Imagery Rescripting and Exposure in Social Anxiety: A Randomized Trial Comparing Treatment Techniques

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Abstract

This randomized trial compared the effects of imagery rescripting against in vivo exposure administered separately during a single session with 27 socially anxious individuals. Previous research shows that imagery rescripting is a promising treatment technique for various disorders including social anxiety, although imagery rescripting and exposure for social anxiety have not yet been compared. Social anxiety self-report measures (LSAS-SR and BFNE-II); the distress, vividness, and frequency of fear images (i.e., Imagery condition); and the levels of anxiety, avoidance, and the strength of convictions of a feared social situation (i.e., exposure condition) were rated at baseline, before treatment, and after a 2- and 4-week follow up period. Both treatment groups improved significantly on all measures pre- to post treatment and the effects largely remained at the 4-week follow-up. No significant differences between the treatment groups were found on the anxiety measures. The results suggest that either a single session of imagery rescripting or of exposure are effective in reducing social anxiety, and that both treatment techniques, even when administered in a single session, reduces social anxiety.

Keywords Social anxiety · Imagery rescripting · Exposure · Treatment · CBT · Psychotherapy

Introduction

Individuals suffering from social anxiety disorder (DSM-5) fear making unfavorable impressions and being critically evaluated in social situations such as public speaking and mingling at parties. Often, they dread simple activities like eating and writing in the company of others and worry excessively about being flawed in social performance (American Psychiatric Association 2013; Clark and Wells 1995). The worries are commonly accompanied by unpleasant, recurrent and spontaneous imagery from a critical observer's perspective (Hackman et al. 2000). This fear disrupt many levels of functioning, resulting in decreased quality of life in many areas including the establishment of intimate relationships and career building (Wittchen and Fehm 2003). The onset of social anxiety disorder often occurs in childhood or early adolescence and, if untreated, the recovery rate is

low (Scholing and Emmelkamp 1990). Hence, the disorder is often a lifelong illness.

Following the early formulation of cognitive models for social anxiety disorder by Clark and Wells (1995) and Rapee and Heimberg (1997), a wide range of cognitive-behavioral treatment (CBT) protocols have been developed. Even though most of these have proven effective, the most researched treatment is a combination of exposure and cognitive restructuring (Heimberg and Magee 2014). In a meta-study comprising 30 controlled studies and 1628 participants (Acarturk et al. 2009), this treatment resulted in substantial symptom reduction with large effect sizes (with Cohen's *d*s at .80). Arguably, the most effective component of CBT protocols is in vivo exposure to feared situations (Barrera et al. 2016). Exposure is a confrontation technique aimed at helping a person manage feared situations and to tolerate fear (Abramowitz 2013). Although research has shown exposure to be safe and not associated with higher dropout rates than other therapies, some patients and therapists, for reasons such as regarding the treatment aversive, are reluctant to employ the technique (Abramowitz 2013). Also, the application of exposure in daily life situations may appear time consuming and difficult to organize. In addition, some patients respond only

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partially or not at all to current CBT treatments (Carpenter et al. 2018). Thus, improved treatments have been called for (Carpenter et al. 2018).

Imagery rescripting is an intervention aiming to update intrusive, aversive early memories that are believed to play a part in the maintenance of different disorders. The focus is on modifying the individual's mental representation of the unpleasant memories into benign images. It was originally developed by Smucker and Niederee (1995) to facilitate emotional processing (Foa and Kozak 1986) and was subsequently adapted for treating trauma and personality disorders (Arntz and Wertman 1999). Previous research into imagery rescripting has shown promising effects in various anxiety disorders (see the meta-study by Morina et al. 2017), including social anxiety disorder (Lee and Kwon 2013; Nilsson et al. 2012; Reimer and Moscovitch 2015; Wild et al. 2008). Generally, it shows improvements of large effect sizes, even with a small number of sessions (Morina et al. 2017). However, most studies were pre-post comparisons and a lack of randomized controlled trials was observed. Compared to exposure, imagery rescripting is arguably less time and resource consuming and has the potential for higher specificity and personal relevance, allowing complex feared social situations to be accessed in the clinician's office. It may also be less aversive.

