



The impact of imagery rescripting on memory appraisals and core beliefs in social anxiety disorder



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ABSTRACT

Negative mental images in social anxiety disorder (SAD) are often rooted in autobiographical memories of formative, distressing life events. In the present study, 25 participants with SAD retrieved an idiosyncratic negative mental image and associated autobiographical memory. Participants were then randomly assigned either to a single-session of *imagery rescripting* (IR) targeting the retrieved autobiographical memory or to a non-intervention control condition (no-IR). Outcomes were assessed one week later. Compared to control participants, those who received IR experienced substantial reduction in SAD symptoms accompanied by more positive and less negative appraisals of their autobiographical memories. Moreover, IR relative to no-IR participants reported marked shifts in the content, validity, and accuracy of their memory-derived negative core beliefs about self and others, but not about the world. Results support the promise of IR as a stand-alone intervention for SAD and suggest important directions for future research to enhance our understanding of the cognitive mechanisms that underlie its effects.

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According to cognitive models of social anxiety disorder (SAD), a key factor in the persistence of the disorder is the intrusion of recurrent, negative imagery into awareness when socially anxious individuals anticipate or enter social situations (e.g., Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997). These images, which may contain multisensory and cognitive elements, consist of mental representations that often highlight aspects of the self which the individual believes to be faulty or flawed (e.g., Hirsch, Clark, & Mathews, 2006; Moscovitch, Gavric, Merrifield, Bielak, & Moscovitch, 2011; Stopa, 2009).

Cognitive models posit a cycle that maintains social anxiety (SA) wherein negative imagery is activated when individuals are under social threat (Clark & Wells, 1995), and then relied upon for information about their current presentation or performance. Reliance on the image as a source of accurate information is problematic because images have been shown to contain negatively biased representations of the self, often seen from an observer perspective (Hackmann & Holmes, 2004; Hackmann, Surawy, & Clark, 1998), and to amplify negative emotional responses (Holmes & Mathews,

2005). Due to the erroneous belief that the image is valid and accurate (e.g., Hackmann et al., 1998; Hirsch, Clark, Mathews, & Williams, 2003), individuals adjust their behaviour – for example by dressing so as to conceal sweating, or planning what they will say in even a casual interaction – according to what they perceive within the image (“ex-consequencia reasoning”; Arntz, Rauner, & van den Hout, 1995; also, Hirsch, Meynen, & Clark, 2004). Such compensatory behaviours may prevent disconfirmation of biased assumptions about likelihood or cost of feared outcomes by preemptively preventing those outcomes (e.g., Clark & Wells, 1995; Salkovskis, 1991); hence, beliefs and assumptions are not updated, and the individual continues to perceive threat where it may not exist, and to behave according to that imaginary threat.

Using a semi-structured interview with a clinical sample of patients diagnosed with SAD, Hackmann and colleagues (Hackmann, Clark, & McManus, 2000; Hackmann et al., 1998; Wild, Hackmann, & Clark, 2007; Wild, Hackmann, & Clark, 2008) found that 100% of participants with SAD reported experiencing negative, recurrent, intrusive images in anxiety-provoking social situations. Using more standardized methodology with an analogue sample of high and low SA undergraduates, Moscovitch and colleagues (Moscovitch et al., 2011) found that 76% percent of high SA participants reported such images. Furthermore, most (74%, in Moscovitch et al., 2011) or nearly all (96% in Hackmann et al., 2000) participants who reported experiencing recurrent, intrusive images

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were able to identify a distressing earlier experience from which they believed the contents of the recurrent image were derived. Thus, negative images are historically-derived, carrying over distressing content from past autobiographical experiences. The negative autobiographical event that participants described as corresponding to their images tended to occur around the recalled onset or marked increase of SA symptoms (Hackmann et al., 2000), implying that the event was believed to play a pivotal role in anxiety development. For these reasons, some researchers have likened the phenomenon of intrusive imagery in social anxiety to that of intrusive imagery in Posttraumatic Stress Disorder (PTSD; Erwin, Heimberg, Marx, & Franklin, 2006; Wild & Clark, 2011). When evoked in the present, the images retrieved by socially anxious participants tend to activate strong negative emotions and to correspond with deeply held meanings about the self, others, and the world (Hackmann et al., 1998; Moscovitch et al., 2011; Wild et al., 2007, 2008).

Thus, negative images may be traced back to specific autobiographical memories and are threatening because of the idiosyncratic meaning they represent, suggesting an approach to intervention that helps patients access meaning through imagery and works within the structure of the memory itself in order to create cognitive and affective change. One of the fundamental tenets of cognitive behavioural therapy (CBT) is that people hold core beliefs about themselves, others, and the world which interact with one another to drive their affective and behavioural responses and inform the motivational rules that guide such responses (Padesky, 1994). A research agenda devoted to investigating the nature and potency of clinical applications that target mental images and autobiographical memories in individuals with emotional disorders such as SAD is valuable not only because of its potential to enhance public health outcomes by changing symptoms and associated core beliefs, but also because it may provide an ideal context for researchers to test theories about the mechanisms by which representations of the self are stored in memory, activated within particular emotional contexts, and retrieved into conscious awareness (e.g., Blinder, 2007; Brewin, 2006; Conway & Pleydell-Pearce, 2000; Prebble, Addis, & Tippett, 2013).

Imagery rescripting (IR) is a relatively novel intervention that has garnered increasing interest and attention within the clinical research community in recent years (Arntz, 2012; Holmes, Arntz, & Smucker, 2007; Stopa, 2011). IR occurs in three phases in which the patient's autobiographical memories are the target of 'rescripting' efforts that are geared toward altering their valence and associated meaning (see Arntz & Weertman, 1999). Originally developed as an intervention for PTSD-related trauma, IR has more recently been integrated into CBT protocols for a range of different disorders (see Arntz, 2012), including both group and individual treatment protocols for SAD (Clark et al., 2003; McEvoy, Erceg-Hurn, Saulsman, & Thibodeau, 2015; McEvoy & Saulsman, 2014). In phase 1, patients recount the memory from their own point of view *at the time of the event* (the "prior self"). They are directed to describe the scene using the first person (e.g., "I am standing at the front of the class"), conveying as much detail as they can recall, including characteristics of the environment, others present, and their own feelings and thoughts, as well as the sequence of events. In phase 2, patients *observe the scene from the perspective of the current self* (i.e., from the perspective of an adult, as they would presumably observe it if they should happen upon the scene today). They are instructed to participate in the scene as their current self, doing whatever needs to be done to make the outcome of the event more positive or satisfying for the prior self. In phase 3, the patient once again assumes the perspective of the prior self during the event and recounts the whole event again in the first person, this time incorporating the new content from phase 2. Once phase 3 has been

completed, clinician and patient collaboratively process the experience with the intention of summarizing changes and making them explicit, thereby helping to consolidate new learning.

Three previous studies have shown that the administration of a single-session of IR, combined with cognitive restructuring (CR), leads to significant improvements in SA symptoms, decreased distress in relation to negative memories, and reduced conviction in memory-related encapsulated beliefs (Lee & Kwon, 2013; Wild et al., 2007, 2008). In these studies, within- and/or between-subjects comparisons of IR-related changes at post-treatment and follow-up time points relative to pre-treatment or non-intervention control conditions were associated with substantial effect sizes across measures. A major methodological limitation of these prior studies, however, was that IR was delivered only after participants completed formal CR; in other words, IR was *combined* with a technique already well-known to be effective (e.g., Mattick, Peters, & Clarke, 1989; Taylor, 1996). Moreover, both of the Wild et al. studies used within-subjects rather than between-subjects comparisons to evaluate the impact of IR. As such, these studies were not designed in a manner that was capable of ascertaining the unique effects of IR as a stand-alone intervention.

