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The effect of a brief online self-compassion versus cognitive restructuring intervention on trait social anxiety

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ABSTRACT

We compared two brief online interventions of 2-week duration for individuals with elevated levels of social anxiety. Participants were randomized to self-compassion or cognitive restructuring conditions ($N = 119$) and assessed across five assessment points, including a 5-week follow-up. Mediators and moderators of outcome were also examined. Both interventions led to significant decreases in social anxiety (*d*'s ranged from 0.26 to 0.58), which were maintained and improved at follow-up (*d*'s from baseline ranged from 0.53 to 0.80). Of those who were above social anxiety cut-off at baseline (> 75%), approximately 20% of participants in each group showed reliable and clinically significant changes in symptoms. No differences between the treatment conditions were found for social anxiety outcomes. Similarly, there were no measures that differentially mediated the effect of treatment condition on social anxiety. Furthermore, we did not find support for a theory-driven mediational model in which self-compassion reduced social anxiety through activation of the soothing system. Contrary to predictions and theory, neither self-criticism nor fear of self-compassion moderated the effect of the interventions. Although preliminary, the findings suggest that self-compassion techniques warrant further study as an additional means of reducing social anxiety.

1. Introduction

Social Anxiety Disorder (SAD) is highly prevalent and associated with significant life impairment. Although the current gold-standard treatment for SAD, Cognitive Behavioural Therapy (CBT), is effective (e.g., Mayo-Wilson et al., 2014), a considerable number of individuals do not respond to this treatment (approximately 55%; Loerinc et al., 2015). As such, there is a need to investigate alternative therapy approaches and the underlying processes that determine their efficacy. In this study, we examined whether self-compassion is a possible alternative intervention for SAD. Additionally, we investigated proposed mediators and moderators of outcome, with a core CBT technique, cognitive restructuring, used as a comparison intervention in this randomized design.

One possible alternative to cognitive restructuring, self-compassion, is commonly defined as a way of relating to the self that involves self-kindness, mindfulness, and a feeling of connection to the rest of humanity (Neff, 2003). There has been a significant increase in research investigating the therapeutic benefits of improving self-compassion. A recent meta-analysis of randomized controlled compassion-based trials ($N = 21$) by Kirby, Tellegen, and Steindl (2017) found evidence for moderate effect sizes in improving outcomes such as depression, anxiety, and psychological distress (Cohen's *d*s ranged from 0.47 to 0.64[1]). Although limited in the number of studies undertaken, the relationship between self-compassion and social anxiety has been examined. Cross-sectional research using non-clinical samples has found that self-compassion is correlated with symptoms of social anxiety ($r = -.57$; Hayes, Lockard, Janis, & Locke, 2016) and related constructs such as post-event processing ($r = -.42$; Blackie & Kocovski, 2017). In the first study to utilize a clinical sample in this area, Werner et al. (2012) found that those with SAD ($n = 72$) reported less self-compassion than healthy controls ($n = 40$; partial $\eta^2 = 0.55$). Additionally, among those with SAD, self-compassion was associated with fear of both negative ($r = -.38$) *and* positive ($r = -.37$) evaluation, each representing cognitive maintenance factors of SAD (Heimberg, Brozovich, & Rapee, 2014). However, contrary to expectations, self-compassion was not significantly correlated with social anxiety symptom severity as measured by the Liebowtiz Social Anxiety Scale (Liebowitz, 1987; $r = -.15$; CI_{95}

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[1] Although effect sizes are not typically reported in the Introduction, we do so because they speak to both the magnitude and variability of effects, which we argue is more informative than whether the finding was significant or not (see Cumming, 2012).

[2] A Buddhist construct which refers to a sense of equanimity in the face of changing circumstances (Sahdra, Shaver, & Brown, 2010).

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[-0.37, 0.08]) and the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998; r = -.18; CI_{95} = −0.40 to 0.05), although wide confidence intervals suggest some variability in the strength of these relationships.

Several studies have manipulated self-compassion in order to gauge its effect on social anxiety. Using a sample of undergraduates with elevated social anxiety (N = 98), Blackie and Kocovski (2018) had participants engage in a short speech task before being randomized into a self-compassion, rumination, or a neutral writing control condition. When participants were assessed one day later, those instructed to complete a brief self-compassionate written letter reported greater willingness to engage in social situations (partial η^2 = 0.07) and less post-event processing (partial η^2 = 0.11), compared to the other conditions. However, although the study successfully manipulated self-compassion, it did not assess within-person changes in the dependent variables, and thus causal inferences are limited.

A stronger study design was utilized by Arch et al. (2014) who tested whether brief training in self-compassion meditation would reduce anxiety responses in nonclinical female undergraduates when exposed to a social stressor. Compared to two control conditions of attention (placebo) and no intervention, the authors found that pre-social stress training in self-compassion reduced anxiety when measured by subjective anxiety (d = 0.11), cardiac parasympathetic (d = 0.09), and salivary alpha-amylase (ΔR^2 = 0.05) reactions, although no effect was found using salivary cortisol. However, it should be noted that the compassion intervention in this study included some compassion directed towards others, and the sample used was entirely female. In a similar study design but examining both participants diagnosed with SAD (n = 21) and healthy controls (n = 35) as well as both males and females, Arch, Landy, Schneider, Koban, and Andrews-Hanna (2018) examined the effect of a brief self-compassion written exercise on recovery from social stress. Relative to healthy controls, those with SAD reported greater increases in self-compassion (partial η^2 = 0.08) and greater reductions in state anxiety (partial η^2 = 0.08). In contrast to Arch et al. (2014), this study had a specific focus on self-compassion relating to social stress.

In the only study of its kind to date, Boersma, Hakanson, Salomonsson, and Johansson (2015) tested the effectiveness of self-compassion in a single case experimental design among participants with SAD (N = 6). The authors piloted a course of eight individual sessions of Compassion Focused Therapy (CFT; Gilbert, 2014) and found that three of six participants reported clinically significant reductions in social anxiety two to four weeks after the intervention, as measured by the SIAS. Although demonstrating some promise, these findings need to be qualified by the limitations of the study design (e.g., small sample size, lack of control group, short follow-up) that prevent strong conclusions from being drawn.

Taken together, although the studies reviewed had slightly different aims (e.g., a focus on reducing social stress among a non-clinical sample by Arch et al., 2014, versus Boersma, Håkanson, Salomonsson, & Johansson, 2015, who were specifically interested in the effect of self-compassion on trait social anxiety among participants with a diagnosis of SAD), there is broad evidence to suggest that self-compassion delivered across various modalities (e.g., meditation, written exercise, individual therapy) can reduce outcomes including state anxiety, post-event processing, and social anxiety symptoms, in a range of samples (non-clinical, elevated social anxiety, and clinically diagnosed SAD). However, further research is needed within well-controlled designs to investigate the effects of more extended self-compassion interventions on trait measures of social anxiety. Furthermore, given the current push towards understanding the processes through which interventions function (see Hayes & Hofmann, 2017), research into how and for whom self-compassion works is required.

1.1. Are there unique mediators and mechanisms of change of self-compassion?

In one of the most dominant theories of compassion (Gilbert, 2010), which includes a major focus on *self*-compassion, the primary mechanism of change proposed is 'activation of the soothing system'. This evolutionary-driven theory proposes that self-compassion activates the biopsychological soothing system, which in turn down-regulates the 'threat system' (i.e., psychopathological symptoms). Surprisingly, this proposed mechanism has not been empirically evaluated. As such, it remains unclear whether activation of the soothing system actually is a mechanism of self-compassion, and moreover, whether it is a *unique* mechanism. Notably, Gilbert (2010) suggested that the soothing system also underlies successful cognitive therapy, and thus may be a common therapeutic mechanism. One possible explanation for the lack of research on the soothing system is the absence of a measure that specifically assesses this system. However, there are two measures in existence that are consistent with theoretical descriptions of the subjective experience of the activation of the soothing system: the safe-affect subscale of the Types of Positive Affect Scale (TPAS; Gilbert et al., 2008), and the Social Safeness and Pleasure Scale (SSPS; Gilbert et al., 2009). Research investigating these theoretical issues is needed. Also of importance is whether there are other constructs that differentially mediate the relationship between interventions such as self-compassion and cognitive restructuring in relation to outcomes such as social anxiety. Another research question, perhaps even more pertinent, is whether there are individual differences that predict the suitability and efficacy of self-compassion versus other psychological treatments.

1.2. What are the key moderators of self-compassion?

Empirically, only two studies have examined potential moderators of the relationship between self-compassion and social anxiety. When self-compassion was compared with inactive control groups such as no intervention and rumination, there was some evidence for moderating effects of higher baseline social anxiety and non-attachment[2] enhancing the benefits of self-compassion (Arch, Landy, & Brown, 2016; Harwood & Kocovski, 2017). However, social anxiety moderation research has yet to compare self-compassion with an active control group such as cognitive restructuring. Moreover, in the context of social anxiety, the central theory-driven moderators of self-compassion have not been evaluated.

