	.488	1.000	-1.373	2.115
	2	1.847*	.458	.012	.211	3.483
	3	1.172	.441	.682	-.403	2.747

4	1.466	.450	.129	-.142	3.074
5	1.472	.480	.221	-.241	3.185
6	.838	.432	1.000	-.705	2.381
7	.223	.489	1.000	-1.525	1.970
8	1.110	.478	1.000	-.598	2.819
9	1.448	.481	.263	-.271	3.167
10	.567	.445	1.000	-1.021	2.155
11	1.208	.439	.530	-.359	2.774

Based on estimated marginal means*. The mean difference is significant at the .05 level, b. Adjustment for multiple comparisons: Bonferroni..

Appendix A5. Pairwise Comparisons for each minute of the SCL data

Pairwise Comparisons (SCL)						
(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	.089*	.011	.000	.049	.129
	3	.176*	.017	.000	.116	.237
	4	.228*	.022	.000	.151	.306
	5	.275*	.024	.000	.190	.361
	6	.278*	.030	.000	.172	.384
	7	.203*	.034	.000	.079	.326
	8	.233*	.036	.000	.103	.362
	9	.277*	.035	.000	.153	.402
	10	.285*	.037	.000	.154	.416
	11	.295*	.038	.000	.160	.429
	12	.211*	.041	.000	.065	.357
2	1	-.089*	.011	.000	-.129	-.049
	3	.087*	.009	.000	.057	.118
	4	.139*	.013	.000	.092	.187
	5	.186*	.017	.000	.127	.245
	6	.189*	.024	.000	.105	.273
	7	.114*	.029	.019	.009	.218
	8	.144*	.031	.001	.033	.255
	9	.188*	.029	.000	.085	.292
	10	.196*	.032	.000	.083	.309
	11	.206*	.034	.000	.084	.328
	12	.122	.039	.180	-.017	.261
3	1	-.176*	.017	.000	-.237	-.116
	2	-.087*	.009	.000	-.118	-.057
	4	.052*	.009	.000	.020	.083
	5	.099*	.013	.000	.051	.147
	6	.102*	.021	.001	.028	.175
	7	.026	.027	1.000	-.072	.124
	8	.056	.029	1.000	-.047	.160
	9	.101*	.027	.028	.005	.197
	10	.109*	.030	.038	.003	.215
	11	.118*	.033	.043	.001	.235
	12	.035	.038	1.000	-.100	.170
4	1	-.228*	.022	.000	-.306	-.151
	2	-.139*	.013	.000	-.187	-.092
	3	-.052*	.009	.000	-.083	-.020
	5	.047*	.008	.000	.018	.076
	6	.050	.016	.206	-.008	.108

	7	-.026	.025	1.000	-.116	.065
	8	.005	.027	1.000	-.090	.099
	9	.049	.025	1.000	-.039	.138
	10	.057	.028	1.000	-.044	.158
	11	.067	.032	1.000	-.046	.180
	12	-.017	.036	1.000	-.147	.113
5	1	-.275*	.024	.000	-.361	-.190
	2	-.186*	.017	.000	-.245	-.127
	3	-.099*	.013	.000	-.147	-.051
	4	-.047*	.008	.000	-.076	-.018
	6	.003	.011	1.000	-.035	.041
	7	-.073	.023	.205	-.156	.011
	8	-.042	.025	1.000	-.131	.047
	9	.002	.023	1.000	-.080	.085
	10	.010	.027	1.000	-.086	.106
	11	.020	.031	1.000	-.090	.129
	12	-.064	.035	1.000	-.190	.062
6	1	-.278*	.030	.000	-.384	-.172
	2	-.189*	.024	.000	-.273	-.105
	3	-.102*	.021	.001	-.175	-.028
	4	-.050	.016	.206	-.108	.008
	5	-.003	.011	1.000	-.041	.035
	7	-.075*	.019	.017	-.144	-.006
	8	-.045	.022	1.000	-.124	.033
	9	-.001	.021	1.000	-.076	.074
	10	.007	.026	1.000	-.086	.100
	11	.017	.032	1.000	-.098	.131
	12	-.067	.035	1.000	-.192	.058
7	1	-.203*	.034	.000	-.326	-.079
	2	-.114*	.029	.019	-.218	-.009
	3	-.026	.027	1.000	-.124	.072
	4	.026	.025	1.000	-.065	.116
	5	.073	.023	.205	-.011	.156
	6	.075*	.019	.017	.006	.144
	8	.030	.013	1.000	-.017	.078
	9	.075*	.018	.006	.011	.138
	10	.082	.024	.067	-.002	.167
	11	.092	.030	.198	-.014	.198
	12	.008	.033	1.000	-.109	.126
8	1	-.233*	.036	.000	-.362	-.103
	2	-.144*	.031	.001	-.255	-.033
	3	-.056	.029	1.000	-.160	.047
	4	-.005	.027	1.000	-.099	.090