Only one previous study has rigorously examined IR as a stand-alone treatment for SAD *without* the addition of CR (Nilsson, Lundh, & Viborg, 2012). Nilsson et al. (2012) randomized 14 patients with SAD to either IR without CR ($n = 7$) or a reading task control condition ($n = 7$). The results of the study indicated that participants who received IR in the absence of CR reported significant improvements relative to control participants across a number of outcome measures, including fear of negative evaluation and social interaction anxiety, feelings of distress related to the image and memory, and the encapsulated meaning of their images. Effect sizes were comparable to those reported in the earlier studies that combined IR and CR. More recently, Frets, Kevenaar, and van der Heiden (2014) published a series of six uncontrolled case studies showing that repeated administrations of IR without CR across multiple sessions led to improved outcomes for patients with SAD relative to pre-treatment baseline. Despite the encouraging results of the Frets et al. (2014) case studies, the study by Nilsson et al. (2012) remains the only empirical investigation to date that has documented the beneficial effects of IR without CR within the context of a controlled single-session intervention.

1. The present study

The primary aims of this study were twofold: First, to conduct a second controlled study designed to investigate the efficacy of IR as a stand-alone intervention for SAD in the absence of CR and, second, to examine the extent to which IR might facilitate specific changes in autobiographical event recollections and appraisals, as well as underlying core beliefs about the self, others, and the world in general. We hypothesized that in comparison to participants who were assigned to the non-intervention control condition, those who received IR would report both reduced SA symptoms and significant changes in their emotional appraisals of the autobiographical memories that were targeted during the brief intervention. With respect to participants' memory appraisals, we predicted that after IR, participants would specifically: (a) rate their feelings about the memory that was rescripted as significantly less embarrassed, ashamed, and otherwise not very good, and as significantly more proud, pleased, and otherwise very good; (b) rate the specific affective experience of retrieving the memory of the event as being less negative and intense and more positive; and (c) adjust the content of memory-derived core beliefs as well as their perceptions of the validity and accuracy of their original (pre-treatment) beliefs.

2. Methods and materials

2.1. Participants

The sample for this study consisted of undergraduate student participants with a clinical diagnosis of SAD. Participants were recruited for the study via a centralized recruitment mechanism within the authors' department in which potential participants complete a number of online measures at the start of every semester, and are then invited to participate in individual studies if they meet pre-established criteria. To be invited for the present study, potential participants were required to meet or surpass the cutoff scores (described below) on the *Social Phobia Inventory* (SPIN; Connor et al., 2000) and the self-report version of the *Liebowitz Social Anxiety Scale* (LSAS; Liebowitz, 1987). Participants were not aware of these inclusion criteria.

When invited into the laboratory, potential participants took part in a clinical assessment, in which a senior graduate student who had extensive training in psychodiagnostic assessment administered the *Mini-International Neuropsychiatric Interview* (M.I.N.I. 6.0; Sheehan et al., 1998) and the SAD module of the *Anxiety Disorders Interview Schedule for DSM-IV* (ADIS-IV; Di Nardo, Brown, & Barlow, 1994). Those who met full DSM-IV-TR (*American Psychiatric Association, 2000*) diagnostic criteria for a current principal diagnosis of SAD, and who did not meet predetermined exclusion criteria, including active suicidality, psychosis, alcohol/substance use/abuse that would interfere with participation, and/or a principal diagnosis other than SAD, were offered continued participation in the study.

Using this selection process, 60 participants provided informed consent and took part in the diagnostic assessment session based on their initial SPIN and LSAS scores. Of those 60, 28 met inclusion criteria when assessed using the diagnostic interview and were therefore offered participation in the remainder of the study. One participant opted to discontinue at the conclusion of the assessment session (due to scheduling constraints that became apparent while trying to book subsequent sessions), while 27 continued. All participants had a principal diagnosis of SAD, with 40% meeting diagnostic criteria for additional comorbid diagnoses, including Major Depressive Disorder or Dysthymia (18%), Generalized Anxiety Disorder (7%), Posttraumatic Stress Disorder (4%), Specific Phobia (4%), Bulimia Nervosa (4%), and other (3%). Participants received \$5 per half hour of participation and/or credits towards their psychology courses.

2.2. Procedure

All study procedures were approved by the institutional ethics board. Participants who met inclusion criteria and chose to continue in the study ($n = 27$) returned one week after the diagnostic assessment (Week 1) and completed a 90-min initial pre-treatment session during which they were administered the *Waterloo Images and Memories Interview* (WIMI, Moscovitch et al., 2011) along with the *Core Beliefs Module* (see below). Then, they completed the symptom measures and memory appraisal ratings described below. Participants who did not endorse experiencing recurrent negative imagery ($n = 1$) or who did not identify a specific autobiographical memory to which the image might have corresponded ($n = 1$) discontinued their participation following this session, leaving a final sample of 25 participants.

Half of the participants ($n = 13$) returned the following week (Week 2) for another 90-min session, which consisted of the IR intervention, which is described in detail below. The remaining 12 participants did not receive any intervention at Week 2. One week later, at Week 3, all participants completed the symptom measures

and memory appraisal ratings, which were administered online via an encrypted website. For ethical reasons, the IR intervention was subsequently offered and delivered to each of the 13 control participants.

2.3. Semi-structured interviews

The *Mini-International Neuropsychiatric Interview* (M.I.N.I. 6.0; Sheehan et al., 1998) is a structured clinical interview for the major Axis-I disorders in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV-TR; APA, 2000) and International Statistical Classification of Diseases, Tenth Revision (ICD-10; World Health Organization, 2004). The M.I.N.I. 6.0 takes significantly less time to administer than alternative diagnostic structured interviews such as the *Structured Clinical Interview for DSM-IV-TR* (SCID-I; First, Spitzer, Gibbon, & Williams, 2002); however, researchers have found that its psychometric properties are similar to lengthier structured interviews such as the SCID (Lecrubier et al., 1997; Pinninti, Madison, Musser, & Rissmiller, 2003). The SAD module from the *Anxiety Disorders Interview Schedule for DSM-IV* (ADIS-IV; Di Nardo et al., 1994) was also administered in order to collect more comprehensive information about participants' SA symptoms and to aid differential diagnosis.

The *Waterloo Images and Memories Interview* (WIMI; Moscovitch et al., 2011) was used in the present study to inquire about the presence of recurrent, intrusive images. The WIMI was originally developed to aid the empirical investigation of images and memories in a valid and reliable manner. It is a standardized, semi-structured interview that assesses the presence of negative and/or positive images and associated autobiographical memories in anxiety-provoking and non-anxiety-provoking social situations. In the present study, the WIMI was used in its original format, except that inquiries were limited to images and corresponding memories that participants experience in *negative*/anxiety-provoking social situations only (i.e., the probes about positive images/memories were not administered). As in the original WIMI, any autobiographical memories that were retrieved were required to have occurred at a *specific time and place*.

The *Core Beliefs Module for the WIMI* was developed for use in the present study. The WIMI protocol, as originally developed, does not explicitly explore the idiosyncratic meaning of the image/memory for each participant but the module elaborates this aspect of the WIMI by explicitly pursuing the underlying beliefs associated with participants' endorsed images in a standardized, semi-structured way within the interview itself. For the present study it was important to identify the personal meaning represented by, or embedded within, participants' endorsed images and memories more systematically than previous methods permitted. Previous research (Hackmann et al., 2000) established that core beliefs tend to be embedded within such imagery, but such information has not been systematically reported. Thus, the purpose of including this module in the present study was to have a consistent means of inquiring about the presence and content of core beliefs embedded in imagery. The module was appended to the WIMI in the pre-treatment session and each participant's unique responses were recorded by the experimenter.