Given that compassion-based approaches were developed specifically for people who are highly self-critical (e.g., Gilbert & Procter, 2006), one theoretically driven moderator of these treatment approaches is *self-criticism*. As argued by compassion-theorists, self-compassion might be a better therapeutic approach for self-critical individuals than traditional cognitive therapy because it more effectively activates their soothing system (Gilbert & Procter, 2006). So far, however, the empirical support for this proposal is mixed (see Kelly, Zuroff, Foa, & Gilbert, 2010; Shapira & Mongrain, 2010; Sommers-Spijkerman, Trompetter, Schreurs, & Bohlmeijer, 2018) and has not made a direct comparison between self-compassion and interventions that contain traditional CBT components (e.g., cognitive restructuring).

In addition to self-criticism, another theory-driven moderator of self-compassion is *fear* of self-compassion. It is thought that some people fear compassion for various reasons, such as not feeling worthy, or because compassion can activate early attachment memories involving unmet needs and unresolved feelings (Gilbert, 2010). For these people, practicing self-compassion may actually be detrimental. Only one study has examined the moderating role of fear of self-compassion in the context of a self-compassion intervention. In a randomized controlled trial of participants with binge eating disorder, Kelly and Carter (2015) compared three conditions: 1) food planning plus self-compassion, 2) food planning plus behavioural strategies to replace binging with healthy alternatives, and 3) waitlist control. The authors found

that fear of self-compassion moderated the effect of condition on eating disorder pathology and depression, such that those with higher fear of self-compassion in the self-compassion group had worse outcomes than those lower in this trait. Those in the behavioural strategies group improved irrespective of level of fear of self-compassion. Of relevance to the present study is whether fear of self-compassion plays a similar, detrimental moderating role in the relationship between self-compassion and other disorders such as SAD.

1.3. The current study

This investigation was framed by the need for further research into alternative treatment modalities for SAD, with self-compassion proposed as one possible alternative. We conducted a brief two-week intervention study comparing an online self-compassion approach with an active comparison condition, cognitive restructuring, in a sample with elevated social anxiety.[3] Online delivery of the interventions was chosen because of its lower cost, increased accessibility for participants, and because it is potentially more appealing for people with social anxiety who are averse to face-to-face treatment. We hypothesized that both self-compassion and cognitive restructuring would reduce social anxiety and did not anticipate any overall differential response to intervention. However, we expected that self-criticism and fear of self-compassion (analyzed separately) would be important moderators of social anxiety outcome. Specifically, those higher in self-criticism and lower in fear of self-compassion would have greater reductions in social anxiety in the self-compassion group relative to those who received cognitive restructuring. We also tested a number of exploratory variables measured at baseline as moderators of primary outcomes. Additionally, in light of the gaps in the literature regarding the unique mechanisms of self-compassion, we conducted exploratory analyses of a key mediator that has been proposed - activation of the soothing system. We also selected a number of other factors proposed by theorists to influence the trajectory of social anxiety, with these either traditionally assessed in SAD intervention studies (e.g., anticipatory and post-event processing, probability and cost biases), and others due to our focus on self-compassion (e.g., perceived inferiority, self-criticism). Specifically, we tested whether these factors differentially mediated the effects of the two interventions. Secondary exploratory mediation analyses using treatment engagement variables were also conducted (e.g., the degree to which participants carried out intervention tasks). Finally, we conducted further longitudinal mediation analyses in order to test the foundational argument of compassion theorists that self-compassion leads to activation of the soothing system, which in turn leads to a reduced activity in the threat system, which in this study referred to social anxiety.

2. Method

2.1. Participants

Of the 226 participants screened for the study, 119 met criteria and were randomized to the intervention phase (see Fig. 1 for participant flow, reasons for attrition reported in online supplementary materials). The inclusion criteria required that participants scored above cut-off on the screening measure (≥19, Social Phobia Inventory; SPIN; Connor et al., 2000), were aged 18 or older, living in Australia (in case self-harm risk needed to be addressed), and were not currently receiving weekly or fortnightly therapy for social anxiety. The study was conducted through an online website (www.qualtrics.com). Participants were recruited from various sources including the Flinders University online study recruitment system and online forums (e.g., Reddit, Gumtree, www.socialanxietysupport.com, www.meetup.com), from which links to the study were provided. The study was advertised as an investigation of online self-help strategies that might reduce social anxiety. Of the 42 participants who were ineligible, 36 scored below the SPIN cut-off, five were already receiving therapy, and one was underage.

Of the 119 participants randomized, university students made up 52.1% of the sample. They ranged in age from 18 to 71 years with a mean age of 29.04 (SD = 11.65), with 76.5% female, and 69.7% White, 21.8% Asian, and 8.5% of different ethnicities. The majority of the sample were single (68.1%) and 27.7% were in a relationship (e.g., de-facto or married). Across the sample, the mean score on the screening measure of the SPIN was 42.71[4] (SD = 8.97). As summarised in Table 1, 50 participants reported having received some form of general therapy in the 12 months preceding the study (48.0% counselling, 44.0% CBT, 8.0% other), with a mean number of sessions of 9.24 (SD = 7.95).

2.2. Procedure

Participants followed a link from an advertisement to the website (administered using Qualtrics™). The first page of the website provided information regarding the study and stated that Part One (screening for high social anxiety symptoms) involved a brief questionnaire aimed at determining eligibility for Part Two (intervention). If informed consent was provided, the participant completed the Social Phobia Inventory (SPIN). If the participant scored equal to or above the clinical cut-off they were advised they were eligible for Part Two. If eligible participants were uninterested in continuing the study, they simply exited the page without needing to provide a reason (see 'declined to participate' in Fig. 1). Those who scored below the clinical cut-off were informed that they were ineligible for the study.

Participants who screened positive on the SPIN (i.e., were above the cut-off) then completed a phone interview with the lead researcher which involved confirmation of full eligibility (e.g., risk and current engagement in therapy was assessed), and completion of the MINI International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). Next, participants were randomized into either cognitive restructuring or self-compassion using block randomization (blocks of four). Participants were emailed a link to the intervention exercises each morning and received a reminder text message each afternoon. Instructions were the same each day. There were 14 consecutive days of exercises and five assessments (baseline, mid-treatment at day seven, post-treatment, one-week follow-up, and five-week follow-up). Participants were reimbursed either a $40 Gift Card or course credit (for university participants). Reimbursement was adjusted accordingly for participants who did not complete the entire study (e.g., if they completed 50% of the study, they received 50% of the reimbursement).

2.3. Interventions

2.3.1. Self-compassion

Participants were first given a rationale for the exercises from an evolutionary model of self-compassion (Gilbert, 2010), see online supplementary materials for more details of interventions). This model of self-compassion was chosen over others (e.g., Neff, 2003) given its larger evidence base (see systematic review by Leaviss & Uttley, 2015) and availability of resources for the planned intervention. Instructions for the exercises were based on those used by Shapira and Mongrain

[3] Participants with elevated social anxiety above established clinical cut-offs but who did not meet diagnostic criteria for SAD were still included in the study given evidence that even those who do not meet diagnostic criteria but are still symptomatic demonstrate significant impairment and comorbidity (Fehm et al., 2008).

[4] Although this mean score is high, it should be noted that internet administration of self-report questionnaires can inflate scores (e.g., McCue, Buchanan, & Martin, 2006).

