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Changes in Empathy Mediate the Effects of Cognitive-Behavioral Group Therapy but Not Mindfulness-Based Stress Reduction for Social Anxiety Disorder

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Social anxiety disorder (SAD) has been shown to be associated with difficulty in the ability to vicariously share others' positive emotions (positive affective empathy). Mixed evidence also suggests potentially impaired recognition of the positive and negative emotions of others (cognitive empathy) and impaired or enhanced sharing of the negative emotions of others (negative affective empathy). Therefore, we examined whether two efficacious treatments for SAD, cognitive-behavioral group therapy (CBGT) and mindfulness-based stress reduction (MBSR), improve empathy in SAD relative to a wait-list condition and whether improvements in empathy mediate improvements in social anxiety. In the context of a randomized controlled trial, participants with SAD completed an empathy task at baseline, posttreatment/wait-list (N = 81), and 1-year follow-up (N = 37). Relative to both MBSR and wait-list, CBGT resulted in significant improvements in positive affective empathy. CBGT-related changes in positive affective empathy also mediated improvements in social anxiety at both posttreatment/wait-list and at 1-year follow-up. Other indices of empathy did not change differentially across the three conditions. Therefore, one way in which CBGT may specifically confer benefits to individuals with SAD is through increasing their ability or willingness to share in the positive emotions of others.

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Social anxiety disorder (SAD) is a common, debilitating, and chronic mental disorder that has serious personal, interpersonal, and economic costs (Aderka et al., 2012; Kessler, Chiu, Demler, Merikangas, & Walters, 2005; Ruscio et al., 2008). One particular challenge in SAD is forming and maintaining close relationships (see Alden & Taylor, 2004, for review). Successful relationship building may depend on a number of interpersonal skills, one of which is empathy. Several studies of empathy in SAD have revealed evidence of difficulties (e.g., Hezel & McNally, 2014), with one previous study suggesting a particular difficulty in the sharing of positive emotions in SAD (Morrison et al., 2016). Two crucial questions are whether treatment for SAD improves empathy and whether this improvement mediates improvement in social anxiety.

Empathy in SAD

Most theorists consider empathy to comprise cognitive and affective components (Davis, 1983; Duan & Hill, 1996; Gladstein, 1983; Zaki & Ochsner, 2011). Cognitive empathy, otherwise known as theory of mind, perspective taking, or empathic accuracy, refers to the ability to perceive another's emotion accurately. Affective empathy, otherwise known as experience sharing, refers to the tendency to vicariously share in the same emotions as another. Sharing in this context refers to perception of the other's (i.e., target's) emotional state and then experiencing it. In the current study, we specifically conceptualize sharing as the degree of concurrent and congruent subjective experiencing of the same emotion as the other/target, without regard to the participant's expression or communication of the emotion. In addition to these two aspects of empathy, which are considered in the current study, there are several additional aspects of empathy that are considered elsewhere, such as empathic behavior (e.g., emotional contagion, prosocial behavior; see Singer & Lamm, 2009; Zaki & Ochsner, 2012, for reviews).

Research on the relationship between social anxiety and cognitive empathy for others' negative emotions has been mixed, though it tends to suggest mild social anxiety-related impairment in negative cognitive empathy. Research on interpersonal emotion knowledge, or the ability to identify others' emotions and to understand their causes and consequences (Eisenberg, Hofer, & Vaughan, 2007), suggests that higher social anxiety is associated with lower interpersonal emotion knowledge (r = –.18; O'Toole, Hougaard, & Mennin, 2013). This association is stronger in studies of complex emotional situations compared to simple emotion situations (O'Toole et al., 2013). Likewise, in a study of theory of mind, or the ability to make accurate inferences about others' mental states (Blair, 2005), individuals with SAD were more likely than control participants to miscategorize negative emotions (Hezel & McNally, 2014). However, in an unselected sample of undergraduate students not under social threat, social anxiety was not associated with cognitive empathy for targets describing instances of social exclusion (Auyeung & Alden, 2016). When participants were under social threat, however, social anxiety was *positively* associated with cognitive empathy for social exclusion, a situation that is highly pertinent to those with elevated social anxiety. Most recently, in a study conducted by our group using the empathic accuracy task, in which participants are asked to continuously track the valence of targets' emotions in brief videotaped clips, we found no difference in cognitive empathy for negative emotions in those with SAD compared to healthy controls (Morrison et al., 2016).