The first exploratory study of imagery rescripting for social anxiety disorder was conducted by Wild and colleagues (Wild et al. 2008). Using a within-subjects design they studied the effects of a single session of imagery rescripting, finding robust reductions in memory, imagery distress, memory-derived beliefs and social anxiety. These results were confirmed in subsequent studies. Using a between-subjects experimental design and a sample of 14 participants who met the criteria for social anxiety disorder, Nilsson et al. (2012) found that a single session of imagery rescripting, compared to a reading task, led to strong reductions at 1-week follow-up on memory and image distress, dysfunctional beliefs and social anxiety symptomatology. Similar results were found by Reimer and Moscovitch (2015), who gave 25 participants with social anxiety disorder either a single session of imagery rescripting or a non-intervention control condition. Imagery rescripting resulted in substantial reductions in anxiety, more positive appraisals of retrieved memories and beneficial changes in memory-derived beliefs about themselves and others (Reimer and Moscovitch 2015). Comparing cognitive restructuring and imagery rescripting, Norton and Abbott (2016) found in a sample of 60 socially anxious clients that both interventions yielded large and equivalent effects on symptoms compared to control when performing a public speaking task. Lee and Kwon (2013) compared imagery rescripting to supportive therapy in 23 Korean individuals diagnosed with social phobia. The authors found that the rescripting group

improved significantly compared to the control group, with maintained effects at 3-month follow-up.

It could be argued that new treatment techniques should be equally or more effective than the golden standard (i.e. exposure). However, no controlled studies have actually compared the efficacy of exposure and imagery rescripting for social anxiety disorder. Aiming to remedy this, the present study compares the effects of a single session of imagery rescripting with exposure using an experimental design with 27 socially anxious adult participants.

The present study was designed with two questions in mind. First, does a single session of in vivo exposure and imagery rescripting differ in effectiveness in the treatment of social anxiety, and second, are the interventions, studied independently, effective in reducing anxiety and image distress? In line with previous research, we expected both imagery and exposure to be efficient treatments for social anxiety disorder. However, due to a lack of previous research, our study into differences between the treatments was exploratory.

Method

Design

In order to evaluate and compare the effectiveness of imagery rescripting and in vivo exposure, a two conditions (Imagery and Exposure) parallel design was chosen. Furthermore, it employed within group measurements.

Participants

An open offer to participate containing contact information and a brief description of the study and its purpose was announced on the web sites of eight departments at Lund University. The description stated that the aim is to investigate two treatment techniques for social anxiety in a single session-format, and that these techniques should not be considered as alternatives to conventional treatment of social anxiety disorder. No compensation for participation was given. 80 students responded and were contacted for further information and a request to complete an online version of the LSAS-SR (Time 1). 38 students scored 35 or above and were subsequently contacted in order to schedule the treatment session and check for additional exclusion criteria (e.g. suicidality, ongoing psychotherapy or the use of anxiolytic medications). 27 of these (11 males and 16 females: mean age 25 years, SD 3.8, range 15) offered to participate and were included in the trial. A formal diagnosis of social anxiety disorder according to DSM-5 criteria was not established. The participants' mean LSAS-SR total score at recruitment was 69.63 (SD = 20.49; range 38–122).

Power Analysis

An a priori power analysis was performed for sample size estimation. Based on data from Morina et al. (2017) meta-analysis of imagery rescripting for psychological complaints; effect sizes on symptom measures are generally large (e.g. 1.22 for pre- to post-treatment and .90 for comparisons with active control groups). The effect size for one session in vivo exposure in social anxiety is presently unknown, but is treated as an active control in the power calculation. Thus, with an $\alpha = .05$ and power = 0.80, the projected sample size needed for an effect size of .90 (GPower 3.1) is approximately $N = 16$ in each condition for the type of ANOVA used in the present trial. For the pre- to post-treatment analyses, with an $\alpha = .05$, the projected sample size needed for an effect size of 1.22 is $N = 11$.

Measures and Image/Exposure Ratings

Two scales were used to assess changes in social anxiety disorder symptoms: Brief Fear of Negative Evaluation (BFNE-II; Watson and Friend 1969) and the Liebowitz Social Anxiety Scale Self-Report (LSAS-SR; Heimberg et al. 1999).