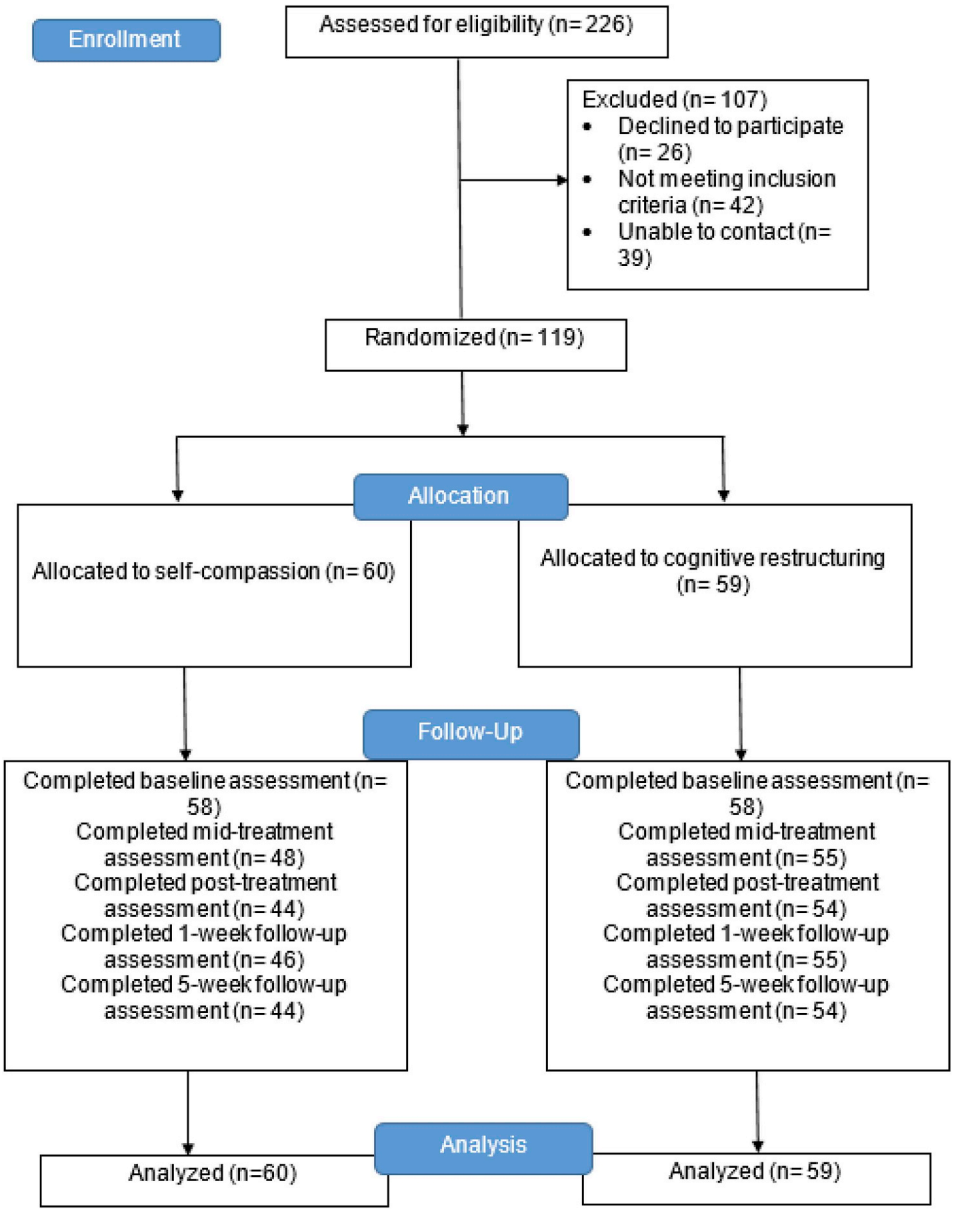

Fig. 1. Study flow chart.

(2010) and resources from https://compassionatemind.co.uk. Participants were asked to think about a recent social situation that elicited social anxiety. Then they were instructed to write a letter in which they expressed compassion (e.g., kindness, understanding, and validation) towards themselves. Participants were told that the online daily tasks may take 5–15 min to complete on each occasion. No instruction was given to practice the skill outside of this time. We selected a written format of self-compassion so that it could be appropriately compared with cognitive restructuring, which typically comprises written work in its initial delivery.

2.3.2. Cognitive restructuring

Participants first read the rationale for the exercises from a cognitive model of social anxiety (Clark & Wells, 1995). For the cognitive restructuring condition, instructions were adapted from Greenberger and Padesky (2015) and materials from https://www.cci.health.wa.gov.au/ whereby the participant was asked to identify: 1) a recent social situation that caused social anxiety, 2) some negative automatic thoughts experienced during or after the situation, with common examples provided (e.g., "He'll think I'm an idiot"), 3) evidence supporting the thought, 4) evidence against the thought, with examples provided (e.g., "I have spoken to him before and he didn't say anything negative"), and 5) an alternative evaluation of the situation (e.g., "Maybe I won't have much to say, but that doesn't mean I'm an idiot"). Participants were told that the task may take 5–15 min to complete on each occasion, and no instruction was given to practice the skill outside of this time.

2.4. Measures

2.4.1. Screening for social anxiety

The eligibility criteria of *elevated* levels of social anxiety was assessed using the established Social Phobia Inventory (SPIN; Connor et al., 2000). The total scale has 17-items ranging from 0 (*not at all*) to 4 (*extremely*), with research demonstrating that a total score of 19 is able to distinguish between clinical and nonclinical socially anxious subjects (Connor et al., 2000). Past studies have demonstrated that this scale has high internal consistency, strong construct validity and good test-retest reliability (Antony, Coons, McCabe, Ashbaugh, & Swinson, 2006; Johnson, Inderbitzen-Nolan, & Anderson, 2006).

2.4.2. Diagnostic, treatment compliance, and outcome measures

Clinical diagnoses were determined using the MINI International Neuropsychiatric Interview – English Version 7.0.2 for DSM-5 (MINI; Sheehan et al., 1998). The MINI has demonstrated reliability and validity (Pettersson, Modin, Wahlström, af Winklerfelt Hammarberg, & Krakau, 2018; Sheehan et al., 1998) and is a widely used instrument. In addition to full diagnosis of SAD, sub-threshold SAD was assessed (1 symptom short of meeting full criteria), given that those who are sub-threshold also demonstrate elevated impairment and comorbidity (Fehm, Beesdo, Jacobi, & Fiedler, 2008). Ten percent of the MINI assessments were randomly selected for inter-rater reliability analyses by an independent researcher. Kappa coefficients were as follows: 1.00 for full or sub-threshold SAD diagnosis, between 0.74 and 1.00 for other anxiety disorders, between 0.41 and 0.52 for mood-related diagnoses, between 0.62 and 1.00 for bipolar-related diagnoses, 0.62 for OCD, 0.78 for eating disorder, and 1.00 for substance abuse disorder.

Several variables representing treatment adherence and engagement were coded, including number of daily exercises completed (out of 14), total amount of minutes spent on exercises (self-report), and total number of words written. Additionally, all of the Self-Compassion letters (in the Self-Compassion condition) and Alternative Thoughts (in the Cognitive Restructuring condition) were coded for level of self-compassion on a 2-point scale[5] (0 = *low compassion*, 1 = *high compassion*). Inter-rater reliability of the scale was moderate (kappa coefficient of 0.53). Finally, at the 5-week follow-up assessment, participants were asked to what degree they had continued engaging in the exercises (either in their head or on paper) since the completion of the formal 2-week intervention on a 5-point scale (0 = *not at all*, 1 = *a little*, 2 = *a moderate amount*, 3 = *a lot*, 4 = *a great deal*).

Two items from the Credibility Expectancy Questionnaire (CEQ; Devilly & Borkovec, 2000) were adapted in order to measure treatment credibility. Participants completed these questions immediately after reading their respective intervention rationale on Day One. The items were "At this point, the self-help exercises for social anxiety seem logical", and "At this point, I believe the self-help exercises for social anxiety will successfully reduce my social anxiety symptoms". A Likert scale was used ranging from 0 (*strongly disagree*) to 7 (*strongly agree*). Only two items were used in order to minimize participant burden. The original scale has demonstrated good internal consistency, test-retest reliability, and construct validity (Devilly & Borkovec, 2000; Smeets et al., 2008). Total Treatment Credibility score was calculated by summing the two items.

The Social Phobia Scale (SPS; Mattick & Clarke, 1998) and the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) were used to assess participants' anxiety around social performance and interaction. Both are widely used and validated measures of social anxiety. Cronbach alphas ranged from .86 to .93 for the SIAS, and from .89 to .95 for the SPS. The Depression subscale of the Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995) was used to measure symptoms of depression. Cronbach alphas for depression ranged from .92 to .95.

2.4.3. Moderator and mediator measures

The Inadequate Self and the Hated Self subscales of the Forms of Self-criticizing/Attacking and Self-Reassuring Scale (FSCRS) (Gilbert, Clarke, Hempel, Miles, & Irons, 2004) were used to measure self-criticism. This widely used measure has two subscales for self-criticism: Inadequate Self and Hated Self. Following previous research (e.g., Gilbert, Baldwin, Irons, Baccus, & Palmer, 2006), we combined these subscales to create a single construct of *self-criticism*, where higher scores indicate greater criticism. The FSCR scale has also shown adequate convergent and discriminant validity when examined with the Levels of Self-Criticism Scale (Gilbert et al., 2004; Thompson & Zuroff, 2004). In the current sample, Cronbach's alphas of self-criticism ranged from .94 to .97.

The Fear of Self-Compassion (FOSC) subscale was used from the Fear of Compassion Scale (Gilbert, McEwan, Matos, & Rivis, 2011). The subscale includes 15-items on a scale from 1 (*don't agree at all*) to 5 (*completely agree*) regarding the degree to which one is afraid of providing oneself with compassion. Example items are "I feel that I don't deserve to be kind and forgiving to myself", and "If I really think about being kind and gentle with myself it makes me sad". Although relatively recently developed, the scale thus far demonstrates good psychometric properties such as discriminant validity between the fear of self-compassion subscale and related constructs like self-compassion (r = -.54; Gilbert et al., 2011). In the current sample, Cronbach's alphas ranged from .92 to .96.