Studies of cognitive empathy for others' positive emotions have more consistently shown no relationship between social anxiety and empathy. In the aforementioned study on theory of mind, Hezel and McNally (2014) found that participants with SAD did not differ from healthy controls in their ability to accurately categorize positive emotions. In Auyeung and Alden's (2016) study in undergraduates, there was no relationship between social anxiety and empathy for social inclusion. Finally, on the empathic accuracy task, individuals with SAD did not differ from healthy control participants in their accuracy for continuously tracking the valence of targets' emotions as they discussed positive autobiographical experiences (Morrison et al., 2016).

There are fewer studies on the relationship between social anxiety and affective empathy. Self-reported feelings of sympathy and concern for others (similar to affective empathy for negative emotions) exhibited a small positive correlation with social anxiety in two studies (Davis, 1983; Davis & Oathout, 1992). In a behavioral task, individuals with SAD exhibited no difficulties sharing in the negative emotions of others (Morrison et al., 2016). Finally, only one study to our knowledge has examined positive affective empathy. In this study, individuals with SAD showed lower congruence in the experience of positive emotions than healthy control participants (Morrison et al., 2016). Although replication of this finding is needed, it is consistent with a sizable literature showing that SAD is associated with dysregulation of positive emotions. For example, individuals with SAD fear positive

evaluation (Weeks, Heimberg, Rodebaugh, & Norton, 2008) and report greater expressive suppression of positive emotion (Farmer & Kashdan, 2012; Turk, Heimberg, Luterek, Mennin, & Fresco, 2005). Similarly, social anxiety is associated with lower capitalization support, or provision of supportive responses to good news, in romantic relationships (Kashdan, Ferssizidis, Farmer, Adams, & McKnight, 2013). Capitalization support may be a downstream consequence of positive affective empathy combined with a willingness to express positive emotions.

More broadly, empathy plays a fundamental role in the maintenance of interpersonal relationships (Eisenberg & Miller, 1987; Zaki & Ochsner, 2012) in which we know individuals with SAD experience multiple difficulties. Therefore, to add to our understanding of the ways in which empathy may affect and be affected by social anxiety, we examined whether two efficacious treatments for SAD improve empathy in SAD, and if so, whether improvements in empathy mediate improvements in social anxiety. Evidence for treatment mediation by empathy would suggest that empathy plays a causal role in the maintenance of SAD, thereby suggesting a treatment target.

Cognitive-Behavioral Therapy as a Context for Change in Empathy

Cognitive-behavioral therapy (CBT) is an efficacious and well-researched treatment for SAD (Kaplan, Swee, & Heimberg, 2018). Traditional CBT for SAD often includes a focus on psychoeducation, for example, about fear and the reinforcing role of avoidance in the maintenance of anxiety. There is also significant focus on therapeutic exposure, with some approaches incorporating explicit instruction in cognitive restructuring (e.g., Hope, Heimberg, & Turk, 2010) and others using behavioral experiments to test the utility of safety behaviors (e.g., Clark et al., 2006). However, empathy has not been a focus in typical CBT packages for SAD.

Even if empathy has not typically been an explicit focus of CBT, this therapy may nonetheless encourage both cognitive and affective empathy. For example, cognitive restructuring for mind-reading errors is likely to challenge the client to consider the various ways that others may be perceiving him or her. By eliciting the client's cognitive and affective experiences of interacting with a socially anxious person, and extending these personal experiences to the perceiver, the therapist is, in effect, helping the client to practice empathy. In cognitive-behavioral group therapy (CBGT), there may be even more opportunities for training in empathy via sharing of experiences and feedback from other group members. However, no studies to date have examined whether CBT increases empathy in SAD.