	5	.042	.025	1.000	-.047	.131
	6	.045	.022	1.000	-.033	.124
	7	-.030	.013	1.000	-.078	.017
	9	.045*	.011	.008	.006	.083
	10	.052	.022	1.000	-.025	.130
	11	.062	.028	1.000	-.039	.163
	12	-.022	.033	1.000	-.141	.097
9	1	-.277*	.035	.000	-.402	-.153
	2	-.188*	.029	.000	-.292	-.085
	3	-.101*	.027	.028	-.197	-.005
	4	-.049	.025	1.000	-.138	.039
	5	-.002	.023	1.000	-.085	.080
	6	.001	.021	1.000	-.074	.076
	7	-.075*	.018	.006	-.138	-.011
	8	-.045*	.011	.008	-.083	-.006
	10	.008	.016	1.000	-.050	.065
	11	.017	.025	1.000	-.071	.106
	12	-.066	.031	1.000	-.178	.046
10	1	-.285*	.037	.000	-.416	-.154
	2	-.196*	.032	.000	-.309	-.083
	3	-.109*	.030	.038	-.215	-.003
	4	-.057	.028	1.000	-.158	.044
	5	-.010	.027	1.000	-.106	.086
	6	-.007	.026	1.000	-.100	.086
	7	-.082	.024	.067	-.167	.002
	8	-.052	.022	1.000	-.130	.025
	9	-.008	.016	1.000	-.065	.050
	11	.010	.018	1.000	-.053	.072
	12	-.074	.027	.489	-.169	.021
11	1	-.295*	.038	.000	-.429	-.160
	2	-.206*	.034	.000	-.328	-.084
	3	-.118*	.033	.043	-.235	-.001
	4	-.067	.032	1.000	-.180	.046
	5	-.020	.031	1.000	-.129	.090
	6	-.017	.032	1.000	-.131	.098
	7	-.092	.030	.198	-.198	.014
	8	-.062	.028	1.000	-.163	.039
	9	-.017	.025	1.000	-.106	.071
	10	-.010	.018	1.000	-.072	.053
	12	-.084*	.018	.001	-.148	-.020
12	1	-.211*	.041	.000	-.357	-.065
	2	-.122	.039	.180	-.261	.017
	3	-.035	.038	1.000	-.170	.100

4	.017	.036	1.000	-.113	.147
5	.064	.035	1.000	-.062	.190
6	.067	.035	1.000	-.058	.192
7	-.008	.033	1.000	-.126	.109
8	.022	.033	1.000	-.097	.141
9	.066	.031	1.000	-.046	.178
10	.074	.027	.489	-.021	.169
11	.084*	.018	.001	.020	.148

Based on estimated marginal means*. The mean difference is significant at the .05 level, b. Adjustment for multiple comparisons: Bonferroni..

Appendix B: Justification of Sample Size

A priori power calculations were conducted using the G*power program (Faul, Erdfelder, Buchner, & Lang, 2009) for the different hypotheses and corresponding analyses. Large within-group effect sizes were expected based on previous findings in healthy and clinical samples (Kirschner et al., 2013; Kearney et al., 2008), indicating Cohen's *d* effect sizes >.80. It was found that a total of 16 participants were required for this study to detect a within-group effect of time (first hypothesis), when α = .05 and 80% power was desired, if a conservative estimate for the repeated measures correlation of .5 was used.