The Safe Positive Affect subscale of the Types of Positive Affect Scale (TPAS; Gilbert et al., 2008) and the Social Safeness and Pleasure Scale (SSPS; Gilbert et al., 2009) were used to measure activation of the soothing system. Currently, there is no scale that has been specifically designed to measure the activation of this proposed system. However, the constructs measured by these scales are consistent with theoretical descriptions of the psychological symptoms associated with the biopsychological 'soothing system' (e.g., Gilbert, 2010). The TPAS provides a list of 18 feelings and asks participants to rate how characteristic each feeling is on a scale from 0 (*not characteristic of me*) to 4 (*very characteristic of me*). The relevant subscale includes the feelings of safety, contentedness, security, and warmth. The SSPS provides 11 statements (e.g., "I feel a sense of warmth in my relationships with people") and asks participants to rate the frequency with which they feel that way. The TPAS has demonstrated adequate internal consistency and good test-retest reliability (e.g., r = .77 for the Safe Positive Affect subscale after a 3-week interval; Gilbert et al., 2012; Holden, Kelly, Welford, & Taylor, 2017). The SSPS has been found to possess good internal consistency, as well as strong construct and discriminant validity (e.g., r = .33 with positive affect; Gilbert et al., 2009; Kelly & Dupasquier, 2016). Cronbach alphas ranged from .75 to .81 for the Safe Positive Affect Subscale, and .91 to .95 for the SSPS.

The Event Probability and Cost Questionnaire (EPCQ; Rapee, Gaston, & Abbot, 2009) was used to measure the perceived likelihood of negative social events and the perceived consequences should these events occur. The questionnaire presents a set of 13 hypothetical scenarios such as "While you are talking with several people, one of them will leave", and "You will have trouble getting your words out while talking". In relation to the scenarios, participants are asked to rate both the likelihood of the event ("How likely is it, in the near future, that this event will happen to you?") and the degree of distress that the event would cause ("How bad or distressing would it be if this event happened to you?"). The probability and cost of the events was rated on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). The EPCQ has demonstrated Cronbach's alphas of .83 for Probability Bias and .89 for Cost Bias, and good construct validity (rs = .53, .58 with the SIAS, respectively; Rapee, Gaston, & Abbot, 2009). Over the five assessment points in the current study, Cronbach's alphas for the Probability Bias subscale ranged from .87 to .92, and for the Cost Bias subscale from .89 to .94.

The Self-Compassion Scale (Neff, 2003) was used to assess trait self-compassion, which contains six subscales of Self-Kindness, Self-Judgement, Common Humanity, Isolation, Mindfulness, and Over-Identification. This frequently used scale consists of 26 items rated on a 5-point scale ranging from 1 (*almost never*) to 5 (*almost always*). Typically, after reverse-coding negative items, scores are averaged on each subscale and then summed to create an overall self-compassion score. Research is currently mixed as to the factor structure of the Self-Compassion Scale (e.g., López et al., 2015; Neff et al., 2019). We decided to distinguish between the positive versus negative aspects of the Self-Compassion Scale given that considerable empirical evidence supports this

[5] Originally a 4-point scale was used but this required transformation due to low inter-rater reliability (kappa coefficient of 0.26).

approach (e.g., Coroiu et al., 2018; Kumlander, Lahtinen, Turunen, & Salmivalli, 2018), and some research has found that the negative aspects of the Self-Compassion Scale overlap with existing psychological constructs such as neuroticism (Pfattheicher, Geiger, Hartung, Weiss, & Schindler, 2017). For both the positive (PA-SC) and negative aspects of self-compassion (NA-SC), Cronbach's alphas ranged from .90 to .94 over the five assessment points.

The Social Self-Compassion Scale (SSCS; Flett, 2017) was used to assess self-compassion specifically in the social domain. The scale is derived from the original Self-Compassion Scale but this iteration has slightly adjusted wording. Examples of items include "When I fail to do the right thing in a social situation, I become consumed by feelings of inadequacy", and "I try to be understanding and patient towards myself when I fall short of my social expectations". Psychometric properties of the SSCS have yet to be published. However, when creating the scale, Flett found that the SSCS demonstrated good convergent, discriminant, and incremental validity. For example, the SSCS uniquely predicted constructs related to social anxiety (e.g., fear of negative evaluation) after controlling for the original Self-Compassion Scale. To maintain consistency with the Self-Compassion Scale, we also divided the SSCS into both positive (Cronbach alphas ranging from .78 to .87) and negative (Cronbach alphas ranging from .90 to .94) components.

To minimize participant burden, two short scales were created for anticipatory and post-event processing based on descriptions of these processes from the major cognitive models of SAD (e.g., Clark & Wells, 1995). The Anticipatory Processing Scale (APS) had 7-items and asked participants to "describe to what degree this type of thinking, feeling, or behaviour is characteristic of you when anticipating a social situation over the past week" and included items such as "I plan and rehearse conversations and behaviours" and "I think about what could go wrong". The Post-Event Processing Scale (PEPS) had 4-items and asked participants to "describe to what degree this type of thinking, feeling, or behaviour is characteristic of you following a social situation in the past week" and included items such as "I think about what happened" and "I think about how anxious I felt". Both scales were scored from 0 (*not at all*) to 4 (*extremely*). Cronbach's alphas ranged from .87 to .93 for the PEPS, and .83 to .92 for the APS.

Perceived inferiority was measured using the Social Comparison Scale (Allan & Gilbert, 1995). The 11-item Social Comparison Scale measures perceptions of the self in comparison to others on 10-point scales which are anchored on each end by bipolar descriptors such as *unattractive-attractive* and *weak-strong*. One additional item was added in the current study (*boring-interesting*) because it was deemed relevant to individuals with social anxiety. Descriptors cover judgements concerned with social rank, attractiveness, and belongingness. Participants are required to report where on the scale they are ranked in comparison to others. In the standard scoring of this scale, lower scores indicate greater perceptions of inferiority. In the current study, however, scores were reversed to ease interpretability of findings such that higher scores indicate greater perceptions of inferiority. The Social Comparison Scale has been used across both clinical and non-clinical populations and shows good psychometric properties such as strong reliability (see Allan & Gilbert, 1995; Gilbert & Allan, 1998). Across the five assessment points, Cronbach's alphas for perceived inferiority ranged from .87 to .94.

2.5. Data analysis

All analyses were conducted using the intention-to-treat sample, defined as those participants who progressed through the screening and completed the phone interview involving the MINI regardless of whether they completed the baseline measures. The first research question regarding the effectiveness of the interventions on the primary (SIAS and SPS) and secondary outcomes was addressed using linear mixed models (LMM). Mixed modelling is considered preferable to ANOVAs primarily due to its capacity to utilize all available data (Gueorguieva & Krystal, 2004), which is done through maximum likelihood estimation. In the current study, an unstructured covariance structure was used. The first analysis involved a 2 (group: self-compassion and cognitive restructuring) x 5 (baseline, mid-intervention, post-intervention, 1-week follow-up, and 5-week follow-up) mixed design. Reliable and clinically significant change was assessed using a combination of the Reliable Change Index (RCI), with a change exceeding 1.96 (z score) considered significant (Jacobson & Truax, 1991), and a movement from above to below the cut-offs on either the SIAS or SPS. As such, we defined an excellent response to the intervention as a participant who reported a reliable decrease in social anxiety *and* a change in status from above SAD cut-off to below. Thus, reliable and clinically significant change was assessed separately for the SPS and the SIAS, and only done for participants who were above cut-offs for the respective measure at baseline. LMM was also used for moderation analyses to test group by time by moderator interactions.

For the primary analyses, G-Power (Faul, Erdfelder, Buchner, & Lang, 2009) was used to determine that 52 participants in total were needed to detect a small to medium between-group effect (with $\alpha = .05$, $d = 0.35$ and 80% power), based on past similar research (e.g., Shapira & Mongrain, 2010). For the moderation analyses, we also used G-Power (Repeated Measures ANOVA, within-between interaction) to approximate the required sample size; the ANOVA option was used to approximate LMM which is not included in G-Power and given there is no established strategy for conducting power analyses for the specific analyses that we intended to conduct. Although sometimes simulation methods can be undertaken to estimate power, given our design, the new variables being measured, and the complex analyses, this was not considered an option. Accordingly, in order to detect a small moderation effect (based on past similar research, Kelly & Carter, 2015), we estimated that 122 participants in total were needed (with $\alpha = .05$, $f = 0.10$, groups[6] = 2, measurements = 5, correlation among repeated measures = .5, nonsphericity correlation = 1, and 80% power).

To evaluate differential mediation between groups, structural equation modelling (SEM) was used in the form of a simplex model with lagged pathways (see online material for full details), as per recent recommendations by Goldsmith et al. (2018). This model was chosen as it is designed for intervention-based longitudinal mediation analysis, and it is conducive to the study of temporal precedence – a major criterion required to establish mediation (Kazdin, 2007). The seven mediators (comprising eight measures) with repeated measures were substituted one by one into the model, making 16 models in total with the two outcome variables of SIAS and SPS. The effect of interest was the overall indirect effect which is calculated by multiplying the parameters for each indirect pathway and summing these together, with 95% confidence intervals used to assess significance. A significant overall indirect effect indicated a difference in mediation between cognitive restructuring and self-compassion. We used the PROCESS macro (Hayes, 2013) for simpler secondary exploratory analyses that did not involve repeated measurement of the mediators. These analyses examined the mediating role of treatment engagement: total words written and total level of self-compassion coded. Treatment condition was the predictor variable, and T5 SIAS/SPS scores the outcome variables of interest (controlling for baseline levels). Once again, the overall indirect effect was the effect of interest.