BFNE-II is an 8-item self-report questionnaire measuring fear of negative evaluation, e.g. “I am often afraid that I may look ridiculous and make a fool of myself”. Each item is rated on a 5-point scale of 0 (Does not match me at all) to 4 (extremely like me) resulting in a score from 0 to 36. Internal consistency is very good (Cronbach’s $\alpha = .96$). A cut-off score of 25 indicates clinically significant levels of social anxiety (Carleton et al. 2007). BFNE-II is derived from the original 30-item version (FNE; Watson and Friend 1969). The internal consistency of the Swedish version of BFNE in this study was high (Cronbach’s $\alpha = .89$).

The LSAS-SR is a self-administered scale for the assessment of social anxiety disorder. It is using 24 items, to be rated from 0 to 3, assessing the presence and strength of fear and avoidance of social situations. A total score of 35 was found to indicate clinically significant levels of social anxiety in a German sample of 311 patients with social anxiety disorder (von Glischinski et al. 2018). LSAS-SR has shown good psychometric properties with a high internal consistency (Cronbach’s $\alpha = .95$) (Baker et al. 2002). The Swedish version of LSAS in the present study had an internal consistency of $\alpha = .94$.

In the Imagery condition, the participants were asked to conjure up their negative self-image, to retain it and to rate how distressing the image (Imagery Distress) was on a scale of 0 (not at all) to 100 (extremely). They also rated how vivid it was (Imagery Vividness) on the same scale and were finally asked to rate how often the image had appeared during the last week (Imagery Frequency) on a scale of 0 (*not at all*) to 100 (*all the time*). Subsequently, they were asked

to retrieve their early memory and rate how distressing it (Memory Distress) was on a scale of 0 (*not at all*) to 100 (*extremely*). They were also asked to formulate one or two sentences that captured the personal meaning of the images (Imagery Belief) and to rate how strongly they believed their belief on a scale of 0 (*not convinced*) to 100 (*totally convinced*).

In the exposure condition, having discussed a selection of the participants’ most feared social situations in the Exposure interview, Exposure Anxiety, Exposure Avoidance and strength of the catastrophic beliefs related to the feared situation (Belief SC) were rated from 0 (No Anxiety/No Avoidance/Not at all convinced) to 100 (Extreme Anxiety/Total Avoidance/Completely Convinced). In addition, the participants were asked to formulate their major negative beliefs about themselves as a social person (Belief SP) associated with the feared situations and estimate how strong their conviction was from 0 (*not convinced*) to 100 (*totally convinced*).

Procedure

Following a pairwise matching procedure based on LSAS-SR scores and gender, participants were randomized to either Imagery ($N = 14$) or Exposure ($N = 13$) conditions and scheduled for a treatment session 14 days later, performed by two clinical psychologists, trained and supervised in both treatment methods. All treatment and follow-up sessions took place in an office practice at Lund University.

Before the onset of the treatment session all participants were again invited to ask questions about the study, re-read the information letter and sign the informed consent form, after which the BFNE-II and LSAS-SR were completed (Time 2).

At the same time (Time 2), a semi-structured interview (Hackmann et al. 2000) was conducted with participants in the Imagery condition permitting their negative self-images to be described and rated for memory and imagery distress, vividness and frequency. Following this, the imagery rescripting was administered after which the participants were once more (Time 3) asked to rate memory and imagery distress, vividness and frequency.

In the Exposure condition, the participants underwent the exposure interview, assessing their (Time 2) most feared situations, avoidance, safety behavior and catastrophic thoughts. A prepared exposure hierarchy was then presented. The participants were encouraged to choose one or two high-anxiety scenarios based on their specific anxiety and avoidance patterns. These were individualized in relation to their beliefs from the interview. Following this, the exposure was performed as described below. Finally and immediately after completing the exposure, post-intervention ratings (Time 3)

of the exposure anxiety, avoidance and strength of associated beliefs were completed.

At the end of the treatment session, participants in both conditions were debriefed and residual anxiety was addressed. A first follow-up appointment took place after 14 days (Time 4) and a second after 4 weeks (Time 5) during which the participants again completed the LSAS-SR and BFNE-II. In addition, participants in the Imagery condition re-rated their Negative self-images and memories and the exposure participants re-rated their exposure anxiety, avoidance and strength of associated beliefs. Of the 27 participants, four did not attend the last follow-up appointments, although one of these completed the 14-day follow-up. Thus 23 (12 in the Imagery condition and 11 in the exposure condition) completed all measurements.