There were no studies on which to base effect sizes for within-between interactions (second hypothesis). However, Kirschner et al (2013) found correlation coefficients between pre-to-post state self-compassion following intervention (r = .67). Hutcherson et al. (2008) found a Group x Time interaction for LKM in relation to positive mood (f =.36). A total of 34 participants were required to detect medium to large effect sizes, if again a conservative repeated measures estimate of .5 was applied.

Finally, as there were no comparable studies for the moderation analyses, and regression models were planned to involve no more than three predictors (exploratory third hypothesis), to detect a medium effect size for the interaction term (f^2= .15) a total of 55 participants would be required.

Appendix C: Consideration of Effect Size

For hypothesis 1, the within-subjects factors yielded effects sizes ranging from small to large, for happiness (f = .31), for self-critical (f =.51), for self-compassion (f =.20), for HR (f = .11) and for SCL (f = .66).

For hypothesis 2, the within-between interaction yielded small to medium effect sizes, for happiness (f = .28), for self-critical (f =.10), for self-compassion (f =.15), for HR (f = .17) and for SCL (f = .04).

For repeated measures between-subjects effects the effect sizes for the self-report measures were large: f = .42 for happiness, f = .53 for self-compassion, and f = .54 for self-criticism. However, for the physiological measurements the effects sizes were small: f = .07 for HR and f = .15 for SCL.

For hypothesis 3, the moderating effect of trait self-compassion, trait self-criticism and fear of self compassion on the relationship between state self-compassion change and symptoms, medium to large effect sizes of f^2=0.25, f^2=0.31 and f^2=0.41 were found, respectively.

For the moderating effect of trait self-compassion, trait self-criticism and fear of self compassion on the relationship between state self-criticism change and symptoms, small to medium effect sizes of f^2=0.06, f^2=0.14 and f^2=0.04 were found, respectively.

This indicates that there was sufficient power to ascertain medium to large effects but not small effects.

Appendix D: Ethics Documentation

NHS
Health Research Authority
NRES Committee South West - Cornwall & Plymouth
Bristol Research Ethics Committee Centre
Level 3
Block B
Whitefriars
Lewins Mead
Bristol
BS1 2NT

Telephone: 01173421390
Facsimile: 01173420445

15 April 2014

Ms Joanne Louise Storr
22 Gloucester Court
Gloucester Street
Taunton, Somerset
TA1 1TF

Dear Ms Storr

Study title:	**Effects of self-compassion on post-traumatic stress symptoms, physiology, and avoidance.**
REC reference:	**14/SW/0055**
Protocol number:	**Protocol_Ethics**
IRAS project ID:	**138576**

Thank you for your letter of 07 April 2014, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details, unless you expressly withhold permission to do so. Publication will be no earlier than three months from the date of this favourable opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to withhold permission to publish, please contact the REC Manager Mrs Kirsten Peck, nrescommittee.southwest-cornwall-plymouth@nhs.net.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Advertisement	2	18 February 2014
Covering Letter		20 February 2014
Covering Letter		
Evidence of insurance or indemnity		22 February 2014
Investigator CV		19 February 2014
Letter from Sponsor		22 February 2014
Letter of invitation to participant	1	19 February 2014
Other: CV - Supervisor	Anke Karl	
Other: CV - Supervisor	professor Willem Kuyken	
Other: Materials		19 February 2014
Other: Debriefing Sheet	1.3	18 February 2014
Other: Research Proposal		19 February 2014
Other: Telephone Screening Interview	1.1	18 February 2014
Other: Lone Worker Policy		
Participant Consent Form	1.3	19 February 2013
Participant Information Sheet	1.4	05 April 2014
Protocol	1	21 February 2014
REC application	3.5	21 February 2014
Referees or other scientific critique report		19 February 2014
Response to Request for Further Information		07 April 2014

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

A Research Ethics Committee established by the Health Research Authority

After ethical review

Reporting requirements

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review

14/SW/0055	**Please quote this number on all correspondence**

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at http://www.hra.nhs.uk/hra-training/

With the Committee's best wishes for the success of this project.