Mindfulness-Based Stress Reduction as a Context for Change in Empathy

Mindfulness has been defined in Western conceptualizations as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p. 145). Consistent with its Buddhist roots, which emphasizes self-transcending awareness, mindfulness has been more recently defined as "awareness itself" and a form of "innate capacity" that is "virtually transparent to us" (Williams and Kabat-Zinn, 2011, p. 15; see Khoury et al., 2017, for review). Mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1990) is the most widely used secular approach to teaching mindfulness, and research has shown MBSR and other mindfulness- and acceptance-based treatments for SAD to be as effective as CBT (Goldin et al., 2016; Kocovski, Fleming, Hawley, Huta, & Antony, 2013; Koszycki, Benger, Shlik, & Bradwejn, 2007).

In contrast to CBT, empathy is seen as a natural consequence of MBSR (see Block-Lerner, Adair, Plumb, Rhatigan, & Orsillo, 2007, for review). One way MBSR may support empathy is by encouraging metacognitive awareness of one's own emotions. Over time, increased self-awareness may contribute to a deeper understanding of the causes and consequences of these emotions, which may support a greater ability to empathize with others (Block-Lerner et al., 2007). Another theory proposes a two-stage model of how mindfulness may foster empathy (Kristeller & Johnson, 2005). In the first stage, awareness of habitual responding is cultivated and the focus is shifted away from the typical self-centered and self-protective stance toward a loosening of attachment to the self. In the second stage, there is focus on engagement of empathy, altruism, and compassion through meditative practices for the cultivation of compassionate love, such as "loving-kindness" practice (see Graser & Stangier, 2018, for review).

Despite theories supportive of a positive relationship between empathy and mindfulness, empirical data are mixed. One study found a moderate positive correlation between mindfulness and self-reported perspective taking (r = .41) and self-reported empathic concern (similar to affective empathy for negative emotions; r = .28; Beitel, Ferrer, & Cecero, 2005). However, a second study found nonsignificant correlations between mindfulness and both

constructs in a sample of unselected adults prior to taking an MBSR course (with perspective taking: r = .15; with empathic concern: r = -.21; Birnie, Speca, & Carlson, 2010). Following the course, mindfulness correlated positively with perspective taking (r = .31) but the correlation with empathic concern remained nonsignificant (r = .11).

There is also mixed evidence that MBSR improves empathy, and these data are limited to healthy samples. For example, in two studies with students, an 8-week MBSR program increased participants' levels of self-reported empathy relative to a wait-list control group (Shapiro, Schwartz, & Bonner, 1998; Shapiro, Brown, Thoresen, & Plante, 2011). Likewise, in an adult sample, MBSR improved self-reported perspective taking (Birnie et al., 2010). However, the results of the latter study should be interpreted with caution, as this was an uncontrolled study and changes in empathy did not correlate with changes in mindfulness. In contrast to these findings, in one open study of an 8-week mindfulness meditation intervention (which incorporated MBSR with elements of cognitive therapy) for health care professionals, there was no effect of the intervention on self-reported empathy (Galantino, Baime, Maguire, Szapary, & Farrar, 2005). To our knowledge, no studies to date have examined whether MBSR increases empathy in SAD.

Current Study

Empathy is a social cognitive process necessary for healthy relationship functioning. Individuals with SAD have exhibited mild impairment in cognitive empathy for negative emotions (e.g., Hezel & McNally, 2014) and one study showed a specific difficulty in their sharing of positive emotions with others (Morrison et al., 2016). Although CBGT and MBSR are efficacious treatments for SAD, we do not know whether they modify empathy, and specifically, whether they ameliorate the difficulty in positive affective empathy. Therefore, the goals of the present study were to examine whether (a) empathy improves during treatment for SAD (CBGT, MBSR) relative to a wait-list, (b) gains in empathy during treatment (CBGT, MBSR) are maintained at 1-year follow-up, and (c) improvements in empathy during treatment mediate improvements in social anxiety both at posttreatment and at 1-year follow-up. Based on prior literature, we hypothesized that (a) CBGT and MBSR would result in comparable, significant improvements in positive affective empathy (the one aspect of empathy shown to be reduced relative to healthy controls in the current sample at baseline; see Morrison et al., 2016) relative to a wait-list, (b) there would be no change in empathy from posttreatment to 1-year follow-up for either CBGT or MBSR, and (c) improvements in positive affective empathy would mediate improvements in social anxiety for both CBGT and MBSR at both posttreatment and 1-year follow-up.