Treatment Interventions

Both interventions were administrated in a single therapist-led 90-min session. The imagery rescripting applied in the present study built on Arntz and Weertman's (1999) procedure in three phases (reliving, mastering and compassion), as adapted by Nilsson et al. (2012). In the latter version, a *safe-place exercise* (Leuner 1994) was performed, just prior to, and at the conclusion of the rescripting intervention. During reliving, participants were first asked to imagine the memory, at the age at which the event occurred, and to relive it as if it was happening just now. Then, they were asked to describe the episode in a present tense (e.g., "I see my teacher coming towards me... he's making fun of me in front of all the others in the class, ... making everybody laughing at me...I feel crushed and ashamed..."). Secondly, in the mastering phase, participants were instructed to imagine the same scene as a bystander at their current age and were asked to watch what was happening to their younger self and to describe their reactions as well as saying how they could help their younger self. Generally, participants intervened in order to help or correct and sometimes to address the younger self, conveying a sense of security and encouraging the child to act in an assertive way. In the third phase of compassion, participants were asked to relive the memory as the younger self with the adult self present and were asked to explore what actions would be necessary for the younger self to feel better and prompted to ask for this. This stage was generally marked by the need for extra nurturing and compassion.

The single session exposure had the following sequence: The feared "real-life" situation from the exposure interview (described above) was related, with support from the therapist, to a pre-prepared exposure hierarchy. Similarities and differences were discussed, beliefs about what could happen were elicited and exposure was performed at appropriate locations (i.e. a nearby café, talking to strangers, at the town

square, pretending to be lost and asking for directions), or in the office (i.e. making phone-calls to different local authorities requesting information). High priority was given to the variability of the exposure in accordance with guidelines discussed in Craske et al. (2014). Expectancy violation in relation to the participants' catastrophic beliefs was prioritized rather than full habituation to the fear response.

Results

Base-Line Measure for Within-Group Comparisons

For the purpose of investigating the treatment effects separately, base-line measures of BFNE-II and LSAS-SR at Time 2 were obtained by comparing them with the initial measurements at recruitment (Time 1) 14 days earlier. Four *t* tests per condition showed that the mean scores on all measurements did not differ between Time 1 and Time 2 (the Imagery condition: BFNE-II, $t(13) = 1.125$, $p = .28$; LSAS-SR, $t(13) = -.581$, $p = .571$ and the Exposure condition: BFNE-II, $t(12) = 1.696$, $p = .116$; LSAS-SR, $t(13) = -.581$, $p = .571$). Thus the participants did not improve without treatment over 2 weeks.

Effects of the Imagery and Exposure Treatments on Social Anxiety

In order to investigate the effects of the two interventions, $2 \text{ (Imagery; Exposure)} \times 3 \text{ (Time 2, Time 4 and Time 5)}$ repeated measures ANOVA analyses were performed for the outcome measures BFNE-II and LSAS-SR. Pairwise *t* test analyses were conducted in cases in which significant interactions were indicated and effect sizes (Cohen's *d*) were calculated. The results are shown in Table 1.

The ANOVAs revealed no significant interactions between the two treatments on any of the outcome measures. This shows that the measures did not differ between conditions. However, significant single main effects were found for both conditions over time: BFNE-II, $F(2, 20) = 12.832$, $p = .000$, $\eta^2 = .379$, power = .990; and LSAS, $F(2, 20) = 16.008$, $p = .001$, $\eta^2 = .433$, power = .968. Thus, the results showed that the treatments had similar effects and that fear of negative evaluation, levels of anxiety and avoidance reduced following the interventions.

Post-hoc analysis revealed that both treatments were associated with a reduced fear of negative evaluation at the 14-day follow-up (Imagery, $t(12) = 2.204$, $p = .048$; Exposure, $t(10) = 2.462$, $p = .03$) and at the 4-week follow-up (Imagery, $t(11) = 3.362$, $p = .006$; Exposure, $t(10) = 2.785$, $p = .019$). Also, significant reductions were found on the LSAS-SR, for the Imagery Rescripting at the 14-day follow-up, $t(12) = 3.093$, $p = .009$; and

Table 1 Means and standard deviations on outcome measures before and after imagery rescripting^a, In-Vivo Exposure^b, and at Follow-up, *p* values and Cohen's *d*