Yours sincerely

Canon Ian Ainsworth-Smith
Chair

Email: nrescommittee.southwest-cornwall-plymouth@nhs.net

Enclosures: "After ethical review – guidance for researchers" *[SL-AR2]*

Copy to: *Ms Gail Seymour*
Ms Lynda Garcia, Royal Devon & Exeter NHS Foundation Trust

A Research Ethics Committee established by the Health Research Authority

Royal Devon and Exeter NHS
NHS Foundation Trust

Ms Joanne Storr
22 Gloucester Court
Gloucester Street
Taunton
Somerset
TA1 1TF

Royal Devon and Exeter Hospital (Wonford)
Barrack Road
Exeter
EX2 5DW

Tel: 01392 411611
RESEARCH AND DEVELOPMENT DIRECTORATE
Direct Dial: 01392 406933
Direct Fax: 01392 403012
Email: rde-tr.Research@nhs.net
Ref: VL/MC/R&D/CG

15 May 2014

Dear Joanne

Study Title: **Effects of self-compassion on post-traumatic stress symptoms, physiology and avoidance**
Researcher Name: **Ms Joanne Storr**
MREC Ref: **14/SW/0055**

Thank you for submitting your study documents to the Royal Devon & Exeter NHS Foundation Trust for review. We can confirm that the research satisfies our checks and has the following:

- Ethics Approval
- Sponsorship
- Research protocol
- Participant Information Sheet, Consent Form and associated documents
- Researcher CV

This assurance is for research based on the documents provided by the researcher and does not take into account any alterations to the research after the date of this letter.

Research Governance

I would like to take this opportunity to remind you of your responsibilities as a Principal Investigator.

These are:

1. Research procedures must be carried out in line with Good Clinical Practice and the Research Governance Framework for Health and Social Services, which details the responsibilities for everyone involved in research.
2. The Data Protection Act 1998 requires you to follow the eight principles of 'good information handling'.
3. To provide information when requested for research governance monitoring and auditing purposes.
4. You must be aware of, and comply with, Health and Safety standards in relation to your research.

This letter is not an approval letter for the research to take place, but provides assurance that the study has been reviewed and has been approved by ethics.

It is advised that you, as the researcher, obtain written approval from each site you wish to involve in your study.

Yours sincerely

CM Gardner

Chris Gardner
R&D Directorate Manager

Research Assurance Letter
V2.0 15/04/13

Devon Partnership NHS
NHS Trust

Research and Development Directorate
Wonford House Hospital
Dryden Road
EXETER
EX2 5AF

Tel: 01392 675 689
Email: sarahlaidler@nhs.net

Ms Joanne Storr
22 Gloucester Court
Taunton
Somerset
TA1 1TF

2 September 2014

Dear Joanne

Study Title: **Effects of self-compassion on post-traumatic stress symptoms, physiology and avoidance.**
DPT No: **DPT0287**
MREC Ref: **14/SW/0055**

I have reviewed the Trust R&D file for the above named study, which has received approval from the appropriate regulatory bodies, and I am happy to give approval on behalf of the Devon Partnership NHS Trust (DPT). I can confirm from your REC form that you aim to recruit 46 patients over a 16 month period of time.

The documents approved for use in this study are those approved by ethics, these are detailed on a separate sheet.

As named Investigator for the research that is being undertaken at this Trust, it is your responsibility to manage and conduct this study in accordance with;

- The requirements of the **Research Governance Framework for Health and Social Care (2005)** and **Medicines for Human Use (Clinical Trials) Regulations 2004** (if applicable).
- **ICH-GCP** (Good Clinical Practice) – It is mandatory for those staff who will be consenting participants into this study to have undertaken GCP and to ensure it is updated every 2 years.
- The **Human Tissue Act 2004** and the **EU Tissue and Cells Directive (2006)** for research involving human tissue.
- The **Data Protection Act 1998** which details the eight principles of 'good information handling'.
- **R&D Standard Operating Procedures** (SOPs) and **Trust policies** which are available on the Trust intranet site

As Lead Investigator for this research, you are required to ensure study specific duties are appropriately delegated and clearly documented on the study Delegation Log. This guarantees clarity of roles and must be signed and dated by each individual on the study and yourself as Lead Investigator.