Method

PARTICIPANTS

Participants were 81 individuals with a primary diagnosis of generalized SAD according to diagnostic interview with the Anxiety Disorders Interview Schedule for DSM-IV—Lifetime version (ADIS-IV-L; Di Nardo, Brown, & Barlow, 1994; see "Materials" section). Participants were recruited for a randomized controlled trial (RCT) comparing CBGT to MBSR and a wait-list/delayed treatment control group (WL; Goldin et al., 2016; see Goldin, Morrison, Jazaieri, Heimberg, & Gross, 2017, for the CONSORT diagram). There were 108 individuals randomized to treatment in the RCT. The 81 participants in the current sample were those who had complete data on the empathy task and the social anxiety questionnaire at baseline and Time 2 (i.e., posttreatment for those in CBGT and MBSR and post-wait-list for those in the WL condition). These 81 participants did not differ from those excluded on gender, $\chi^2(1) = 0.20$, p = .66; age, $t(106) = 0.18$, p = .86; years of education, $t(102)$ = 0.33, p = .74; baseline social anxiety, $t(106)$ = 1.00, p = .32; likelihood of having two or more comorbid conditions, $\chi^2(1)$ = 0.69, p = .41; or any of the four baseline empathy indices, ts(94) < 1.00, ps > .43. The current sample includes some participants reported in a previous study on the baseline results of the empathy task, in which only 32 participants with SAD were included because they were compared to a demographically matched sample of 32 healthy control individuals (Morrison et al., 2016). Participants in the current subsample were 56.8% women predominantly in their 30s (M_{age} = 32.78, SD = 7.87), Caucasian (43.2%) or Asian (40.7%), well educated ($M_{years\ education}$ = 16.76, SD = 2.01), and single (54.3%) or married (33.3%). Demographic and clinical characteristics did not differ across the three treatment arms (see Table 1).

Individuals were eligible for the RCT if they had a primary diagnosis of generalized SAD. Participants were required to score above the clinical cutoff score (i.e., 60; Rytwinski et al., 2009) for generalized SAD on the Liebowitz Social Anxiety Scale—Self-Report version (LSAS-SR; Fresco et al., 2001; Liebowitz, 1987; see "Materials" section). They were also required to endorse clinically significant anxiety or avoidance of at least five social situations (operationalized as endorsing greater than moderate fear or

avoidance of five or more distinct social situations), satisfying diagnostic criteria for the generalized subtype of SAD according to the fourth edition of *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association, 1994). The mean score on the LSAS-SR for the total sample was 89.70 (*SD* = 16.12).

Because participants underwent neuroimaging as part of the parent RCT, they were required to be between the ages of 21 and 55, and free of neurological impairment and cardiovascular disorders. They were also excluded for use of psychotropic medication or psychotherapy in the past year, CBT for anxiety in the past 2 years, any previous experience with MBSR, regular meditation practice, or participation in long-term meditation retreats.

Participants were additionally excluded for current or lifetime experience of psychosis, bipolar disorder, or eating disorders; substance or alcohol abuse or dependence within the past 12 months; significant symptoms of obsessive-compulsive disorder or posttraumatic stress disorder; or a major depressive episode in the past month. Rates of anxiety disorder comorbidity were high, whereas depressive disorder comorbidity was relatively low (see Table 1). High comorbidity, defined as two or more comorbid conditions in addition to SAD, did not differ across the three treatment arms (CBGT = 22.2%, MBSR = 30.8%, WL = 14.3%), $\chi^2(2) = 2.12$, $p = .35$, Cramer's $V = .16$. The research was approved by the university's IRB and was conducted in accordance with the Declaration of Helsinki and its later amendments.