Finally, we examined the central proposition of compassion theorists that self-compassion leads to activation of the soothing system which in turns leads to a deactivation of the threat system. This proposition was tested using Random-Intercept Cross-Lagged Panel Modelling (RI-CLPM; see Hamaker, Kuiper, & Grasman, 2015) in order to control for between-person differences, with the overall indirect effect as the primary effect of interest. The individual indirect pathways

[6] Number of groups were specified as 2 given that the proposed moderators were assumed to have a linear effect.

Table 1
Demographic and diagnostic variables of the ITT sample. Frequency, means, and standard deviations (N = 119).

	SC (n = 60)	CR (n = 59)	Statistics
Demographics			
Gender (male/female)	15/45	13/46	χ^2 (1) = 0.15, p = .70
Age (in years)	30.93 (12.37)	27.12 (10.64)	t(115) = −1.81, p = .07
Therapy in past 12 months % (n)	40.0 (24)	42.4, (25)	χ^2 (1) = 0.07, p = .79
Student (student vs. non-student)	27/33	35/24	χ^2 (1) = 2.45, p = .12
DSM-5 diagnoses % (n)			
SAD	85.0 (51)	69.5 (41)	χ^2 (1) = 4.08, p = .04
Sub-threshold SAD	3.3 (2)	15.3 (9)	χ^2 (1) = 5.04, p = .03
Full or sub-threshold SAD	88.3 (53)	84.7 (50)	χ^2 (1) = 0.33, p = .57
MDD (current)	25.0 (15)	23.7 (14)	χ^2 (1) = 0.00, p = .97
MDD (past)	58.3 (35)	52.5 (31)	χ^2 (1) = 0.40, p = .53
Bipolar (current)	1.7 (1)	0.0 (0)	χ^2 (1) = 0.99, p = .32
Bipolar (past)	16.7 (10)	22.0 (13)	χ^2 (1) = 0.55, p = .46
Panic (current)	25.0 (15)	25.4 (15)	χ^2 (1) = 0.00, p = .96
Panic (past)	50.0 (30)	49.2 (29)	χ^2 (1) = 0.01, p = .93
Agoraphobia	26.7 (16)	18.6 (11)	χ^2 (1) = 1.09, p = .30
OCD	13.3 (8)	18.6 (11)	χ^2 (1) = 0.63, p = .43
PTSD	13.3 (8)	16.9 (10)	χ^2 (1) = 0.30, p = .58
Alcohol abuse	30.0 (18)	28.8 (17)	χ^2 (1) = 0.02, p = .89
Substance abuse	6.7 (4)	8.5 (5)	χ^2 (1) = 0.14, p = .71
Eating disorder	8.3 (5)	8.5 (5)	χ^2 (1) = 0.00, p = .98
GAD	36.7 (22)	25.4 (15)	χ^2 (1) = 1.76, p = .19

Note: SC = self-compassion; CR = cognitive restructuring; SAD = Social Anxiety Disorder; MDD = Major Depressive Disorder; OCD = Obsessive Compulsive Disorder; PTSD = Posttraumatic Stress Disorder; GAD = Generalized Anxiety Disorder; Student = student status (university student versus non-university student).

were specified from Cole and Maxwell (2003, p. 564). Positive aspects of self-compassion (PA-SC) was used as the independent variable (given evidence that PA-SC alone is a more valid measure of the construct of self-compassion; López et al., 2015), activation of the soothing system as the mediator (safe positive affect, social safeness and pleasure), and social anxiety (SIAS, SPS) as the outcome variable. For mediation analyses, variables were standardized in order to facilitate interpretation (Goldsmith et al., 2018). Analyses were conducted with IBM Statistical Package for the Social Sciences (SPSS), Version 25 (IBM Corp, 2017) and Mplus 3.13 (Muthén & Muthén, 2006).

3. Results

3.1. Preliminary analyses

Baseline demographic and diagnostic characteristics can be seen in Table 1, and Table 2 summarises self-report measures at baseline. There were relatively few differences between groups, although a higher number of participants in self-compassion met full SAD diagnostic criteria whereas greater numbers of subthreshold SAD participants were seen in cognitive-restructuring. However, there were no differences between the groups for those characterised as having full *or* subthreshold SAD (1 symptom short of meeting full criteria). Differences in psychological measures were found on the SIAS (higher scores in self-compassion group; d = 0.37) and in terms of positive aspects of social self-compassion (PA-SSC; higher scores in cognitive restructuring group; d = 0.40). As such, mixed model analyses using these constructs as outcome variables ran analyses both before and after controlling for their baseline levels and did not find any difference in results.

The cognitive restructuring group completed a significantly greater number of assessments across the study, t(102) = 2.48, p = .02, d = 0.49. There were 10 formal drop-outs (i.e., participants who explicitly asked to withdraw from the study): eight in self-compassion and two in cognitive restructuring. This difference approached significance, χ^2 (1) = 3.82, p = .051. Two participants dropped out without completing the baseline self-report questionnaires, five further participants dropped out before the mid-treatment assessment at T2 (day seven), and three further participants dropped out before the post-treatment assessment at T3 (day 14).[7] Group comparisons between drop-outs and completers showed no differences on diagnostic variables (ps > .05), but numerous differences on baseline self-report variables (see Table S1, online material), with drop-outs generally demonstrating greater psychopathology and lower treatment credibility ratings.

3.2. Treatment credibility, engagement and adherence

Table 3 shows that the cognitive restructuring group reported spending significantly more time on exercises, wrote more in the exercises, and completed a greater number of assessments than the self-compassion group. When comparing the level of self-compassion coded in the exercises, the self-compassion group had a significantly greater level. There was also a trend towards participants in cognitive restructuring judging their treatment as more credible at baseline than those in self-compassion. After excluding drop-outs, however, there were no longer significant group differences in exercises completed or words written (see Table S2 in supplementary material), although the effect for words written remained marginally significant (p = .050, approximately 400 word differences). Furthermore, the effect of time spent on exercises remained significant.

3.3. Treatment outcome

Table 4 demonstrates that as expected no interaction effects were found between treatment group and time on any primary or secondary outcome variables. As predicted, there were significant main effects of time, seen for all outcome variables (there was also an unanticipated main effect of group on SPS). Within-group effect sizes for social anxiety were generally small from baseline to T2 (mid-treatment) and T3 (final day of treatment; d's ranged from 0.06 to 0.58), and medium-sized from baseline to T4 (2-week posttreatment) and T5 (5-week follow-up; ranging from 0.44 to 0.80, see Table S3 in online materials for details).

3.4. Clinical significance of change and adverse outcomes

As summarised in the supplementary material (Table S3), approximately 20% of participants in each condition showed an excellent response as defined by a reliable reduction in social anxiety and a change in status from above to below SAD cutoff (on the SIAS and SPS) between pre-treatment and subsequent assessments. For the SIAS, 81.4% of those in cognitive restructuring and 91.7% of those in self-compassion were above cut-off at baseline. For the SPS, 74.6% of those in cognitive restructuring and 79.3% of those in self-compassion were above cut-off at baseline. No between-group differences on these indices emerged. A small number of participants (6.7%) reported a reliable increase in anxiety on the SPS between the pretreatment – posttreatment assessments (see supplementary material for further details).

3.5. Moderation

Table 5 and S5 (placed in supplementary material due to space considerations) show the mixed model results for *a priori* and exploratory moderator analyses, respectively. Contrary to prediction, neither of the *a priori* moderators (self-criticism and fear of self-compassion) were statistically significant (i.e., no group by time by

[7] For detailed breakdown see Fig. S2 in supplementary materials.

Table 2
Self-report psychological variables of the ITT sample at baseline. Means, and standard deviations (in parentheses) (N = 119).