Safety Reporting
Guidance on the classification of Adverse Events/Reactions (AEs/ARs) / Serious Adverse Events/Reactions (SAEs/SARs) and Suspected Unexpected Serious Adverse Reactions (SUSARs) and the requirements for reporting to the sponsor can be found in the study protocol. For Devon

Devon Partnership NHS
NHS Trust

Partnership NHS Trust sponsored studies this is also detailed in the sponsorship letter. All safety events that involve DPT patients, that require reporting to the Sponsor, must also be reported by fax marked for the attention of Sarah Laidler and sent to the R&D Office within 24 hours of becoming aware of the event (01392 6744929) alternatively via email to sarahlaidler@nhs.net.

Progress Reporting
You are required to submit regular recruitment updates to the R&D Office, as well as annual progress reports to Ethics, MHRA (where applicable) and R&D. Please note that new government and Trust targets require you to have recruited your **first patient within 30 days of the date of Trust Approval** and to have recruited your target number of participants within the time frame stipulated on your SSI form (Time to Target).

Monitoring and Audit
Your study may be monitored by the Sponsor and selected for audit by the R&D Office (where DPT is not the Sponsor) and Regulatory Authorities at any time. The team involved in conducting this research must ensure full co-operation with any requests from any of these bodies. Action may be taken to suspend research if it is found to not be conducted in accordance with the protocol and all applicable regulations.

Archiving
Upon completion of this Research an **End of Study Report** must be submitted to the Regulatory Authorities (this will be done by the CI) and a copy submitted to the R&D Office. All studies must be archived appropriately and in accordance with the applicable Law. Where DPT is the Sponsor or where the Sponsor has delegated archiving to the Investigator team, it is your responsibility to contact the R&D Office to discuss appropriate archiving arrangements.

Any publications arising from the Research conducted at this site must be sent to the R&D Office as part of the on-going Research Governance Process.

You should be aware that the Trust accepts no responsibility for the provision of any study drug outside of Clinical Trials and specifically would not fund the continuing prescription of any therapy once the trial has concluded unless there is a written agreement.

Trust Approval is for the duration of the study, as specified in your SSI form. Research must **commence** within **6 months** of Trust Approval. If you have received an Honorary Contract or Letter of Access in order to conduct the above research at this Trust, it is important that you check the termination date on these documents and if applicable contact the R&D Office to extend the document end date.

We wish you every success with your study.

Yours sincerely

Dr Peter Aitken
Directorate of Research and Development

R&D Trust Approval Letter (excluding No Ethics and Tissue Bank)
V1.1 07/05/2014

Appendix E: Measures

DASS

Name: *Date:*

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

1	I found myself getting upset by quite trivial things	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I just couldn't seem to get going	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I had a feeling of shakiness (eg, legs going to give way)	0	1	2	3
8	I found it difficult to relax	0	1	2	3
9	I found myself in situations that made me so anxious I was most relieved when they ended	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting upset rather easily	0	1	2	3
12	I felt that I was using a lot of nervous energy	0	1	2	3
13	I felt sad and depressed	0	1	2	3
14	I found myself getting impatient when I was delayed in any way (eg, lifts, traffic lights, being kept waiting)	0	1	2	3
15	I had a feeling of faintness	0	1	2	3
16	I felt that I had lost interest in just about everything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I perspired noticeably (eg, hands sweaty) in the absence of high temperatures or physical exertion	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life wasn't worthwhile	0	1	2	3

Reminder of rating scale:

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

22	I found it hard to wind down	0	1	2	3
23	I had difficulty in swallowing	0	1	2	3
24	I couldn't seem to get any enjoyment out of the things I did	0	1	2	3
25	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
26	I felt down-hearted and blue	0	1	2	3
27	I found that I was very irritable	0	1	2	3
28	I felt I was close to panic	0	1	2	3
29	I found it hard to calm down after something upset me	0	1	2	3
30	I feared that I would be "thrown" by some trivial but unfamiliar task	0	1	2	3
31	I was unable to become enthusiastic about anything	0	1	2	3
32	I found it difficult to tolerate interruptions to what I was doing	0	1	2	3
33	I was in a state of nervous tension	0	1	2	3
34	I felt I was pretty worthless	0	1	2	3
35	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
36	I felt terrified	0	1	2	3
37	I could see nothing in the future to be hopeful about	0	1	2	3
38	I felt that life was meaningless	0	1	2	3
39	I found myself getting agitated	0	1	2	3
40	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
41	I experienced trembling (eg, in the hands)	0	1	2	3
42	I found it difficult to work up the initiative to do things	0	1	2	3

PTSD CheckList – Civilian Version (PCL-C)

Client's Name: _____

Instruction to patient: Below is a list of problems and complaints that veterans sometimes have in response to stressful life experiences. Please read each one carefully, put an "X" in the box to indicate how much you have been bothered by that problem *in the last month*.