2.4. Intervention

IR was administered as a single-session intervention based on published guidelines from prior research (Arntz & Weertman, 1999; Wild et al., 2007, 2008). Here, as in Nilsson et al. (2012), cognitive restructuring (CR) was *not* included as part of the IR protocol. Using the information obtained from the WIMI and Core Beliefs Module, the experimenter–therapist conducted a three-phase 'rescripting'

of imagery pertaining to a specific event in memory – in this case, the memory associated with the content of recurrent negative imagery. In preparation, the participant was informed that the experimenter–therapist would be turned slightly away from them and, thus, was encouraged not to have to maintain eye contact with the therapist during the imagery procedures. Participants were instructed either to close their eyes or gaze towards the floor.

In phase 1 of the intervention, participants were asked to recount the memory from the point of view of their self *at the time of the event* (i.e., the “prior self”). The participant was then directed (and, if necessary, reminded) to describe the scene in detail using the first person (e.g., “I am standing at the front of the class”), conveying as much detail as they could recall, including characteristics of the environment, others present, and their own feelings and thoughts, as well as the sequence of events.

Once this was complete, phase 2 began, in which the participant was instructed to observe the *scene from the perspective of the current self*. In other words, they were asked to observe the scene as they would if they witnessed it as a bystander today. Participants were instructed to begin (or, in some cases, they spontaneously began) to participate in the scene as their current self, doing whatever they felt needed to be done to make the outcome of the event “more positive or satisfying” for the prior self. These interventions were, at times, interactive either between prior and present self or between past or present self and others in the scene (e.g., confronting a bully or a critical parent).

In phase 3, the participant once again assumed the perspective of the prior self during the event and recounted the event again in the first person, this time incorporating the new content from phase 2. Finally, the researcher–therapist asked whether there is “anything more the prior self would like from the current self, or to see changed in the event.” If there was anything remaining, then participants were encouraged to enact that in the scene until they achieved a sense of satisfaction or completion. Once phase 3 was completed, the intervention was finished.

2.5. Symptom measures

To assess symptoms of SA, the *Social Phobia Inventory* (SPIN; Connor et al., 2000) and the *Liebowitz Social Anxiety Scale – Self Report Version* (LSAS-SR; Cox, Ross, Swinson, & Dorenfeld, 1998) were administered at Weeks 1 and 3. On the SPIN, participants rated the extent to which each of the 17 items bothered them over the past week on a 5-point scale ranging from 0 (Not At All) to 4 (Extremely). On the LSAS-SR, participants rated their fear and avoidance of 24 different social situations over the past week using a 4-point scale ranging from 0 (No Fear/Never Avoid) to 3 (Severe Fear/Usually Avoid). Both measures have shown very strong psychometric properties in previous studies and both can reliably distinguish individuals with vs. those without clinical levels of SAD (Antony, Coons, McCabe, Ashbaugh, & Swinson, 2006; Baker, Heinrichs, Kim, & Hofmann, 2002; Heimberg et al., 1999; Mennin et al., 2002). In the present study, a SPIN total score of 30 and an LSAS-SR combined fear and avoidance total score of 47 were used to preselect potentially eligible individuals for participation in the initial diagnostic assessment (see Mennin et al., 2002; Moscovitch, Rodebaugh, & Hesch, 2012; Moser, Hajcak, Huppert, Foa, & Simons, 2008).

The *Depression Anxiety Stress Scales 21-item* (DASS-21; Lovibond & Lovibond, 1995) questionnaire is a 3-factor self-report measure of depression, anxiety, and stress that has shown strong validity and reliability in previous studies (Antony, Bieling, Cox, Enns, & Swinson, 1998). For the present study, the DASS was administered at pre-treatment with a focus on the depression (DASS-D) subscale only in order to ensure that participants across the two

conditions did not differ in reported levels of depression symptoms.

2.6. Reliable symptom change

Applying Jacobson and Truax's (1991) Reliable Change Index (RCI) criteria to participants' SPIN scores, participants across the conditions were categorized as: (a) *recovered* (demonstrating reliable change of $RC > 1.96$ from Week 1 to Week 3 and reaching a Week 3 cutoff score on the SPIN for clinical significance); (b) *improved but not recovered* (showing reliable change from Week 1–3 but not reaching the established cutoff score on the SPIN); (c) *unchanged* (failing to meet either change criterion); or (d) *deteriorated* ($RC < -1.96$ from Week 1–3). Following instructions provided by Jacobson and Truax (1991), a SPIN cutoff score of 22.45 was derived from the study sample's Week 1 data ($M_1 = 41.77$; $S_1 = 9.66$) using the formula $a = M_1 + 2S_1$. Next, RCI values were calculated for each participant using the formula $RC = (X_2 - X_1)/S_{diff}$ and applying an RC cutoff criterion score at or above 1.96. The value substituted in the formula for S_{diff} was 5.11, which was calculated based on the test–retest reliability of .86 for the SPIN, as reported in Antony et al. (2006).

2.7. Memory appraisal ratings

2.7.1. Shame vs. pride about the autobiographical memory

At both Weeks 1 and 3, participants rated the following two items on 5-point scales ranging from 1 (very slightly or not at all) to 5 (extremely): (a) *I am embarrassed, ashamed, or otherwise don't feel very good about the event* and (b) *I am pleased, proud, or otherwise feel very good about the event*.

2.7.2. Perceived emotional impact of memory retrieval

At both Weeks 1 and 3, participants rated the valence and intensity of their affective responses during retrieval of the target memory. The following three items were rated using a 5-point scale ranging from 1 (very slightly or not at all) to 5 (extremely): (a) *While remembering the event, the emotions I felt were positive*; (b) *While remembering the event, the emotions I felt were negative*; and (c) *While remembering the event, the emotions I felt were intense*.

2.7.3. Perceived validity and accuracy of core beliefs derived from the recalled event

Once participants identified their memory-derived core beliefs about self, others, and the world, they were asked to rate the following items on a 5-point scale ranging from 1 (very slightly or not at all) to 5 (extremely) at both Weeks 1 and 3: (a) *I believe this thought is valid*; and (b) *I experience this belief as an accurate reflection of the way things 'really are.'*

2.8. Content of core beliefs derived from the recalled event

Immediately after completing the intervention at Week 2, participants were given an opportunity to revise their reported original beliefs about self, others, and the world in any way they desired. Specifically, participants were instructed at this stage to reflect on what they experienced/saw/learned during IR and, on this basis, to consider whether they would alter or revise their original cognitions about self, others, and the world in any way. If the participant responded in the affirmative, the revised cognition was recorded.

Reported data below are based on the full sample ($n = 27$) of participants after they received the IR intervention, including participants initially assigned to the control condition who subsequently received IR.

3. Data analytic procedure

Separate 2 (time) \times 2 (condition) mixed-factorial ANOVAs were conducted on the measures of interest, comparing participants' responses in the IR and control conditions at Weeks 1 and 3. Due to the modest sample size, both significant ($p < .05$) and nearly significant ($p < .10$) omnibus tests were followed up by paired-samples and independent-samples t -tests in order to probe the nature of the effects. Cohen's d was calculated for all significant or nearly significant between-condition univariate effects. Cohen (1988) suggested that small, medium, and large effect sizes are represented by d values of 0.2, 0.5, and 0.8, respectively. Non-trending, non-significant multivariate tests ($p > .10$) were not explored further. Reliable symptom change was calculated using the RCI criteria described above, and chi-square tests were used to examine differences in the proportion of participants between conditions whose clinical status after the intervention was improved/recovered or unchanged/deteriorated.

4. Results

4.1. Preliminary analyses

Participants' demographic and clinical characteristics are summarized in Table 1. As shown, there were no significant differences in age, gender, ethnicity, or diagnostic comorbidity between conditions. Comparisons of pre-treatment depression symptoms also revealed no significant differences between the IR condition ($M = 9.36$, $SD = 5.90$) and the non-intervention control condition ($M = 6.92$, $SD = 3.66$), $t(25) = 1.28$, $p = .21$.