PROCEDURE

Participants were recruited through web postings, flyers, and clinician referrals. Participants were first asked to complete an online screening, which included the LSAS-SR. Participants then completed a telephone screening and were invited for an in-person diagnostic interview with the ADIS-IV-L if they continued to meet initial eligibility criteria. Following provision of informed consent, participants completed the diagnostic interview and then a battery of online self-report measures. They were also scheduled for a functional magnetic resonance imaging (fMRI) appointment and an additional assessment session, during which the empathy task was completed (along with several other computerized tasks not reported here).

Table 1
Demographic and Clinical Characteristics by Treatment Arm

Variable	CBGT ($n = 27$)	MBSR ($n = 26$)	WL ($n = 28$)	Test
Females, no. (%)	17 (63.0)	12 (46.2)	17 (60.7)	$\chi^2(2, N = 81) = 1.79$, $p = .41$, Cramer's $V = .15$
Age, *M* (*SD*)	34.0 (7.7)	30.2 (7.6)	34.1 (8.0)	$F(2, 78) = 2.13$, $p = .13$, $\eta_p^2 = .05$
Education, *M* (*SD*)	17.1 (2.7)	16.5 (1.4)	16.7 (1.8)	$F(2, 75) = 0.66$, $p = .52$, $\eta_p^2 = .02$
Ethnicity, no. (%)				$\chi^2(2, N = 68) = 0.46$, $p = .80$, Cramer's $V = .08$
Caucasian	12 (44.4)	11 (42.3)	12 (42.9)	
Asian	13 (48.1)	8 (30.8)	12 (42.9)	
Latino	1 (3.7)	7 (26.9)	1 (3.6)	
African American	0	0	0	
More than one race	1 (3.7)	0	3 (10.7)	
Marital status, no. (%)				$\chi^2(2, N = 71) = 1.32$, $p = .52$, Cramer's $V = .14$
Single, never married	16 (59.3)	14 (53.8)	14 (50.0)	
Married	9 (33.3)	6 (23.1)	12 (42.9)	
Divorced, separated, widowed	1 (3.7)	0	0	
Living with partner	1 (3.7)	5 (19.2)	1 (3.6)	
LSAS-SR at baseline	90.6 (17.2)	88.5 (19.8)	90.0 (16.1)	$F(2, 78) = 0.10$, $p = .91$, $\eta_p^2 = .002$
Current Axis I comorbidity, no. (%)				$\chi^2(2, N = 81) = 2.12$, $p = .35$, Cramer's $V = .16$
Generalized anxiety disorder	10 (37.0)	7 (26.9)	6 (21.4)	
Specific phobia	4 (11.1)	8 (30.8)	5 (17.9)	
Panic disorder	5 (18.5)	3 (11.5)	2 (7.1)	
Agoraphobia	2 (7.4)	2 (7.7)	3 (10.7)	
Major depressive disorder	1 (3.7)	1 (3.8)	1 (3.6)	
Dysthymic disorder	2 (7.4)	1 (3.8)	2 (7.1)	

Note. CBGT = cognitive-behavioral group therapy; MBSR = mindfulness-based stress reduction; WL = wait-list; LSAS-SR = Liebowitz Social Anxiety Scale—Self-Report version; test for ethnicity compared proportion of Caucasian versus Asian; test for marital status compared proportion of single versus married; test for current Axis I comorbidity compared the proportion with fewer than two versus two or more comorbid diagnoses.

Following completion of all baseline assessments, participants were randomized to one of the three treatment arms. Participants assigned to immediate treatment (either CBGT or MBSR) completed 12 weeks of therapy. Participants assigned to delayed treatment waited 12 weeks. Following immediate treatment or the wait-list period, participants completed the same assessments as at baseline. If interested, participants assigned to wait-list/delayed treatment were then randomized to 12 weeks of either CBGT or MBSR. They completed the same battery of assessments at posttreatment. All participants who completed treatment were contacted for follow-up appointments at 3-, 6-, 9-, and 12-months posttreatment. At 3-, 6-, and 9-month follow-ups, only self-reports were administered, whereas at the 12-month follow-up, self-reports and other measures, including the empathy task, were completed.