	SC (n = 60)	CR (n = 59)	Statistics
SPIN	44.05 (8.67)	41.36 (9.14)	$t(117) = -1.65$, $p = .10$
SIAS	51.39 (12.20)	46.53 (13.48)	$t(115) = -2.04$, $p = .04$
SPS	35.97 (14.09)	33.47 (13.36)	$t(115) = -0.98$, $p = .33$
Self-criticism	32.46 (14.37)	31.78 (11.76)	$t(111) = -0.28$, $p = .78$
PA-SSC	15.01 (3.85)	16.77 (4.57)	$t(115) = 2.17$, $p = .03$
NA-SSC	23.90 (4.46)	22.79 (3.79)	$t(115) = -1.44$, $p = .15$
PA-SC	33.07 (9.22)	34.28 (8.98)	$t(115) = 0.72$, $p = .47$
NA-SC	45.25 (8.57)	44.12 (7.25)	$t(115) = -0.77$, $p = .44$
Post-event processing	10.47 (3.98)	8.98 (4.30)	$t(115) = 0.56$, $p = .06$
Anticipatory processing	18.09 (5.90)	16.34 (5.48)	$t(114) = -1.65$, $p = .10$
Safe positive-affect	6.71 (3.44)	6.76 (3.18)	$t(114) = 0.08$, $p = .93$
Social-safeness	18.48 (9.23)	19.71 (8.84)	$t(114) = 0.73$, $p = .47$
Fear of self-compassion	24.31 (12.35)	26.69 (11.57)	$t(115) = 1.08$, $p = .28$
Depression	17.80 (12.67)	16.21 (10.21)	$t(111) = -0.75$, $p = .46$
Probability bias	39.26 (9.45)	36.66 (9.76)	$t(114) = -1.46$, $p = .15$
Cost bias	45.86 (10.24)	43.78 (9.45)	$t(114) = -1.14$, $p = .26$
Perceived Inferiority	79.25 (15.02)	80.50 (14.47)	$t(115) = 0.73$, $p = .65$

Note. SC = self-compassion; CR = cognitive restructuring; SPIN = Social Phobia Inventory; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; PA-SSC = Positive Aspects of Social Self-Compassion; NA-SSC = Negative Aspects of Social Self-Compassion; PA-SC = Positive Aspects of Self-Compassion; NA-SC = Negative Aspects of Self-Compassion.

Table 3
Treatment engagement and adherence differences between groups. Means, standard deviations, effect sizes, and confidence intervals (N = 119).

	SC (n = 60)	CR (n = 59)	t-test	Cohen's d (CI 95%)
Overall treatment credibility	9.30 (2.39)	10.24 (2.44)	$t(106) = 1.98$, $p = .050$	0.36 (0.00, 0.73)
Treatment credibility - logic	5.14 (1.41)	5.70 (1.24)	$t(106) = 2.18$, $p = .032$	0.40 (0.04, 0.76)
Treatment credibility - confidence	4.15 (1.35)	4.54 (1.67)	$t(102) = 1.33$, $p = .186$	0.24 (−0.12, 0.60)
Exercises completed (out of 14 total)	10.32 (4.94)	11.90 (3.66)	$t(109) = 1.99$, $p = .049$	0.36 (0.00, 0.73)
Self-reported total minutes on exercises	93.55 (59.46)	151.39 (107.95)	$t(117) = 3.63$, $p < .001$	0.67 (0.30, 1.03)
Words written	1497.88 (1060.10)	1974.56 (1095.22)	$t(117) = 2.41$, $p = .017$	0.44 (0.08, 0.81)
Self-compassion level coded	23.28 (14.25)	15.61 (9.13)	$t(101) = -3.50$, $p = .001$	−0.64 (−1.01, −0.27)
Continued practice	3.86 (1.51)	3.75 (1.55)	$t(91) = -0.35$, $p = .726$	−0.06 (−0.42, 0.30)

Note. SC = Self-Compassion; CR = Cognitive Restructuring; Treatment credibility - logic refers to perceived logic of exercises; Treatment credibility - confidence refers to belief that the exercises will help; Self-compassion level refers to amount of self-compassion coded in exercises; Continued practice variable refers to number of informal practices of exercises since post-treatment and ranges from 2 to 9.

moderator interactions were evident. Only one of 19 exploratory moderators was significant (SPIN moderating the effect of intervention on the SIAS; $p = .003$). However, this effect only moderated the trajectory of SIAS, with scores in cognitive restructuring continuing to decrease from T3 to T4 before levelling out between T4 to T5, whereas scores in self-compassion slightly increased between T3 and T4 before reducing again from T4 to T5. As such, baseline SPIN did not predict differential SIAS scores between-groups at final follow-up (see Fig. S3 in supplementary material).

3.6. Differential mediation

There were no significant overall indirect effects from the primary mediation analyses (see Table S6, online materials). Specifically, none of the repeated measures mediators differentially mediated the relationship between treatment condition (self-compassion versus cognitive restructuring) and social anxiety (SIAS, SPS). Similarly, with exploratory analyses of treatment engagement (e.g., number of exercises completed, time spent practising), there were no significant overall indirect effects (*b*s ranging from −1.84, CI_{95} [-4.90, 0.79], to 0.18, CI_{95} [-0.47, 1.14]).

3.7. Further exploratory mediation

In order to evaluate the foundational arguments of compassion theorists, we tested whether positive aspects of self-compassion exerted an impact on social anxiety through an indirect effect on the soothing system (safe positive affect; social safeness and pleasure). Only the SIAS was used to measure social anxiety in these models as the random intercept for the SPS consistently produced a negative residual variance. The two models showed good fit: χ^2 (75) = 89.23 ($p = .125$), *RMSEA* = .04 ($p = .682$), *CFI* = 0.99, using safe positive affect as the mediator; and χ^2 (75) = 83.37 ($p = .238$), *RMSEA* = .03 ($p = .550$), *CFI* = 1.00 using social safeness and pleasure as the mediator. As reported in Table S7 (see online supplementary material), there were no significant overall direct or indirect effects (*b*s ranging from −0.02, CI_{95} [-0.12, 0.00], to 0.00, CI_{95} [-0.05, 0.02]).

4. Discussion

In the context of the emerging focus on using self-compassion techniques in the treatment of psychopathology, we examined whether a brief two-week online self-compassion intervention could reduce social anxiety among participants with elevated levels of symptoms. In addition, we investigated how self-compassion might operate to influence social anxiety (i.e., mediators) and for whom this approach might be most useful (i.e., moderators). This study represented the first occasion that the potential effectiveness of self-compassion for reducing social anxiety was directly compared with a self-help version of an established method for treating social anxiety, cognitive restructuring.

The results showed that both self-compassion and cognitive restructuring appeared to reduce trait social anxiety on established measures (the SIAS and SPS) over the five assessment points. Among those who were above cut-offs on the SIAS (86.5%) and SPS (75.6%) at baseline, approximately one fifth of the participants had achieved both a reliable reduction in social anxiety and a change in status from above

Table 4
Means, standard deviations, main effects of group and time, and interaction effects of group by time for all primary and secondary outcome variables.