4.2. Changes in SA symptoms

Descriptive statistics and tests of significance for the primary sets of analyses are provided in Table 2. Two 2 (Time: Week 1, Week 3) \times 2 (Condition: IR, Control) mixed-factorial ANOVAs were conducted with SPIN and LSAS-SR scores entered as the dependent variables in separate analyses. Analyses of SPIN scores revealed that at the omnibus level, there was a main effect of Time in the expected direction, $F(1, 23) = 7.35$, $p = .012$, $\eta^2_p = .24$. There was no main effect of Condition ($p = .54$), but there was a significant Time \times Condition interaction, $F(1, 23) = 19.33$, $p < .001$, $\eta^2_p = .46$, which is illustrated in Fig. 1. Examination of simple effects using follow-up paired-samples t -tests revealed significant changes in

SPIN scores from Week 1 to Week 3 for IR participants, $t(12) = 4.48$, $p = .001$, but not for control participants, $t(11) = 1.44$, $p = .18$. Follow-up independent samples t -tests comparing participants between conditions at each time point demonstrated that IR participants reported lower SPIN scores than control participants at Week 3, $t(23) = 2.06$, $p = .05$, $d = .86$, but not at Week 1, $t(25) = 1.42$, $p = .17$.

Analyses of LSAS-SR scores revealed that at the omnibus level, there was a main effect of Time in the expected direction, $F(1, 23) = 16.79$, $p < .001$, $\eta^2_p = .42$. There was no main effect of Condition ($p = .41$), but there was a significant Time \times Condition interaction, $F(1, 23) = 8.51$, $p = .008$, $\eta^2_p = .27$. Follow-up paired-samples t -tests revealed a significant decrease in LSAS-SR scores from Week 1 to Week 3 for IR participants, $t(12) = 4.40$, $p = .001$, but not for control participants, $t(11) = 1.02$, $p = .33$. Independent samples t -tests at each time point separately demonstrated that scores between conditions did not differ significantly at Week 1, $t(25) = 1.06$, $p = .30$, whereas scores for IR participants trended toward being significantly lower than those of control participants at Week 3, $t(23) = 1.86$, $p = .08$, $d = .78$.

4.3. Reliable symptom change based on RCI criteria

Among the 13 participants who completed the IR intervention, 3 (23.08%) were categorized as *recovered*, 5 (38.46%) as *improved but not recovered*, and 5 (38.46%) as *unchanged*. None was classified as *deteriorated*. Among the 12 participants in the WL condition, 11 (91.67%) were categorized as *unchanged* and 1 (8.33%) as *deteriorated*. Chi-square tests demonstrated that significantly more IR participants were *improved or recovered* and significantly more control participants were *unchanged or deteriorated*, $\chi^2(1) = 10.86$, $p = .001$. Post-hoc independent-samples t -tests revealed no baseline differences between IR responders ($n = 8$) and nonresponders ($n = 5$) in symptoms of social anxiety on the SPIN and LSAS-SR, or in symptoms of depression on the DASS-D (all $ts < 1.06$, all $ps > .31$).

4.4. Changes in appraisals of the autobiographical memory

Two 2 (time) \times 2 (condition) mixed-factorial ANOVAs were conducted on appraisals of the target memory (feeling embarrassed/ashamed or otherwise not very good about the event, feeling pleased/proud or otherwise very good about the event) entered as the dependent variables in separate analyses. Analyses of participants' ratings revealed omnibus main effects of Time, $F(1,$

Table 1
Sample characteristics overall and across conditions.

	Overall sample	IR condition	Control condition	Comparisons between conditions
Age in years: $M(SD)$	19.52 (1.25)	19.57 (1.16)	19.46 (1.39)	$t(25) = .22$, $p = .83$ ($n = 27$)
Gender (% female)	70%	79%	62%	$\chi^2(1) = .94$, $p = .42$ ($n = 27$)
Ethnicity				$\chi^2(4) = 3.52$, $p = .48$ ($n = 26$)
White/European	42%	31%	54%	
Chinese	30%	39%	23%	
Other Asian	18%	23%	16%	
Middle Eastern	4%	0%	8%	
Black/Caribbean	4%	8%	0%	
Comorbid diagnoses				$\chi^2(7) = 8.31$, $p = .31$ ($n = 27$)
None	60%	57%	62%	
MDD	11%	14%	8%	
Dysthymia	7%	0%	15%	
GAD	7%	7%	0%	
PTSD	4%	0%	4%	
Bulimia	4%	4%	0%	
Specific phobia	4%	4%	0%	
Multiple comorbidities	11%	11%	0%	

Note: IR = Imagery rescripting; MDD = Major Depressive Disorder; GAD = Generalized Anxiety Disorder; PTSD = Posttraumatic Stress Disorder.

Table 2

Mean scores on measures across conditions at Week 1 (pre-IR) and Week 3 (post-IR).

Measures	IR condition			Control condition			Comparisons between conditions	
	Week 1 M(SD)	Week 3 M(SD)	Comparisons within condition	Week 1 M(SD)	Week 3 M(SD)	Comparisons within condition	Week 1	Week 3
<i>SA symptoms</i>								
SPIN	41.77(9.66)	31.23(9.85)	$t(12) = 4.48^{**}$	37.50(8.01)	40.00(11.39)	$t(11) = 1.42$	$t(25) = 1.42$	$t(23) = 2.06^*$
LSAS-SR	76.62(19.15)	50.38(17.60)	$t(12) = 4.40^{**}$	72.25(20.33)	67.83(28.38)	$t(11) = 1.02$	$t(25) = 1.06$	$t(23) = 1.86^\dagger$
<i>Global perceptions</i>								
Embarr/Ashamed	4.08(1.19)	2.23(.83)	$t(12) = 6.73^{**}$	4.08(1.19)	3.82(.87)	$t(10) = 1.94^\dagger$	$t(25) = .63$	$t(22) = 4.55^{**}$
Pleased/Proud	1.15(.38)	1.85(.80)	$t(12) = 1.17$	1.00(.00)	1.09(.30)	$t(10) = .00$	$t(25) = .06$	$t(22) = 2.95^*$
<i>Emotional impact</i>								
Positive	1.23(.44)	2.31(1.11)	$t(12) = 3.74^*$	1.09(.30)	1.09(.30)	$t(10) = .00$	$t(25) = .45$	$t(22) = 3.52^*$
Negative	4.15(.69)	2.69(.85)	$t(12) = 6.01^{**}$	4.55(.69)	4.00(.77)	$t(10) = 1.75$	$t(25) = 1.45$	$t(22) = 3.90^{**}$
Intense	3.69(1.03)	2.23(.93)	$t(12) = 4.16^{**}$	3.45(1.04)	3.00(1.26)	$t(10) = 1.46$	$t(25) = .66$	$t(22) = 1.72$
<i>Core beliefs about Self</i>								
Validity	3.77(.83)	2.31(.85)	$t(12) = 5.02^{**}$	3.50(1.38)	3.33(1.56)	$t(11) = .48$	$t(25) = 1.33$	$t(23) = 2.06^*$
Accuracy	3.77(1.01)	2.38(.65)	$t(12) = 4.78^{**}$	3.67(1.23)	3.50(.90)	$t(11) = .69$	$t(25) = .40$	$t(23) = 3.56^*$
<i>Others</i>								
Validity	4.00(.60)	2.58(.90)	$t(11) = 4.93^{**}$	2.70(1.06)	2.70(1.16)	$t(9) = .00$	$t(22) = 3.87^{**}$	$t(20) = .27$
Accuracy	4.00(1.03)	2.67(.65)	$t(11) = 4.30^{**}$	3.20(1.03)	3.20(1.03)	$t(9) = .00$	$t(25) = 2.26^*$	$t(20) = 1.48$
<i>World</i>								
Validity	4.36(.50)	3.09(1.04)	Omnibus <i>ns</i>	3.67(1.12)	3.00(1.41)	Omnibus <i>ns</i>	Omnibus <i>ns</i>	Omnibus <i>ns</i>
Accuracy	4.00(1.00)	2.63(1.12)	$t(10) = 4.89^{**}$	3.67(1.22)	3.22(1.39)	$t(8) = 1.08$	$t(20) = .86$	$t(18) = 1.04$

Note. IR = Imagery rescripting; SPIN = Social Phobia Inventory; LSAS-SR = Liebowitz Social Anxiety Scale – Self Report Version; Embarr/Ashamed = Feeling embarrassed, ashamed, or not very good about the event; Pleased/Proud = Feeling pleased, proud, or otherwise very good about the event; * $p \leq .05$; ** $p \leq .001$; $^\dagger p < .10$; *ns* = not significant.