Cognitive-Behavioral Group Therapy

The CBGT protocol followed Heimberg and Becker (2002). It was delivered by CBT-trained doctoral-level clinical psychologists. Treatment covered four primary components: (a) psychoeducation, (b) cognitive restructuring, (c) exposure to feared social situations, and (d) relapse prevention and termination. Each group comprised six participants. Groups met weekly for 2.5 hours over the course of 12 weeks. Participants were provided a CBT workbook (Hope et al., 2010) to support relevant portions of the protocol.

Mindfulness-Based Stress Reduction

The MBSR protocol followed the standard MBSR curriculum compiled at the University of Massachusetts Center for Mindfulness by Jon Kabat-Zinn in 1993 (the standard MBSR curriculum is available at https://umassmed.edu/cfm/training/mbsr-curriculum). It was modified so that the 1-day meditation retreat was converted to four additional sessions between the standard Session 6 and 7 so that there were 12 weekly sessions (2.5 hours each) to match the CBGT protocol. The MBSR instructor was certified by the University of Massachusetts Center for Mindfulness. He had experience leading multiple MBSR courses and over 30 years of teaching experience. Similar to CBGT, participants were provided a workbook to support the practice (i.e., *A Mindfulness-Based Stress Reduction Workbook*; Stahl & Goldstein, 2010). Participants were provided audio files of guided meditations in the instructor's voice to support between-session practice and the workbook includes descriptions of mindfulness exercises and additional audio files. Groups comprised six individuals, just as in CBGT.

EMPATHY TASK

The empathy task was a modified version of the empathic accuracy task (Zaki, Bolger, & Ochsner, 2008), previously used and described by Morrison et al. (2016). In the development of the task by Zaki and colleagues (2008), 14 target nonactor, research participants were videotaped describing the four most positive and four most negative personal events they felt comfortable discussing. After describing the events, these target participants watched their videotapes and provided continuous ratings of the positive or negative affect they had felt at each moment while talking, using a 9-point Likert scale ranging from 1 (*very negative*) to 9 (*very positive*). The index of empathic accuracy (i.e., cognitive empathy) is calculated as the time-course correlation between participants' continuous ratings of the targets' affect and the targets' own ratings of their affect (Zaki et al., 2008). The index of empathic congruence (i.e., affective empathy) is calculated as the time-course correlation between participants' continuous ratings of their own affect and the targets' ratings of their own affect (Morrison et al., 2016).

In the current study, we used the version of the task described in Morrison et al. (2016). Ten clips were selected from the original stimulus set. Clips were selected to balance target gender (man, woman) and target affect (negative, positive) and to be as brief as possible to minimize participant burden (i.e., < 180 seconds duration). Participants were instructed that they would be asked to watch a series of film clips in which people discussed emotional events in their lives. They were further asked to provide ratings while watching these clips. Rather than only rate the targets' emotions, participants were instructed on half of the trials to provide a continuous rating of their own affect while watching the clip, and on the other half of the trials they were asked to provide the typical continuous rating of the targets' affect while watching the clip. A single cue word, "other" or "self," appeared prior to each clip to instruct participants as to whether they should rate the affect of the target or of themselves, respectively.

Participants were instructed that they should provide continuous ratings during each clip by using the left and right arrow keys on the keyboard. Affect was rated on a 9-point Likert scale, ranging from 1 (*very negative*) to 9 (*very positive*). The rating scale was displayed at the bottom of the screen for the duration of each clip. At the start of each clip, the center of the scale (5 = *neutral*) was flanked by two asterisks. These asterisks moved with each arrow click (leftward/more negative or rightward/more positive) to highlight the selected

rating. Participants could make an unlimited number of shifts during each clip, and the number of shifts was recorded. Participants were instructed to focus not only on the overall emotion, but also on the "moment-to-moment changes" in the emotional state of the target/self. The cue word ("other" or "self") was displayed in the center of the screen for 3 seconds just prior to each clip. After each clip, participants were presented with 10 items designed to direct participants' attention to relevant aspects of the task and to assess interpersonal perceptions of the targets. These items were not analyzed.