Measure	Recruitment (T1)	Pre-Intervention (T2)	14-day Follow-up (T4)	4-week follow-up (T5)	Post-hoc t-test T2 vs. T4 T2 vs. T5			
					<i>p</i>	<i>d</i>	<i>p</i>	<i>d</i>
BFNE-II								
Imagery	21.33 (5.19)	20.08 (6.07)	17.42* (6.75)	15.08** (6.32)	.048	.41	.006	.81
Exposure	23.73 (3.41)	22.82 (3.49)	19.09* (6.32)	17.55* (6.42)	.034	.76	.019	1.06
LSAS-SR								
Imagery	69.43 (19.54)	71.64 (22.07)	63.00** (27.03)	58.42* (26.72)	.009	.35	.011	.54
Exposure	70.46 (22.27)	72.00 (29.57)	58.00* (18.04)	53.27* (16.03)	.074	.57	.024	.79

Cohen's *d* was computed by dividing the mean condition difference on outcome measure by the pooled standard deviation

Imagery imagery rescripting, *Exposure* in vivo exposure, *BFNE-II* fear of negative evaluation, *LSAS-SR* Liebowitz Social Anxiety Scale

^a*n* = 14

^b*n* = 13

p* < .05; *p* < .01

for both treatments at the 4-week follow-up (Imagery, $t(11) = 3061$, $p = .011$ and Exposure, $t(10) = 2.667$, $p = .024$).

In addition, we calculated the reliable change index (RCI; Jacobson and Truax 1991) for each individual to ensure that any difference between the baseline and post-treatment measurements was not caused by measurement error of the outcome instruments. The RCI was based on the baseline score (Time 2) and the 14-day (Time 4) or the 4-week follow-up (Time 5), and the standard error of the difference between the two scores. For the BFNE-II, Carleton et al. (2007) norm-data from a Canadian sample of undergraduate students was used ($SD = 8.94$ and $\alpha = .96$) and for the LSAS-SR, we used American norm-data (Baker et al. 2002; $SD = 25.5$ and $\alpha = .95$). The change is considered reliable ($p < 0.05$), i.e. unlikely to be the product of measurement error, if the RCI is greater than 1.96 or below -1.96 (Jacobson and Truax 1991). When the individual has a change score exceeding these thresholds, it can be assumed that the individual has shown significant improvement or deterioration.

For BFNE-II, the proportion significantly improved participants after treatment (Time 4) were 23% in the Imagery and 36% in the Exposure condition, and at the 4-week follow up (Time 5) 50% showed improvement after imagery and 45% after exposure. For LSAS-SR, 38% improved after imagery and 64% after exposure, and at follow up the proportion that improved was 50% for imagery and 55% for Exposure. One participant showed significant deterioration after Exposure for both the LSAS-SR and the BFNE-II scores, but at follow-up the deterioration was significant only for LSAS-SR.

Social Image/Situation Threat Ratings

As the procedure for social image/situation threat ratings differed in the two conditions, these measures could not be compared between treatments. To examine within-condition changes, however, pairwise t-tests were used. Ratings were made at pre-intervention (Time 2), post-intervention (Time 3), 14-day follow-up (Time 4) and 4-week follow-up (Time 5) (see Table 2).

In comparison with pre-Imagery measurements, we found significant reductions (approx. 50%) on Image Frequency at the 4-week follow-up, $t(11) = 5.159$, $p = .000$, $d = .96$, on Memory Distress immediately after imagery rescripting (Time 3), $t(13) = 2.754$, $p = .016$, $d = .75$, and after 4 weeks (Time 5), $t(11) = 5.184$, $p = .000$, $d = 1.81$. The strength of the Negative Belief in oneself was significantly reduced directly after Imagery compared to the pre-Imagery ratings, $t(13) = 3.446$, $p = .004$, effect size ($d = .72$) and was further reduced at the 4-week follow-up, $t(11) = 8.094$, $p = .000$, $d = 2.19$. In contrast, no significant differences were found for Imagery Distress or Vividness ratings.