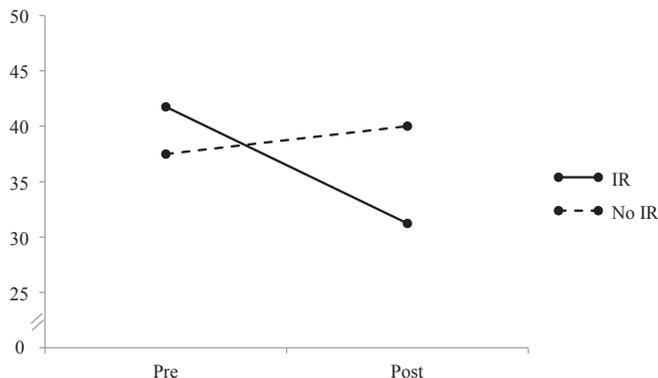


Fig. 1. Changes in Social Phobia Scale (SPIN; range = 0–68) total scores from pre-to post-treatment (Week 1 and Week 3) in imagery rescripting (IR) vs. non-intervention control (no-IR).

$22) = 36.72, p < .001, \eta^2_p = .63$, and Condition, $F(1, 22) = 8.43, p = .008, \eta^2_p = .28$, as well as a significant Time \times Condition interaction, $F(1, 22) = 10.86, p = .003, \eta^2_p = .33$. Examination of simple effects using follow-up paired-samples *t*-tests in each condition separately revealed significant changes in embarrassment/shame from Week 1 to Week 3 for IR participants, $t(12) = 6.73, p < .001$, but a non-significant trend for control participants, $t(10) = 1.94, p = .08$. Follow-up independent samples *t*-tests comparing participants between conditions at each time point demonstrated that IR participants reported lower ratings of embarrassment/shame than control participants at Week 3, $t(22) = 4.55, p < .001, d = 1.94$, but not at Week 1, $t(25) = .63, p = .53$.

Analyses of pleased/proud ratings revealed omnibus main effects of Time, $F(1, 22) = 8.31, p = .009, \eta^2_p = .27$, and Condition, $F(1, 22) = 9.93, p = .005, \eta^2_p = .31$, as well as a significant Time \times Condition interaction, $F(1, 22) = 4.90, p = .04, \eta^2_p = .18$. Examination of simple effects using follow-up paired-samples *t*-tests in each condition separately revealed no significant changes in

ratings from Week 1 to Week 3 for either group of participants, $t_s < 1.18, p_s > .26$. Follow-up independent samples *t*-tests between conditions at each time point separately demonstrated that IR participants reported significantly higher ratings of pride than control participants at Week 3, $t(22) = 2.95, p = .007, d = 1.26$, but not at Week 1, $t(25) = .06, p = .95$.

4.5. Changes in perceived emotional impact of memory retrieval

Three 2 (time) \times 2 (condition) mixed factorial ANOVAs were conducted with participants' appraisals of the valence and intensity of the affective consequences of memory retrieval (positive emotions during retrieval, negative emotions during retrieval, and intense emotions during retrieval) entered as the dependent variables in separate analyses. Analyses of the positive emotion ratings revealed omnibus main effects of Time, $F(1, 22) = 10.19, p = .004, \eta^2_p = .32$, and Condition, $F(1, 22) = 10.55, p = .004, \eta^2_p = .32$, as well as a significant Time \times Condition interaction, $F(1, 22) = 10.19, p = .004, \eta^2_p = .32$. Examination of simple effects using follow-up paired-samples *t*-tests in each condition separately revealed that ratings of positive emotions during retrieval increased significantly from Week 1 to Week 3 for IR participants, $t(12) = 3.74, p = .003$, but did not change for control participants, $t(10) = .00, p = 1.00$. Follow-up independent samples *t*-tests between conditions at each time point demonstrated that IR participants reported greater positive emotions than control participants at Week 3, $t(22) = 3.52, p = .002, d = 1.50$, whereas the two conditions did not differ at Week 1, $t(25) = .45, p = .65$.

Analyses of the negative emotion ratings revealed omnibus main effects of Time, $F(1, 22) = 26.46, p < .001, \eta^2_p = .55$, and Condition, $F(1, 22) = 12.44, p = .002, \eta^2_p = .36$, as well as a significant Time \times Condition interaction, $F(1, 22) = 5.51, p = .03, \eta^2_p = .20$. Follow-up paired-samples *t*-tests in each condition separately revealed significant decreases in ratings of negative emotions during retrieval from Week 1 to Week 3 for IR participants, $t(12) = 6.01, p < .001$, but not for control participants, $t(10) = 1.75, p = .11$. Independent samples *t*-tests comparing conditions at each time point demonstrated that IR participants reported less negative emotion during memory retrieval than control

participants at Week 3, $t(22) = 3.90$, $p = .001$, $d = 1.66$, but no difference between conditions at Week 1, $t(25) = 1.45$, $p = .16$.

Analyses of the intensity of felt emotions during retrieval revealed an omnibus main effect of Time, $F(1, 22) = 16.06$, $p = .001$, $\eta^2_p = .42$, but not Condition ($p = .47$). There was also a marginally significant Time \times Condition interaction effect, $F(1, 22) = 4.44$, $p = .05$, $\eta^2_p = .17$. Follow-up paired-samples t -tests in each condition separately revealed significant decreases in intensity ratings from Week 1 to Week 3 for IR participants, $t(12) = 4.16$, $p = .001$, but not for control participants, $t(10) = 1.46$, $p = .18$. Independent samples t -tests comparing participants between conditions at each time point demonstrated that intensity ratings of IR and control participants did not differ significantly at either time point ($ps > .10$).

4.6. Changes in perceived validity and accuracy of core beliefs derived from the recalled event

Two separate 2 (time) \times 2 (condition) mixed factorial ANOVAs were conducted on participants' ratings of the validity and accuracy of their memory-derived core beliefs, respectively. Three separate sets of these analyses were conducted: first, examining core beliefs about the self; then, core beliefs about others; and finally, core beliefs about the world.

4.6.1. Core beliefs about the self

Analyses of participants' perceived validity of core beliefs about themselves revealed a significant omnibus main effect of Time, $F(1, 23) = 13.17$, $p = .001$, $\eta^2_p = .36$, but no effect of Condition ($p = .38$). There was also a significant Time \times Condition interaction, $F(1, 23) = 8.33$, $p = .008$, $\eta^2_p = .27$. Examination of simple effects using follow-up paired-samples t -tests in each condition separately revealed significant decrease in the perceived validity of core beliefs about the self from Week 1 to Week 3 for IR participants, $t(12) = 5.02$, $p < .001$, but not for control participants, $t(11) = .48$, $p = .64$. Independent samples t -tests comparing participants between conditions at each time point demonstrated that the difference in the perceived validity of core self-beliefs endorsed by IR vs. control participants was marginally significant at Week 3, $t(23) = 2.05$, $p = .05$, $d = .86$, but not at Week 1, $t(25) = 1.33$, $p = .20$.