All participants at all three time points (baseline, Time 2, 12-month follow-up) viewed the same 10 clips presented in the same pseudorandom order. The first clip was completed for practice while the experimenter remained in the room. It was a positively valenced cognitive empathy (i.e., other) trial. The experimenter left the room for the remaining nine clips, which included four cognitive empathy trials (three negative, one positive) and five affective empathy trials (two negative, three positive).

MATERIALS

The ADIS-IV-L (Di Nardo et al., 1994) was used to determine eligibility for the RCT. The ADIS-IV-L is a semistructured diagnostic interview used to assess current and lifetime diagnoses of anxiety, mood, somatoform, and substance use disorders according to DSM-IV criteria. Clinicians rate the severity of each disorder on a scale that ranges from 0 to 8. The ADIS-IV-L has demonstrated adequate interrater reliability (Brown, Di Nardo, Lehman, & Campbell, 2001). In the current study, interviewers were trained clinicians at the doctoral or master's level or were trained doctoral psychology graduate students. To assess interrater reliability, 20% of interviews were recoded and there was 100% agreement with the initial diagnosis.

The LSAS-SR (Fresco et al., 2001; Liebowitz, 1987) is a widely used measure of social fear and avoidance. Respondents rate 24 social interaction and performance situations with regard to both fear (rated 0 = *none* to 3 = *severe*) and avoidance (rated 0 = *never* to 3 = *usually*). These 48 ratings are summed to calculate a total score, ranging from 0 to 144. The LSAS-SR has demonstrated good internal consistency and test–retest reliability, as well as convergent validity with other clinician-administered and self-report measures of social anxiety (Baker, Heinrichs, Kim, & Hofmann, 2002; Fresco et al., 2001; Oakman, Van Ameringen, Mancini, & Farvolden, 2003; Rytwinski et al., 2009). In the current sample, the baseline LSAS-SR demonstrated excellent internal consistency (α = .92).

DATA REDUCTION AND ANALYSIS

Data from the empathy task were reduced using Matlab 7.0 (Mathworks, 2005). Continuous ratings of affect for each clip were first averaged across 2-second intervals. Each 2-second mean then served as a single point in subsequent time-series analyses in which ratings were *z* transformed and a time-course correlation between participants' and targets' ratings were calculated for each clip. These coefficients were then *R*-to-*z* transformed (Fisher, 1921) and averaged across videos of the same trial type (either cognitive/other or affective/self) and valence (either negative or positive). This data reduction procedure has been used to calculate empathic accuracy (i.e., cognitive empathy; e.g., Lee et al., 2011; Zaki et al., 2008) and empathic congruence (i.e., affective empathy; Morrison et al., 2016).

To probe whether treatment had an effect on positive or negative, affective or cognitive empathy, we conducted a series of 3 group (CBGT, MBSR, WL) × 2 valence (positive, negative) × 2 time (baseline, Time 2) repeated measures analyses of variance (ANOVAs) on scores from the empathy task. Time 2 represented posttreatment for those assigned to CBGT or MBSR and post-wait-list for those assigned to the WL condition. One 3 × 2 × 2 ANOVA was conducted on empathic congruence (i.e., affective empathy) scores and a second ANOVA was conducted on empathic accuracy (i.e., cognitive empathy) scores. Follow-up tests to probe significant interactions were conducted as appropriate, with a standard *p* value cutoff of .05. Total sample size for these tests was 81 (CBGT, n = 27; MBSR, n = 26; WL, n = 28).