Group	Variable	T1 *M* (*SD*)	T2 *M* (*SD*)	T3 *M* (*SD*)	T4 *M* (*SD*)	T5 *M* (*SD*)	Time	Group	Time × Group interaction
CR	SIAS	46.53 (13.48)	44.53 (11.67)	39.74 (12.94)	37.62 (13.58)	36.64 (14.34)	$F(4, 97) = 21.66$, $p < .001$	$F(1, 115) = 2.55$, $p = .113$	$F(4, 97) = 0.71$, $p = .589$
SC	SIAS	51.39 (12.20)	46.38 (10.63)	43.67 (13.11)	41.02 (12.96)	40.27 (15.78)			
CR	SPS	33.47 (13.36)	31.09 (12.20)	26.09 (13.60)	23.27 (13.59)	21.63 (14.24)	$F(4, 100) = 14.76$, $p < .001$	$F(1, 111) = 4.07$, $p = .046$	$F(4, 100) = 0.41$, $p = .800$
SC	SPS	35.97 (14.09)	35.04 (14.16)	32.67 (15.42)	29.41 (15.09)	28.13 (16.37)			
CR	S-crit	31.78 (11.76)	29.58 (12.27)	25.98 (13.56)	24.42 (14.80)	23.53 (14.98)	$F(4, 101) = 13.48$, $p < .001$	$F(1, 113) = 0.00$, $p = .993$	$F(4, 101) = 0.40$, $p = .807$
SC	S-crit	32.46 (14.37)	27.56 (14.66)	23.91 (14.51)	22.74 (15.53)	23.13 (14.84)			
CR	PA-SSC	16.76 (4.57)	17.25 (4.16)	17.44 (4.63)	17.58 (4.88)	18.47 (4.46)	$F(4, 99) = 10.68$, $p < .001$	$F(1, 113) = 1.19$, $p = .277$	$F(4, 99) = 1.36$, $p = .253$
SC	PA-SSC	15.07 (3.85)	17.10 (3.63)	17.17 (4.35)	16.83 (4.24)	18.38 (4.15)			
CR	NA-SSC	22.79 (3.79)	21.27 (3.82)	20.87 (4.07)	20.00 (4.50)	19.42 (4.59)	$F(4, 101) = 16.30$, $p < .001$	$F(1, 111) = 0.82$, $p = .368$	$F(4, 101) = 1.93$, $p = .112$
SC	NA-SSC	23.90 (4.46)	22.00 (4.41)	20.87 (4.69)	20.20 (5.36)	20.69 (5.14)			
CR	PA-SC	34.28 (8.98)	36.35 (9.25)	36.43 (8.54)	37.44 (9.46)	37.50 (10.22)	$F(4, 100) = 5.58$, $p < .001$	$F(1, 115) = 0.16$, $p = .688$	$F(4, 100) = 0.55$, $p = .700$
SC	PA-SC	33.07 (9.22)	35.96 (8.30)	37.00 (9.47)	37.13 (8.91)	37.48 (10.02)			
CR	NA-SC	44.12 (7.25)	42.73 (7.76)	41.13 (8.21)	40.25 (8.64)	38.07 (9.97)	$F(4, 99) = 12.33$, $p < .001$	$F(1, 114) = 0.10$, $p = .747$	$F(4, 99) = 0.84$, $p = .502$
SC	NA-SC	45.25 (8.57)	42.50 (8.73)	40.22 (9.31)	40.50 (10.71)	39.27 (10.93)			
CR	PEP	8.98 (4.30)	8.45 (4.12)	7.74 (3.86)	7.47 (4.35)	7.24 (4.51)	$F(4, 99) = 7.36$, $p < .001$	$F(1, 113) = 0.21$, $p = .649$	$F(4, 99) = 1.09$, $p = .366$
SC	PEP	10.47 (3.98)	8.73 (3.73)	7.67 (4.89)	7.37 (4.99)	7.66 (5.42)			
CR	AP	16.34 (5.48)	15.78 (5.12)	14.50 (5.79)	13.13 (6.84)	12.80 (5.85)	$F(4, 98) = 11.12$, $p < .001$	$F(1, 113) = 0.18$, $p = .670$	$F(4, 98) = 1.12$, $p = .349$
SC	AP	18.09 (5.90)	15.71 (6.42)	14.53 (7.17)	13.72 (8.06)	12.95 (8.40)			
CR	Safe-PA	6.76 (3.18)	7.60 (3.35)	7.43 (3.17)	7.81 (3.47)	8.19 (3.25)	$F(4, 100) = 5.60$, $p < .001$	$F(1, 114) = 0.02$, $p = .902$	$F(4, 100) = .22$, $p = .926$
SC	Safe-PA	6.71 (3.44)	7.28 (3.44)	7.60 (3.29)	7.89 (3.68)	8.14 (3.81)			
CR	SSP	19.71 (8.84)	21.80 (8.99)	22.87 (9.86)	23.25 (10.45)	23.98 (10.33)	$F(4, 100) = 6.84$, $p < .001$	$F(1, 112) = 0.25$, $p = .621$	$F(4, 100) = 0.46$, $p = .765$
SC	SSP	18.48 (9.23)	22.23 (8.33)	22.57 (9.14)	23.28 (9.93)	24.61 (9.64)			
CR	FOC	26.69 (11.57)	25.56 (13.54)	22.22 (13.51)	20.89 (15.16)	19.50 (14.62)	$F(4, 98) = 11.03$, $p < .001$	$F(1, 116) = 0.86$, $p = .349$	$F(4, 98) = 0.37$, $p = .832$
SC	FOC	24.31 (12.35)	23.15 (11.98)	20.09 (11.67)	20.00 (12.98)	19.02 (13.41)			
CR	DASS-D	16.21 (10.21)	15.13 (11.62)	12.37 (10.86)	13.09 (11.66)	13.82 (12.26)	$F(4, 99) = 8.51$, $p < .001$	$F(1, 109) = 0.19$, $p = .668$	$F(4, 99) = 1.12$, $p = .353$
SC	DASS-D	17.80 (12.67)	12.79 (11.42)	10.35 (10.03)	10.61 (11.27)	11.91 (11.86)			
CR	Prob-bias	36.66 (9.76)	35.85 (9.49)	33.56 (8.91)	33.11 (10.06)	33.04 (10.10)	$F(4, 98) = 5.14$, $p = .001$	$F(1, 109) = 3.05$, $p = .083$	$F(4, 98) = 0.43$, $p = .850$
SC	Prob-bias	39.26 (9.45)	36.85 (8.91)	36.52 (10.04)	35.85 (10.33)	36.48 (11.32)			
CR	Cost-bias	43.78 (9.45)	40.05 (9.43)	37.20 (10.56)	36.29 (10.80)	35.30 (11.51)	$F(4, 95) = 14.91$, $p < .001$	$F(1, 113) = 2.24$, $p = .137$	$F(4, 95) = 0.21$, $p = .932$
SC	Cost-bias	45.86 (10.24)	42.90 (11.01)	40.57 (11.77)	39.07 (11.36)	38.11 (12.35)			
CR	Inferiority	80.50 (14.47)	74.07 (15.57)	72.02 (15.12)	71.95 (14.65)	69.95 (15.45)	$F(4, 101) = 14.05$, $p < .001$	$F(1, 113) = .02$, $p = .894$	$F(4, 101) = 0.41$, $p = .802$
SC	Inferiority	79.25 (15.02)	74.57 (13.40)	72.93 (15.00)	72.48 (15.26)	71.87 (17.55)			

Note. T1 = baseline; T2 = mid-treatment; T3 = post-treatment; T4 = 1-week follow-up; T5 = 5-week follow-up; CR = Cognitive Restructuring; SC = Self-Compassion; Time = main effect of time; Group = main effect of group; Time X group = time by group interaction; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; S-crit = Self-Criticism; PA-SSC = Positive Aspects of Social Self-Compassion; NA-SSC = Negative Aspects of Social Self-Compassion; PA-SC = Positive Aspects of Self-Compassion; NA-SC = Negative Aspects of Self-Compassion; PEP = Post Event Processing; AP = Anticipatory Processing; Safe-PA = Safe Positive Affect; SSP = Social Safeness and Pleasure; FOC = Fear of Self-Compassion; DASS-D = Depression; Prob-bias = Probability Bias; Inferiority = Perceived Inferiority.

Table 5
Main effects of moderator, unstandardized betas of main effects of moderator, and time by group by moderator interaction statistics for SIAS and SPS.

	SIAS			SPS		
	M.E. of Moderator	*b*	Time × Group × Moderator	M.E. Moderator	*b*	Time × Group × Moderator
S-crit	$F(1, 111) = 35.56$, $p < .001$	0.33	$F(4, 97) = 0.87$, $p = .483$	$F(1, 105) = 35.11$, $p < .001$	0.38	$F(4, 97) = 1.10$, $p = .362$
FOC	$F(1, 111) = 17.18$, $p < .001$	0.32	$F(4, 96) = 0.84$, $p = .505$	$F(1, 107) = 27.95$, $p < .001$	0.45	$F(4, 98) = 0.97$, $p = .426$

Note. M.E. of Moderator = main effect of moderator; *b* = unstandardized beta of main effect of moderator; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; S-crit = Self-Criticism; FOC = Fear of Self-Compassion.

to below cut-off by the final assessment (five-week follow-up). There were no significant differences in rate of change between the groups on either of the primary outcome variables (SIAS, SPS). Similarly, on secondary outcome measures, both conditions demonstrated reductions on measures relevant to social anxiety and no interactions were observed. These main findings are consistent with past research that shows self-compassion interventions can reduce important characteristics of social anxiety, whether they be actual symptoms (e.g., Boersma et al., 2015) or related phenomenology ranging from anticipatory anxiety (Harwood & Kocovski, 2017) to unhelpful post-event processing (Blackie & Kocovski, 2018). As such, the current study extends knowledge drawn from previous research that has either been based on shorter experimental studies, or longer uncontrolled designs.

In line with the main findings, there was no evidence of differential mediation through activation of the soothing system or the other selected constructs. Given this finding, it may be that self-compassion and cognitive restructuring offer different ways to address social anxiety, but nonetheless operate through similar mechanisms. Another possibility, however, is that unique mechanisms of self-compassion become apparent during longer interventions or when alternative therapeutic strategies are implemented. Several other compassion-based approaches exist, such as visualising an ideal compassionate other and engaging in loving kindness meditation directed at the self (Gilbert, 2014). It may be useful to explore whether these alternative self-compassion strategies, not tested here, involve mechanisms that are distinct to those seen in cognitive restructuring.

Although the main study findings suggest that a self-compassion intervention reduced social anxiety, the mechanistic analyses present a more complex picture of what drove change in the current study. Notably, when collapsing the sample, changes in self-compassion did not appear to have a direct or indirect effect (through the soothing system) on social anxiety. Thus, there is some conflict in the fact that a self-compassion intervention appeared to reduce social anxiety, but the processes generally underlying symptom change did not seem to relate to changes in self-compassion itself, nor its hypothesized mechanism. This finding provides further support for the notion that self-compassion interventions might operate through non-specific treatment effects (e.g., increased expectations of improvement, increased awareness of cognitions), as opposed to unique elements of the practice of self-compassion (e.g., explicit focus on enhancing feelings of warmth and security). Alternatively, the measures used in the current study may not have fully captured the construct of self-compassion or activation of the soothing system. Indeed, recent research has criticized current measures of compassion (e.g., for insufficient evidence of factor structure) and called for the development of new measures that better assess an integrated definition of the construct (Strauss et al., 2016). Moreover, activation of the soothing system was assessed in our study using two proxy measures that assess the *psychological* symptoms of what is considered a biopsychological construct. However, it should be noted that these measures were developed by one of the prominent theorists in the compassion field. Furthermore, it is entirely possible that there are other mechanisms through which self-compassion operates that were not measured in the current study (e.g., psychological flexibility, shame, isolation). These other mechanisms, which might supersede or complement the soothing system, may be targets for future research in this area.