Analyses of participants' perceived accuracy of core beliefs about themselves revealed a significant omnibus main effect of Time, $F(1, 23) = 9.94$, $p = .004$, $\eta^2_p = .30$, but no Condition effect ($p = .10$). There was also a significant Time \times Condition interaction, $F(1, 23) = 6.13$, $p = .002$, $\eta^2_p = .21$. Follow-up paired-samples t -tests in each condition separately revealed significant decrease in the perceived accuracy of core beliefs about the self from Week 1 to Week 3 for IR participants, $t(12) = 4.78$, $p < .001$, but not for control participants, $t(11) = .41$, $p = .69$. Independent samples t -tests comparing participants between conditions at each time point demonstrated that the difference in the perceived accuracy of core self-beliefs endorsed by IR vs. control participants was significant at Week 3, $t(23) = 3.56$, $p = .002$, $d = 1.48$, but not at Week 1, $t(25) = .40$, $p = .69$.

4.6.2. Core beliefs about others

Analyses of the perceived validity of core beliefs about others revealed a significant omnibus main effect of Time, $F(1, 20) = 12.94$, $p < .002$, $\eta^2_p = .39$, but no effect of Condition ($p = .11$). There was also a significant Time \times Condition interaction, $F(1, 20) = 12.94$, $p = .002$, $\eta^2_p = .39$. Follow-up paired-samples t -tests in each condition separately revealed significant decrease in perceived validity of core beliefs about others from Week 1 to Week 3 for IR participants, $t(11) = 4.93$, $p < .001$, but not for control participants, $t(9) = .00$, $p = 1.00$. Independent samples t -tests comparing

participants between conditions at each time point demonstrated that the difference in the perceived validity of core beliefs about others endorsed by IR vs. control participants was significant at Week 1, $t(22) = 3.87$, $p = .001$ despite random assignment to condition, but this difference disappeared by Week 3, $t(20) = .27$, $p = .79$, due to the decrease in these ratings observed in IR participants alone (as detailed above and outlined in Table 2).

Analyses of the perceived accuracy of core beliefs about others revealed a significant omnibus main effect of Time, $F(1, 20) = 7.86$, $p = .011$, $\eta^2_p = .28$, but no effect Condition ($p = .64$). There was also a significant Time \times Condition interaction, $F(1, 23) = 7.86$, $p = .011$, $\eta^2_p = .28$. Follow-up paired-samples t -tests in each condition separately revealed significant decrease in the perceived accuracy of core beliefs about others from Week 1 to Week 3 for IR participants, $t(11) = 4.30$, $p = .001$, but not for control participants, $t(9) = .00$, $p = 1.00$. Independent samples t -tests comparing participants between conditions at each time point demonstrated that the difference in the perceived validity of core beliefs about others endorsed by IR vs. control participants was significant at Week 1, $t(22) = 2.26$, $p = .03$ despite random assignment to condition, but this difference disappeared by Week 3, $t(20) = 1.48$, $p = .16$, due to both the decrease in these ratings observed in IR participants (as detailed above) and a slight increase in accuracy ratings from Week 1 to 3 among control participants, as shown in Table 2.

4.6.3. Core beliefs about the world

Analyses of the perceived validity of core beliefs about the world revealed a significant omnibus main effect of Time, $F(1, 20) = 12.94$, $p = .002$, $\eta^2_p = .39$, but no effect of Condition ($p = .35$), and no Time \times Condition interaction ($p = .22$). Pairwise comparisons revealed a significant difference between Week 1 and Week 3 collapsed across conditions ($p = .001$), with all participants endorsing higher validity ratings at Week 1.

Analyses of the perceived accuracy of core beliefs about the world revealed a significant omnibus main effect of Time, $F(1, 18) = 14.03$, $p = .001$, $\eta^2_p = .44$, but no effect of Condition ($p = .35$). The Time \times Condition interaction trended toward significance, $F(1, 18) = 3.63$, $p = .07$, $\eta^2_p = .17$. Pairwise comparisons revealed a significant difference between Week 1 and Week 3 collapsed across conditions ($p = .001$), with all participants endorsing significantly higher accuracy ratings at Week 1. Follow-up paired-samples t -tests in each condition separately revealed significant decrease in perceived accuracy of core beliefs about the world from Week 1 to Week 3 for IR participants, $t(10) = 4.89$, $p = .001$, but not for control participants, $t(8) = 1.08$, $p = .31$. Follow-up independent samples t -tests revealed no significant differences between conditions at either time point ($ps > .31$).

4.7. Changes in content of core beliefs derived from the recalled event

Across the entire sample, before receiving the IR intervention, 100% of the 27 participants identified a negative core belief about themselves that derived from the event, 93% identified a negative core belief about others, and 82% identified a negative core belief about the world. After the intervention, 25 of 27 (93%) revised their core beliefs about themselves, 23 of 24 (96%) revised their core beliefs about others, and 22/22 (100%) revised their core beliefs about the world. Descriptive examples of original and updated core beliefs are provided in Table 3.

5. Discussion

Results support the notion that a single-session of IR as a stand-alone intervention is effective not only at significantly reducing SA

Table 3

Selected illustrative examples of participants' original and updated core beliefs about self, others, and world at pre- and post-IR.

Domain	Original beliefs (Pre-IR)	Updated beliefs (Post-IR)
1. Self	I am different, I'm disconnected from others and don't have the right to join the group.	I am different, but so is everybody else. Everybody feels disconnected – it's up to the individual to connect with everybody else.
Others	Other people are very connected with each other; there's no need for me to be connected.	Other people may be more connected, but everyone has to work on it just the same.
World	It doesn't make a difference in the world no matter who I am or what I do.	It may not make a difference to the world, who you are or what you do; but it makes a difference to you and the people around you.
2. Self	I'm worthless. If people get to know me, they'll reject me.	If I accept myself, other people will accept me. I've got lots of qualities and traits that make me likeable and I can laugh at my shortcomings or work on them if I want to change.
Others	Other people are confident and know what they're doing.	Other people don't judge me as much as I might judge myself. Everyone has their shortcomings – some just hide it better than others. I don't judge people for their shortcomings so I can expect others don't judge me either
World	The world is a great place, but if I'm not competent I can't be a part of it.	You don't have to go through the one "ideal" path to have a place in the world. The world is a great place in general.
3. Self	I am deficient. People will see this and will not accept me.	I'm not deficient, I'm human like everyone else.
Others	Other people can't relate to my struggles, so they'll be judgmental and reject me.	Other people can relate to my experiences because they experience them as well. Because they have similar struggles, they'll be understanding rather than judgmental or rejecting.
World	The world is harsh and cruel. You constantly have to prove yourself or you will have a sad, unfulfilled existence.	The world is full of challenges. You need to do your best and if you do overall good things will come.

symptoms and facilitating recovery from SAD, but also at altering the meaning and emotional impact of negative autobiographical memories that are targeted by the intervention. Alongside the one previous investigation by Nilsson et al. (2012), the present study represents only the second study in the literature to demonstrate the beneficial effects of stand-alone single-session IR without accompanying CR.

Replicating and extending the results of prior work in this area, participants in the current study who received IR relative to those who did not reported significant reductions in feeling embarrassed, ashamed, or otherwise not very good about the event and increases in feeling pleased, proud, or otherwise very good about their rescripted autobiographical experiences. They also reported more positive and less negative emotional reactions associated with retrieving memories of these painful events. Moreover, IR was associated with significant reduction in participants' ratings of the validity and accuracy of their memory-derived core beliefs, as well as in the *content* of these beliefs, which was almost universally revised following IR in a manner that assimilated new information drawn from the intervention.