No.	Response	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing *memories, thoughts, or images* of a stressful experience from the past?					
2.	Repeated, disturbing *dreams* of a stressful experience from the past?					
3.	Suddenly *acting* or *feeling* as if a stressful experience *were happening* again (as if you were reliving it)?					
4.	Feeling *very upset* when *something reminded* you of a stressful experience from the past?					
5.	Having *physical reactions* (e.g., heart pounding, trouble breathing, or sweating) when *something reminded* you of a stressful experience from the past?					
6.	Avoid *thinking about* or *talking about* a stressful experience from the past or avoid *having feelings* related to it?					
7.	Avoid *activities* or *situations* because they *remind you* of a stressful experience from the past?					
8.	Trouble *remembering important parts* of a stressful experience from the past?					
9.	Loss of *interest in things that you used to enjoy?*					
10.	Feeling *distant* or *cut* off from other people?					
11.	Feeling *emotionally numb* or being unable to have loving feelings for those close to you?					
12.	Feeling as if your *future* will somehow be *cut short*?					
13.	Trouble *falling* or *staying asleep*?					
14.	Feeling *irritable* or having *angry outbursts*?					
15.	Having *difficulty concentrating*?					
16.	Being *"super alert"* or watchful on guard?					
17.	Feeling *jumpy* or easily startled?					

self-compassion scale: short form

how I typically act towards myself in difficult times ...

Please read each statement carefully before answering; using the scale given below indicate, to the right of each item, how often you behave in the stated manner:

	almost never				***almost always***
	1	***2***	***3***	***4***	***5***

1	*when I fail at something important to me I become consumed by feelings of inadequacy*	
2	I try to be understanding and patient towards those aspects of my personality I don't like	
3	when something painful happens I try to take a balanced view of the situation	
4	*when I'm feeling down, I tend to feel like most other people are probably happier than I am*	
5	I try to see my failings as part of the human condition	
6	when I'm going through a very hard time, I give myself the caring and tenderness I need	
7	when something upsets me I try to keep my emotions in balance	
8	*when I fail at something that's important to me, I tend to feel alone in my failure*	
9	*when I'm feeling down I tend to obsess and fixate on everything that's wrong*	
10	when I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people	
11	*I'm disapproving and judgmental about my own flaws and inadequacies*	
12	*I'm intolerant and impatient towards those aspects of my personality I don't like*	

FSCRS part 1

When things go wrong in our lives or don't work out as we hoped, and we feel we could have done better, we sometimes have *negative and self-critical thoughts and feelings*. These may take the form of feeling worthless, useless or inferior etc. However, people can also try to be supportive of themselves. Below are series of thoughts and feelings that people sometimes have. Read each statement carefully and circle the number that best describes how much each statement is true for you.
Please use the scale below.

Not at all like me	A little bit like me	Moderately like me	Quite a bit like me	Extremely like me
0	1	2	3	4

When things go wrong for me:

1.	I am easily disappointed with myself.	0	1	2	3	4
2.	There is a part of me that puts me down.	0	1	2	3	4
3.	I am able to remind myself of positive things about myself.	0	1	2	3	4
4.	I find it difficult to control my anger and frustration at myself.	0	1	2	3	4
5.	I find it easy to forgive myself.	0	1	2	3	4
6.	There is a part of me that feels I am not good enough.	0	1	2	3	4
7.	I feel beaten down by my own self-critical thoughts.	0	1	2	3	4
8.	I still like being me.	0	1	2	3	4
9.	I have become so angry with myself that I want to hurt or injure myself.	0	1	2	3	4
10.	I have a sense of disgust with myself.	0	1	2	3	4
11.	I can still feel lovable and acceptable.	0	1	2	3	4
12.	I stop caring about myself.	0	1	2	3	4
13.	I find it easy to like myself.	0	1	2	3	4
14.	I remember and dwell on my failings.	0	1	2	3	4
15.	I call myself names.	0	1	2	3	4
16.	I am gentle and supportive with myself.	0	1	2	3	4
17.	I can't accept failures and setbacks without feeling inadequate.	0	1	2	3	4
18.	I think I deserve my self-criticism.	0	1	2	3	4
19.	I am able to care and look after myself.	0	1	2	3	4
20.	There is a part of me that wants to get rid of the bits I don't like.	0	1	2	3	4
21.	I encourage myself for the future.	0	1	2	3	4
22.	I do not like being me.	0	1	2	3	4