Contrary to hypotheses, the variables proposed, *a priori*, to moderate outcomes, namely fear of self-compassion and self-criticism, did not significantly influence outcomes. The current findings are inconsistent with one previous study that found higher fear of self-compassion predicted worse outcomes for those receiving a self-compassion intervention for binge eating disorder (Kelly & Carter, 2015). Several possible explanations exist for these inconsistencies. First, it is possible that fear of self-compassion only moderates outcomes at more extreme levels of this construct. In Kelly and Carter's study, the mean score for fear of self-compassion was significantly higher than the current study.[8] Second, the moderating role of fear of self-compassion may only occur when self-compassion is compared with a non-compassionate intervention. Kelly and Carter used an active control group of a behavioural intervention aimed at implementing healthier alternatives to binging. One important difference between this active control group and that used in the current study is that cognitive restructuring could actually be thought of as a relatively self-compassionate intervention, given that it likely involves the explicit challenging of negative self-beliefs and adoption of more positive self-beliefs (i.e., alternative thoughts). In comparison, the behavioural intervention aimed at reducing binging cannot be viewed as having the same level of explicit self-compassion. For example, it is plausible that someone could engage in these behavioural strategies while continuing to be highly self-critical.

This study was the first to investigate whether baseline self-criticism differentially predicts outcomes between self-compassion and cognitive restructuring, a component of CBT. The lack of moderation by self-criticism is consistent with two previous studies (Shapira & Mongrain, 2010; Sommers-Spijkerman et al., 2018), and inconsistent with one (Kelly et al., 2010). However, it should be highlighted that Kelly et al. only found self-criticism moderated outcomes when comparing the self-compassion group with a self-controlling group (e.g., firm and direct self-talk), which was clearly non-compassionate. Self-criticism did not differentially predict outcomes when comparing the self-compassion group with a self-energizing group, which did contain some self-compassionate elements (e.g., self-encouragement). As such, similar to the proposition made in regard to fear of self-compassion, it may be that self-criticism only moderates outcomes when self-compassion is compared with a clearly non-compassionate intervention. If this proposition is true, it would contradict the central arguments of compassion theorists that compassion-based approaches are particularly beneficial for highly self-critical individuals (e.g., Gilbert, 2010), even when compared with other (relatively compassionate) approaches such as cognitive restructuring. It may be that cognitive restructuring is equally as effective as self-compassion for reducing social anxiety among those high in self-criticism, perhaps because tools such as cognitive restructuring sufficiently equip individuals with the skills to challenge and reduce their self-critical thinking and activate their soothing system.

With the primary findings of the current study in mind, self-compassion appears to hold promise for future investigation as an alternative to current interventions for social anxiety. However, a number of

[8] $d = 0.74$, CI_{95} [0.38, 1.10].

considerations are important when making this suggestion. Notably, there was a trend towards self-compassion having more dropouts, having less exercises completed, and being perceived as less credible compared to cognitive restructuring. Individual analysis of the credibility items suggests that cognitive restructuring was perceived as more logical than self-compassion. It is important to replicate this and associated findings (e.g., higher drop-out) or whether other factors account for these trends. For example, baseline SIAS was higher in the self-compassion group, and negatively correlated with perceived credibility ($r = -.23$). In addition, dropouts reported significantly lower credibility (see Table S1 from supplementary materials) suggesting a possible causal relationship. Future research should continue to examine these relationships using groups with similar baseline social anxiety. Future studies could also measure credibility more comprehensively (only two items were included in the current study), in addition to related constructs such as treatment expectancies, in order to clarify whether group differences exist between self-compassion and cognitive restructuring-type approaches. Future research might also consider the inclusion of qualitative interviews of participants who dropout or score low on credibility in order to evaluate their reasons for doing so. It is also important to note that dropouts (again, comprised mainly of self-compassion participants) were more severe on several baseline measures and had lower treatment credibility. Thus, it is possible that those with more severe symptoms might require a more intensive intervention and/or might benefit from a stronger therapy rationale in future studies. It also remains to be seen how self-compassion would compare to cognitive restructuring in the context of a *therapist*-guided intervention, rather than self-guided. It is interesting to note that despite completing less exercises on average (i.e., lower treatment dosage), the self-compassion group had comparable clinical outcomes to the cognitive restructuring group. This finding raises the possibility that self-compassion may have a more potent effect on social anxiety compared to cognitive restructuring. However, the difference between groups in terms of completed exercises was small and was non-significant when drop-outs were excluded.

The study had several limitations. First, there was no waitlist control group to compare with the active interventions. As such, it is possible that participants' social anxiety reduced merely by being involved in a study for social anxiety, rather than as a consequence of completing the respective exercises. That said, numerous studies have demonstrated that brief CBT interventions outperform waitlist control groups (e.g., Diedrich, Grant; Hofmann, Hiller, & Berking, 2014; Goldin et al., 2013; Wolgast, Lundh, & Viborg, 2011), and as illustrated elsewhere (e.g., Hayward et al., 2008; Stevenson, Chen, Fairweather-Schmidt, Mattiske, & Nixon, 2019), social anxiety symptoms tend to be relatively stable. Furthermore, a recent meta-analysis demonstrates that waitlist control groups in SAD studies tend to show negligible change (Steinert, Stadter, Stark, & Leichsenring, 2017). Second, there were some baseline differences between the groups on several indices including the SIAS and the number of participants with a full SAD diagnosis. Although these differences were small and relevant analyses controlled for baseline levels, it is still possible that baseline disparities confounded the results. Interestingly, however, these baseline differences may provide additional support for self-compassion as an intervention, given the overall similarity in group outcomes. A further limitation was that the level of structure between the two writing conditions was different. The cognitive restructuring intervention had more specific questions and sections compared to the self-compassion condition, which may have caused a discrepancy in the ease of completion of the respective tasks, and in turn, other downstream effects (e.g., unequal treatment adherence). Although no primary group differences were found, future research could hold the level of structure constant in order to control for this potential confound. A final limitation was that this trial was not pre-registered. However, all measures included in the assessment battery are reported in analyses and data is of course available on request.

There were also several strengths to this research. First, the study recruited participants with elevated levels of social anxiety and conducted clinical assessment of SAD diagnosis, as well as other comorbidities. This allowed thorough documentation of the comorbidities that frequently accompany SAD, which also assists with conclusions in regard to the generalizability of findings. It should be noted that not all participants met full diagnostic criteria for SAD, however 77% did, and the entire sample reported levels of social anxiety in the clinical range. Second, the inclusion of an active control group was beneficial in order to make inferences about the efficacy of self-compassion in relation to a component of a gold-standard therapy for social anxiety. Additionally, use of such a control allowed more thorough and informative tests of both moderators and mediators. Knowledge of the factors that influence whether one benefits more from a self-compassion approach versus cognitive restructuring approach (or vice versa) is arguably more useful than when such comparisons are made against a waitlist control group. Furthermore, the informative evaluation of the moderators and mediators underlying therapeutic interventions is in line with the current movement towards process-based therapy (see Hayes & Hofmann, 2017).

In terms of further research avenues not already mentioned, a clear next step is to further investigate the acceptability of online self-compassion interventions in order to determine whether there are differences in comparison to interventions such as online cognitive restructuring. A further next step would be to implement larger scale study designs with longer interventions that include waitlist control groups. Although further research and replication is required, should self-compassion techniques be found to be effective, dismantling and comparison studies could be undertaken (e.g., dismantling the active ingredients of CFT, comparing CBT with CBT *plus* self-compassion). Given the suggestion that self-compassion may operate through non-specific treatment effects, it would be useful to determine whether adjunct self-compassion techniques (e.g., emphasizing warm voice tone, visualising compassionate other) can complement and enhance standard CBT techniques such as cognitive restructuring. Finally, the very high correlation between self-criticism and negative aspects of self-compassion (Table S8) was a potential limitation and future research could explore these constructs further in terms of measurement and discriminability.

5. Conclusion

The current study extended prior research by illustrating that self-compassion methods might be able to alleviate social anxiety symptoms. In the context of a brief online intervention, self-compassion appeared to have similar efficacy as cognitive restructuring in reducing social anxiety. However, some questions remain around the relative acceptability of this online self-compassion intervention, given the trend towards greater dropouts and lower credibility. Furthermore, questions remain around for whom self-compassion might be optimal, given the absence of meaningful moderators in the current study. This area of investigation awaits larger scale studies that will further inform us as to the utility of self-compassion approaches for SAD.

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Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.brat.2019.103492.

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