All Exposure situation ratings, including Exposure Anxiety, Exposure Avoidance, strength of conviction that the feared social catastrophes could happen (Belief SC) and the negative assumptions regarding oneself as a social person (Belief SP) were significantly reduced ($d = 1.06$ – 1.71) between Time 2 (just before Exposure) and Time 5 (the 4-week follow-up). Compared to pre-intervention ratings, Exposure Anxiety was reduced at post-intervention $t(11) = 3.918$, $p = .002$, $d = 1.42$ and the difference remained at the 4-week follow-up, $t(8) = 4.148$, $p = .003$. The effect size was large ($d = 1.71$). Similarly, Exposure Avoidance

Table 2 Means and standard deviations on imagery and threat ratings over conditions

Condition/measure	Pre-intervention (T2)	Post-intervention (T3)	14-day follow-up (T4)	4-week follow-up (T5)
Imagery				
Distress	52.50 (27.60)	40.42 (20.50)	29.17 (22.55)	31.67 (25.97)
Vividness	61.25 (29.93)	50.42 (23.40)	52.92 (30.86)	44.17*** (29.22)
Frequency	48.75 (24.78)	–	27.25 (28.43)	23.75 (27.23)
Belief	66.67 (18.87)	49.58** (22.61)	41.67 (27.83)	22.92*** (20.94)
Memory distress	59.58 (33.33)	35.42* (31.44)	26.67 (18.63)	18.33*** (12.12)
Exposure				
Anxiety	83.89 (15.96)	35.56** (30.36)	49.44 (22.70)	45.56** (28.88)
Avoidance	82.22 (23.33)	31.11*** (25.59)	48.33 (25.62)	50.56* (25.30)
Belief SC	64.89 (29.35)	30.56* (27.32)	51.67 (17.14)	37.78* (16.22)
Belief SP	83.89 (19.03)	38.89*** (28.37)	64.44 (22.00)	57.78** (30.01)

Imagery Distress=level of anxiety (0–100) elicited by the image, Vividness=image vividness (0–100), Frequency=how frequently (0–100) the image has come to mind over the last week, Memory Distress=level of anxiety (0–100) elicited by the memory, Belief=strength of belief (0–100) in the negative assumption regarding oneself as a social person, Anxiety=level of anxiety (0–100) elicited in the feared rated exposure situation, Avoidance=level of avoidance (0–100) of situations similar to the feared social exposure situation, Belief SC/SP=strength of conviction (0–100) in the anxiety laden social beliefs

* $p < .05$; ** $p < .01$; *** $p < .001$

was significantly reduced at post-intervention, $t(11) = 6.271$, $p = .000$, $d = 1.86$. However, when comparing post-intervention ratings to the 4-week follow-up, a significant *increase* in Exposure Avoidance was evident, $t(8) = -3.813$, $p = .005$, $d = .76$. Nevertheless, the avoidance ratings at the 4-week follow-up were still significantly lower than at the pre-intervention, $t(8) = 3.082$, $p = .015$, with a large effect size ($d = 1.30$). In comparison to pre-intervention (Time 2), Belief SC was significantly reduced at post-intervention (Time 3), $t(11) = 2.891$, $p = .015$, $d = 1.14$ and remained at Time 5 after 4 weeks $t(8) = 2.669$, $p = .028$, $d = 1.19$. Turning to Belief SP, a significant reduction was found at post-intervention compared to pre-intervention belief ratings $t(11) = 4.967$, $p = .000$, $d = 1.54$. In contrast, negative self-beliefs grew significantly stronger over time as the post-intervention beliefs were rated significantly lower than those at the 4-week follow-up, $t(8) = -1.750$, $p = .118$, although the latter were still significantly reduced compared to the pre-intervention rating, $t(8) = 3.724$, $p = .006$, $d = 1.06$.

Discussion

The purpose of the present analog study was to investigate and compare the efficacy of imagery rescripting and in vivo exposure in a one-session format for social anxiety. The results clearly indicated that both treatments were effective and produced comparable reductions on all symptom measures (see Table 1). In addition, the participants made situation and image threat ratings. All ratings in the Exposure condition, including in-situation anxiety and avoidance and strength of convictions (expected catastrophes

and negative assumptions) were significantly reduced with large effect sizes, supporting the conclusion that one-session exposure significantly reduces social anxiety. Comparable effects were seen for imagery rescripting as ratings of strength of negative beliefs, Image Frequency and Memory Distress were reduced.