One particularly novel aspect of these findings is that they indicate that IR is a powerful and efficient method for accessing, addressing, and reducing negative core beliefs about both self and others – results that are consistent with cognitive and interpersonal theories of SAD that ascribe central roles to negative beliefs about both the self (e.g., Moscovitch, 2009) and others (e.g., Alden & Taylor, 2004; Bielak & Moscovitch, 2013) in its development and persistence. Whereas ratings of the accuracy of core beliefs about the world decreased significantly for participants with SAD from pre- to post-intervention, between-condition comparisons were not significant at either time point, suggesting that other types of targeted CBT interventions (e.g., behavioural experiments) may be more helpful than IR for changing patients' core beliefs about the world. Alternatively, it is possible that modifications could be usefully integrated into the IR protocol in order to target these types of beliefs more effectively (e.g., by selecting a specific memory that embodies such beliefs most strongly, or focussing on rescripting a particular aspect of the memory in a way that is likely to modify negative beliefs about the world, or even instructing participants to intervene within the memory in phase 2 of the intervention in a manner that would challenge such beliefs more directly). Moreover, future studies could more fruitfully investigate the differential effects of IR on beliefs about self, others, and the

world with the help of temporally-sequenced longitudinal designs and accompanying time-lagged mediational analyses, ideally including follow-up assessments at regular intervals (e.g., 3 months, 6 months, 1 year, etc.). With such a design, it would be possible to examine the interactive nature of changes in symptoms and each type of core belief as a result of IR as they unfold over the course of time.

The rationale that underpins CBT interventions is based on learning and information processing theories which presume that early maladaptive core beliefs play a fundamental role in chronic affective and behavioural problems (see Beck, 1976; Calvete, Orue, & Hankin, 2013). Despite the importance of core beliefs for understanding and treating psychological problems, many seasoned CBT practitioners assert that specific interventions designed to target such beliefs ought to be introduced only at a later stage in therapy, once initial skill-building tasks have been mastered and preliminary therapeutic goals have been achieved. This commonly held viewpoint is based partly on the perception that such initial groundwork is often important for preparing patients adequately for core belief work, which can be difficult and emotionally draining, and partly on the knowledge that core beliefs can be notoriously resistant to change (see Padesky, 1990; Young, Klosko, & Weishaar, 2003). From this perspective, therefore, it is revealing that a stand-alone and relatively brief single-session intervention such as IR could produce meaningful changes in patients' core beliefs about self and others without providing the scaffolding that is generally perceived as a prerequisite for such work, including the more protracted time and energy that is typically used in therapy to allow patients to develop a strong therapeutic alliance and master preliminary skills such as CR (see also, Brewin et al., 2009; Cooper, 2011). To this end, it appears that IR may be an effective technique for helping socially anxious patients make significant changes to deeply held cognitions that are often strongly resistant to change (e.g., Beck & Dozois, 2011; Padesky & Greenberger, 1995; Wenzel, 2012). Future research is needed, however, to determine whether self-reported changes in such beliefs as a result of IR would also be reflected in new ways of behaving and relating to self and others in patients' natural day-to-day lives.

When therapists help patients induce change in a top-down way during CBT by identifying assumptions and beliefs and challenging them based on their logical validity, it is assumed that doing so will facilitate affective change. Indeed, there is good evidence that this

can be helpful in improving SAD (e.g., Taylor et al., 1997). However, while patients with SAD and related difficulties tend to succeed in countering assumptions and beliefs, a disjunction between logical thought and underlying emotion – sometimes referred to as “knowing with the head but not believing with the heart” (e.g., Barnard & Teasdale, 1991; Greenberg & Safran, 1984) – may remain. In other words, they might logically know that their assumptions are incorrect but continue to *feel* as though they are true. It seems likely that the experiential nature of IR and, in particular, the spontaneous reappraisal processes that are generated by this intervention, help to bridge this disconnection by simultaneously activating different subsystems or structures within a broader network. The importance of such broad-based activation within the mechanistic operations of CBT interventions is highlighted by the major tenets of various theoretical models, including emotional-processing theory (Foa & Kozak, 1986), which asserts that memory networks must be activated in order to alter fear associations; the Interacting Cognitive Subsystems approach (Teasdale, 1993), which emphasizes the schematic nature of the interrelationships among meaning, experiences, and emotions; and Brewin's (2006) Retrieval Competition Hypothesis, which underscores the importance of strengthening associations to positive self-representations in memory as a means to decrease the influence of negative self-representations and related symptom-maintaining cognitions and behaviours.

In the present study, in contrast to the top-down approach of some cognitive techniques (for example, cognitive restructuring), core beliefs were elicited prior to rescripting and then revisited at the end of the intervention. Identification and revisiting of core beliefs were not formal components of the rescripting itself; however, based on the experience from this study, we would recommend – for a number of reasons – that they be added to standard IR procedures. First, doing so serves a summarizing function for the patient. In initially eliciting core beliefs via the image and corresponding memory, their meaning becomes explicit, their symbolism becomes more clearly defined, and their impact can be elucidated – all of which sets the stage for change. Second, in the process of rescripting, that initial meaning is altered, whether by achieving a different perspective on the initial meaning or generating new meaning altogether. At the conclusion of the rescripting, then, it is highly instructive and rewarding for patients to revisit those original beliefs and have the opportunity to revise them in light of the rescripting experience. The therapist only needs to provide some structure and coaching for this step but the majority of participants tend to identify revisions to content fairly readily. Finally, having knowledge of the idiosyncratic meaning encapsulated in the memory/image is helpful as the therapist guides the patient to resolution. For example, if the patient does not spontaneously choose actions within the memory “scene” that address the core meanings, the therapist may guide him or her towards actions or reflections that do pertain to the core meaning – and in so doing, may render the intervention more effective.

This study has raised the topic of whether there is any meaningful distinction between a single brief and powerful intervention and a stand-alone *treatment* (see Hollon, 2002). Based on this study's results, why would we not simply use the brief intervention model implemented here to treat SAD, rather than a longer and more costly course of treatment (e.g., Rapee, Gaston, & Abbott, 2009)? There are at least a few possible reasons. First, while effect sizes were large in this study (as they have been in previous ones investigating IR for SAD), symptoms were generally not in the non-clinical range after the intervention, with only about 23% of the IR patients showing full recovery, 38% demonstrating reliable clinical improvement but not recovery, and the rest showing no reliable changes in clinical status. While a combined improvement

and recovery rate of over 60% may be impressive for any single-session intervention and might appropriately lead to calls for wider dissemination and use of IR in clinical settings, such results should not be considered adequate when projecting where the ceiling ought to lie for optimal outcomes of effectively delivered multi-session CBT protocols. Moreover, the long-term durability of IR-related symptom changes is unknown, as are the effects of IR on patients' naturalistic social and interpersonal behaviour as well as their general well-being, functional impairment, and quality of life. Clearly, additional research is needed to understand the short- and long-term clinically significant impact of IR across various measures and domains.

Second, we lack research that compares stand-alone IR to IR delivered within the broader context of a standard package or course of CBT; while IR does well on its own, additive effects would likely be observed if IR were integrated into a standard course of CBT. Third, at present, there is no clear indication of when during treatment, or with which types of patients, IR should be administered, either in addition to or in place of a standard course of CBT. Fourth, there is the question of determining therapist competency with and adherence to a demanding, semi-structured, and experiential treatment modality. Indeed, the experiential nature of the technique and the potential for strong affect arousal would make it less generic than some CBT techniques, and it might require particular expertise from the clinician or be most amenable to particular types of patients. As a stand-alone treatment, the brevity of its administration demands rapid rapport building and the skilled scaffolding of relevant information, and, to a large extent, leaves the integration of the therapeutic content into the patient's life up to the patient alone.