FSCRS part 2

There can be many reasons why people become critical and angry with themselves. Read each statement carefully and circle the number that best describes how much each statement is true for you.

Use the scale below.

Not at all like me	A little bit like me	Moderately like me	Quite a bit like me	Extremely like me
0	1	2	3	4

I get critical and angry with myself:

1.	to make sure I keep up my standards.	0	1	2	3	4
2.	to stop myself being happy.	0	1	2	3	4
3.	to show I care about my mistakes.	0	1	2	3	4
4.	because if I punish myself I feel better.	0	1	2	3	4
5.	to stop me being lazy.	0	1	2	3	4
6.	to harm part of myself.	0	1	2	3	4
7.	to keep myself in check.	0	1	2	3	4
8.	to punish myself for my mistakes.	0	1	2	3	4
9.	to cope with feelings of disgust with myself.	0	1	2	3	4
10.	to take revenge on part of myself.	0	1	2	3	4
11.	to stop me getting overconfident.	0	1	2	3	4
12.	to stop me being angry with others	0	1	2	3	4
13.	to destroy a part of me.	0	1	2	3	4
14.	to make me concentrate.	0	1	2	3	4
15.	to gain reassurance from others.	0	1	2	3	4
16.	to stop me becoming arrogant.	0	1	2	3	4
17.	to prevent future embarrassments.	0	1	2	3	4
18.	to remind me of my past failures	0	1	2	3	4
19.	to keep me from making minor mistakes.	0	1	2	3	4
20.	to remind me of my responsibilities.	0	1	2	3	4
21.	to get at the things I hate in myself.	0	1	2	3	4

If you can think of any other reasons why you become self-critical please write them in the space below:
.....
.....

THE COMPASSION EVALUATION SCALE

Different people have different views of compassion and kindness. While some people believe that it is important to show compassion and kindness in all situations and contexts, others believe we should be more cautious and can worry about showing it too much to ourselves and to others. We are interested in your thoughts and beliefs in regard to kindness and compassion in three areas of your life:

1. Expressing compassion for others
2. Responding to compassion from others
3. Expressing kindness and compassion towards yourself

Below are a series of statements that we would like you to think carefully about and then circle the number that best describes how each statement fits you.

SCALE

Please use this scale to rate the extent that you agree with each statement

Don't agree at all	0	1	2	3	4	Completely agree
		Somewhat agree				

Scale 1: Expressing compassion for others

1.	People will take advantage of me if they see me as too compassionate	0	1	2	3	4
2.	Being compassionate towards people who have done bad things is letting them off the hook	0	1	2	3	4
3.	There are some people in life who don't deserve compassion	0	1	2	3	4
4.	I fear that being too compassionate makes people an easy target	0	1	2	3	4
5.	People will take advantage of you if you are too forgiving and compassionate	0	1	2	3	4
6.	I worry that if I am compassionate, vulnerable people can be drawn to me and drain my emotional resources	0	1	2	3	4
7.	People need to help themselves rather than waiting for others to help them	0	1	2	3	4
8.	I fear that if I am compassionate, some people will become too dependent upon me	0	1	2	3	4
9.	Being too compassionate makes people soft and easy to take advantage of	0	1	2	3	4
10.	For some people, I think discipline and proper punishments are more helpful than being compassionate to them	0	1	2	3	4