Interestingly, despite the focus on diminishing avoidance and safety behavior in in vivo exposure, its effects were no greater than the effects found in the imagery condition. This could be partially explained by the fact that the participants who had the imagery condition not only faced memories of concrete situations, but also mastered them, simulating and possibly improving coping skills, which may reduce perceived social threats in the future. Another part of the explanation could be the interrelatedness of remembering the past and imagining and simulating the future. Neuroimaging research has shown similar levels of activation in brain regions including medial and temporal lobes, posterior cingulate and retrosplenial cortex, as well as lateral parietal and temporal areas, when remembering and imagining (Schacter et al. 2012). Thus, imagery rescripting of past experiences may simultaneously affect the imagery of future difficulties. Finally, as previous research suggests, unprocessed difficult memories continue to distort perception in current social situations (Wild et al. 2008), memory rescripting may result in less imagery-driven memory input in current situations and, consequently, less perception bias and avoidance.

Even though the degree of perception bias has not been investigated in the current study, some important and relevant differences were observed. Following imagery rescripting, participants reported a reduction in negative memory distress during the 4 weeks following the

treatment. Also, negative assumptions about oneself were reduced substantially. In contrast, the observed reduction on current image distress and frequency did not reach statistical significance. In theory, current images are influenced by early memories (Hackmann et al. 2000) and imagery rescripting of memories, should have a small but significant impact on current images. However, our data fail to support this notion. One reason for this could be a possible mismatch between the individual's memory and current images. If so, the therapeutic benefits would increase by using a cognitive restructuring procedure to tie memory and current images together. Also, more imagery rescripting sessions may be required for the processing of social memories to also impact current images.

It can be noted that both treatments, even though no cognitive restructuring was carried out, led to significant reductions in fear of negative evaluation as well as on reported conviction in belief about self as a social person (Tables 1, 2, respectively). These results confirm previous research into imagery rescripting (Norton and Abbott 2016; Lee and Kwon 2013; Nilsson et al. 2012; Wild et al. 2008). In the case of exposure, similar research is lacking, since in vivo exposure for social anxiety has not been applied in a one-session format thus far. For the Exposure condition, it could be argued that the explicit formulation of beliefs about the chosen exposure situations (Belief SC/SP) enabled some exploration and testing of predictions. Nevertheless, no systematic cognitive restructuring was conducted. According to recent findings (Craske et al. 2014), a clear focus on cognitive restructuring following exposure would allow for maximizing expectancy violations and integration of the experience with prior beliefs, which may enhance the effect of the intervention.

Even though all anxiety and avoidance situation-ratings were still significantly lower following the in vivo exposure than before, we observed some rebound effects at follow-up. Such effects would be expected after a short-term treatment, especially if the treatment was planned and performed in accordance with the habituation model. However, following recommendations by Craske et al. (2014), high priority was given to variability of the exposure and testing out participants' catastrophic beliefs. Hence, we believe that the observed rebound effects most likely were the result of inadequate variability of exposure targets and insufficient challenge of catastrophic thoughts after exposure.

The results are very promising for both single-session imagery and exposure, and in line with previous research. The fact that a single-session exposure shows large reductions of social anxiety symptoms is also a valuable finding, as such applications of exposure have not previously been investigated. It would be of interest to investigate the integration of imagery rescripting into treatment packages, for

example, in combination with cognitive restructuring after imagery or with in vivo exposure, to see if current CBT treatment packages could be improved.

This study has a number of limitations. First, we aimed at a sample size of $N=32$, but only 27 individuals participated and 23 completed all follow-up measurements. Although the within groups, pre- to post-treatment analyses were adequately powered, the study may have been somewhat underpowered when comparing anxiety measures between conditions, especially since the difference in effect between the two treatment techniques appear to be small. Further, the design would have offered stronger conclusions if we had added a third baseline measurement, increased the baseline period to 3 weeks, and conducted measurements at the end of the treatment session. Also, an active control group, receiving treatment as usual or a sham intervention (e.g., social support) would strengthen the conclusions. Finally, therapist allegiance effects might have been present as the study was not blinded and the therapists were aware of the study's aim to evaluate imagery rescripting vs. the golden standard of exposure. However, we truly believe the allegiance bias was low if existent at all.

In conclusion, the results are highly encouraging, indicating that a single session of both imagery rescripting and in vivo exposure separately work equally well and are beneficial for individuals interested in seeking help for social anxiety. It warrants further, preferably controlled studies, to see whether the results hold in actual clinical settings with participants meeting diagnostic criteria for social anxiety disorder.

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Compliance with Ethical Standards

Conflict of interest The authors report no conflict of interest.

Ethical Approval All work in the present study was conducted with the formal approval of the Swedish Ethical Review Authority, EPN 2016/493.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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