Ultimately, these questions require more evidence to support decision-making on the part of clinicians who would like to incorporate IR into their practice. In the meantime, we believe that although IR is a powerful stand-alone intervention, it should not be considered as a stand-alone *treatment* in and of itself. IR would likely be most beneficial, with gains maintained even longer-term, if it were administered within a longer course of therapy, although this, of course, remains an important empirical question.

Despite intriguing findings, the study's limitations must be emphasized. Even though the sample consisted of participants with a clinical diagnosis of SAD, it was a university-based rather than treatment-seeking one, in contrast to the recent studies by Nilsson et al. (2012) and Frets et al. (2014) who enrolled treatment-seeking patients. Similar to those previous studies, our sample size was also quite small, which restricted the statistical power of between-condition comparisons. In addition, participants were all young adults with a constrained age range and predominantly female. Moreover, we did not collect information on the history and course of participants' difficulties with social anxiety, although their relatively young age would suggest a somewhat less chronic history of SAD than treatment-seeking outpatients might typically have. Hence, this sample may differ from samples of treatment-seeking individuals in an outpatient clinic or hospital setting. For these reasons, it may be difficult to make strong generalizations based on our results. Replication of our findings is required in studies on diverse samples drawn from the community outside of the research context.

There were also limitations to the study design, which did not permit us to compare IR with other types of active interventions or to conduct a stringent examination of underlying mechanisms and how such mechanisms might interact with symptom changes over time, as noted above. It is possible, for example, that participants who underwent IR may have simply felt more gratified than those who did not, or they may have felt more compelled by the demands of the therapeutic encounter to revise their memory appraisals and

core beliefs, and that these demand characteristics were responsible for driving the significant between-condition effects. Moreover, all data were collected via self-report or interview, precluding investigation of observed behavioural outcomes. Diagnostic interviews were not repeated at post-treatment, thus limiting our conclusions about treatment response to RCI analyses based on the self-report data. To the end, a post-treatment interview may have helped us elucidate why five participants who received IR did not respond as expected. Although nonresponders are commonplace in any treatment study for SAD (see Moscovitch, Gavric, et al., 2012), future research is needed to better understand the mechanisms underlying response vs. nonresponse amongst socially anxious individuals undergoing IR. Another limitation was that the same therapist–experimenter assessed and treated all of the participants in the present study, thus preventing any exploration of whether and how clinical experience or skill may have impacted treatment process and outcome. Finally, whereas participants completed the initial symptom and memory appraisal ratings in a controlled environment subsequent to recalling their autobiographical memories at Week 1, the Week 3 ratings were completed online across various uncontrolled settings without any prior recall of the memories. We cannot rule out the possibility that these different testing conditions may have differentially impacted participants' memory appraisal ratings. For example, the higher levels of distress reported by participants in appraising their memories at Week 1 may have reflected their on-the-spot attempts to make sense of their memories and cope with the negative affect triggered by their recall (see Greenhoot, Sun, Bunnell, & Lindboe, 2013). Greenhoot et al. (2013) concluded in their study on traumatic memories that coding indices of memory narratives provide more predictive power than self-report ratings for understanding psychological adjustment. Thus, it may be particularly interesting and important in future research on IR to examine whether and how the nature and qualities of the memory narratives generated during the WIMI are impacted by IR and/or moderate its effects.

In addition to those outlined above, there are a number of promising future directions that lead from the present study. To begin, our findings require replication – with different therapists, samples, and settings, and with opportunities to measure longer term effects. The efficacy of IR when administered alone vs. as part of a full course of CBT should also be ascertained, in order to measure its additive value to established empirically supported treatments. Future research might also clarify possible refinements to the technique of IR for treating SAD. The IR protocol used in this study was based on available precedence in the literature, which requires identification and rescripting of a single historical memory corresponding to imagery content. However, in our observations during the course of the study, it was not clear that the relevant memory needed to be of a single, specific event in order for an impactful rescripting experience to occur. Indeed, the findings of this study indicate that with IR we must focus on changing personal meaning via recollection and alteration of idiosyncratic, *symbolic* material. The veracity and accuracy of recollection of the historical event may be irrelevant to the therapeutic task; it is the internal representation that is the ultimate target, and this representation is subjective, likely constructive, and may derive from either a single event or a series of events that have significant semantic overlap yet may have occurred over a longer period of time (see Conway, 2005; Prebble et al., 2013). As an alternative to the current protocol which requires that a single event be identified, future research of IR might permit a more flexible definition of autobiographical memory events. For example, a recurrent event might provide an acceptable experience for rescripting, so long as a single episode could either be recalled or reconstructed from a series of similar events and the recollection is suitable to provide access to a rich

meaning structure.

Given the heterogeneity of symptom expression amongst high socially anxious individuals (Heimberg, Holt, Schneier, Spitzer, & Liebowitz, 1993; Hofmann, Heinrichs, & Moscovitch, 2004) and variable responses among patients with SAD to standard CBT protocols (e.g., Davidson et al., 2004; Moscovitch, Gavric, et al., 2012), information about therapeutic processes that distinguish IR as an intervention may have implications for treatment selection based on patient characteristics. Future research would be helpful in ascertaining for whom, under which conditions, and at what point in therapy IR would be most efficacious.

Future research is also needed to deepen our understanding of the cognitive mechanisms underlying the effects of IR. It would be of great interest to ascertain whether and how a single-session of IR might change the strength and/or accessibility of the autobiographical memory trace itself and contribute to our emerging understanding of the processes by which autobiographical memories could be therapeutically altered via psychological intervention, perhaps by disrupting their reconsolidation within the critical window of time during which a retrieved memory is thought to become labile (see Chan & LaPaglia, 2013; Schwabe, Nader, & Pruessner, 2014). To this end, a possible mechanism of change during IR may be the disruption of memory reconsolidation following the initial activation and destabilization of the autobiographical memory during phase 1 of the intervention.

Alternatively, the mechanism of change in IR may be more consistent with emotion regulation accounts of reappraisal (see Gross, 2015), such that only the *meaning* of the memory and underlying schemas (e.g., their valence, coherence, and self-relevance; see Çili & Stopa, 2015) are altered, rather than the content of the specific memory trace itself. According to this view, therapists help patients reappraise the traumatic event as well as its integrative meaning by working to place the memory firmly within the context of their other life story narratives (Çili & Stopa, 2015). Here, the emotional impact during retrieval is expected to become less toxic but the original memory itself does not weaken (Brewin, 2006). Although IR may inhibit the accessibility of both the original negative memory representation (Brewin, 2006; Craske et al., 2008) and the “working self,” which is thought to contain the associated negative self-image and corresponding negative self-beliefs (see Çili & Stopa, 2015; Conway, 2005), these negative self-representations are conceptualized as remaining indefinitely in competition with the reappraised (more positive) representations. Whether the original negative self-representations or the newer positive self-representations become activated within any particular future context depends on a number of variables, including the frequency of rehearsal, the distinctiveness of the representations themselves, and nature and strength of the retrieval cues within that context (see Brewin, 2006), thus providing a helpful model for understanding how and why individuals remain vulnerable to relapse of emotional problems even years after the cessation of successful treatment.

In relation to either view, it similarly would be of interest to understand how IR impacts not only memory but also prospective thinking, as mental time travel into both the past and future are thought to rely on the interplay between episodic memory processes and pre-existing schema-based knowledge structures that are subserved by interactive communication between the hippocampus and prefrontal cortex (Preston & Eichenbaum, 2013).

In sum, it is apparent that IR represents a powerful and important intervention for SAD that significantly improves SA symptoms, alters emotional appraisals of autobiographical memories, and transforms the meaning derived from such memories about both the self and others. Additional theory-driven research on its nature and mechanisms would be of substantial theoretical

and practical benefit to the field of psychology.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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