Scale 2: Responding to the expression of compassion from others

1.	Wanting others to be kind to oneself is a weakness	0	1	2	3	4
2.	I fear that when I need people to be kind and understanding they wont be	0	1	2	3	4
3.	I'm fearful of becoming dependent on the care from others because they might not always be available or willing to give it	0	1	2	3	4
4.	I often wonder whether displays of warmth and kindness from others are genuine	0	1	2	3	4
5.	Feelings of kindness from others are somehow frightening	0	1	2	3	4
6.	When people are kind and compassionate towards me I feel anxious or embarrassed	0	1	2	3	4
7.	If people are friendly and kind I worry they will find out something bad about me that will change their mind	0	1	2	3	4
8.	I worry that people are only kind and compassionate if they want something from me	0	1	2	3	4
9.	When people are kind and compassionate towards me I feel empty and sad	0	1	2	3	4
10.	If people are kind I feel they are getting too close	0	1	2	3	4
11.	Even though other people are kind to me, I have rarely felt warmth from my relationships with others	0	1	2	3	4
12.	I try to keep my distance from others even if I know they are kind	0	1	2	3	4
13.	If I think someone is being kind and caring towards me, I 'put up a barrier'	0	1	2	3	4

Scale 3: Expressing kindness and compassion towards yourself

1.	I feel that I don't deserve to be kind and forgiving to myself	0	1	2	3	4
2.	If I really think about being kind and gentle with myself it makes me sad	0	1	2	3	4
3.	Getting on in life is about being tough rather than compassionate	0	1	2	3	4
4.	I would rather not know what being 'kind and compassionate to myself' feels like	0	1	2	3	4
5.	When I try and feel kind and warm to myself I just feel kind of empty	0	1	2	3	4
6.	I fear that if I start to feel compassion and warmth for myself, I will feel overcome with a sense of loss/grief	0	1	2	3	4
7.	I fear that if I become kinder and less self-critical to myself then my standards will drop	0	1	2	3	4
8.	I fear that if I am more self compassionate I will become a weak person	0	1	2	3	4
9.	I have never felt compassion for myself, so I would not know where to begin to develop these feelings	0	1	2	3	4
10.	I worry that if I start to develop compassion for myself I will become dependent on it	0	1	2	3	4
11.	I fear that if I become too compassionate to myself I will lose my self-criticism and my flaws will show	0	1	2	3	4
12.	I fear that if I develop compassion for myself, I will become someone I do not want to be	0	1	2	3	4
13.	I fear that if I become too compassionate to myself others will reject me	0	1	2	3	4
14.	I find it easier to be critical towards myself rather than compassionate	0	1	2	3	4
15.	I fear that if I am too compassionate towards myself, bad things will happen	0	1	2	3	4

Manipulation Check

Time Point: Post Participant number: _____ Date: _____

Right now:

0----------100

I could not follow the instructions at all — I could follow the instructions very well

0----------100

I did not pay attention to the exercise at all — I paid full attention to the exercise

0----------100

I don't feel happy at all — I feel very happy

0----------100

I don't feel despondent (down, depressed) at all — I feel very despondent

0----------100

I don't feel at all self-critical — I feel very self-critical

0----------100

I don't feel energetic at all — I feel very energetic

0----------100

I feel like not being kind and understanding towards myself at all — I feel like being very kind and understanding towards myself

0----------100

I don't feel loved and safe at all — I feel very loved and safe

0----------100

I don't have a desperate need to feel loved — I really need to feel loved

0----------100

The idea of being emotionally close to someone doesn't make me nervous at all — The idea of being emotionallyclose to someone makes me very nervous

Manipulation Check

Time Point: Post Participant number: _____ Date: _____

0----------100

I don't feel a sense of togetherness with others at all — **I very much feel a sense of togetherness with others**

0----------100

I don't feel calm at all — **I feel very calm**

0----------100

I am not tolerant of my flaws and inadequacies at all — **I am very tolerant of my flaws and inadequacies**

Appendix F: Dissemination Plan

The findings of this study will be disseminated in the following ways:

1. At a presentation to service users, trainee clinical psychologists, and staff from the Exeter DClinPsy programme (June 2015).
2. A presentation to the society of psychophysiological research (SPR) in Seattle (Sept, 2015).
3. In the form of a peer reviewed journal article to be prepared and submitted to the Journal of Abnormal Psychology (Nov, 2015).