We next examined whether there was differential change in empathy between the two treatments in the 1-year follow-up phase. Only those who completed immediate CBGT or MBSR were included in these analyses (i.e., we did not add those who completed treatment after WL) because significant repetition (e.g., practice) effects were observed on several indices of the empathy task (i.e., the WL group showed improvements from pre- to posttreatment) and the WL group completed the task one more time than either of the immediate treatment groups. As with the prior set of analyses, we conducted separate 2 group (CBGT, MBSR) × 2 valence (positive, negative) × 2 time (posttreatment, 12-month follow-up) repeated measures ANOVAs on empathic congruence scores and empathic accuracy scores. Total sample size for these tests was 41 (CBGT, n = 22; MBSR, n = 19).

Finally, we examined whether any index of empathy (positive or negative, affective or cognitive) that changed differentially in an active treatment

versus WL (from our first set of analyses) mediated change in social anxiety symptoms during treatment. For mediation analyses, we used Hayes's (2013) PROCESS macro for SPSS, model 4. With the PROCESS macro, a single command produces estimates of the direct and indirect effects using ordinary least squares (OLS) regression, in addition to percentile-based bootstrap confidence intervals for indirect effects (Preacher & Hayes, 2008). Point estimates and 95% confidence intervals were estimated for the indirect effects with n = 10,000 bootstrap resamples. Significant mediation effects were interpreted when zero was not contained within the confidence interval.

To examine whether within-treatment change in empathy mediated within-treatment change in social anxiety, we used a mediator of Time 2 empathy after residualizing baseline empathy. The outcome was Time 2 social anxiety after residualizing baseline social anxiety. This analysis provides statistical support for mediation but does not have an appropriate timeline of measurement of predictor, mediator, or outcome to establish empathy as a mechanism—the outcome was not measured after the mediator, and thus inferences about causality should be tempered (e.g., Kazdin, 2009; Tryon, 2018). To examine whether within-treatment change in empathy mediated 12-month follow-up social anxiety, we used the same mediator as the previous analyses. The outcome was 12-month follow-up social anxiety after residualizing baseline social anxiety. These tests of mediation, with the 12-month follow-up time point, only included a comparison of CBGT versus MBSR, rather than each active treatment compared to WL. Participants assigned to WL were allowed to complete a treatment after the waiting period, thus there are no 12-month follow-up data for WL. WL participants who later completed treatment and follow-up were excluded from the mediation analysis with 12-month follow-up data because there were significant repetition (e.g., practice) effects on several indices of the empathy task, and those in the WL condition completed the task one more time than those assigned to immediate treatment. Also, these 12-month follow-up tests of mediation did meet timeline criteria to establish empathy as a mechanism of change in social anxiety during treatment. Total sample size for tests of mediation of Time 2 social anxiety was 76 due to missing Time 2 LSAS-SR data (CBGT, n = 26; MBSR, n = 22; WL, n = 28). Total sample size for tests of mediation of 12-month follow-up social anxiety was 37 (CBGT, n = 20; MBSR, n = 17) because we included participants with baseline, posttreatment, and 12-month follow-up data on both the LSAS and empathy task. These 37 participants did not differ from those without 12-month follow-up data (n = 44) on gender, $\chi^2(1) = 1.81$, $p = .18$; age, $t(79) = 0.58$, $p = .56$; years of education, $t(76) = 0.23$, $p = .82$; baseline social anxiety, $t(79) = 0.91$, $p = .36$; likelihood of having two or more comorbid conditions, $\chi^2(1) = 0.91$, $p = .34$; any of the four baseline empathy indices, $ts(79) < 0.90$, $ps > .40$; or any of the four posttreatment empathy indices, $ts(79) < 0.70$, $ps > .50$. However, those included in the 12-month follow-up mediation analyses had significantly lower social anxiety at posttreatment compared to those who were not included in these analyses, $t(74) = 3.41$, $p = .001$.

Results

PRELIMINARY ANALYSES

To check whether baseline "positive" clips were rated as more positive than "negative" clips and that this did not differ by treatment arm, we compared mean affect ratings of each clip—that is, ratings collapsed across the time series. We conducted a 3 group (CBGT, MBSR, WL) × 2 valence (positive, negative) ANOVA with repeated measurement on the second factor separately for affective empathy trials and cognitive empathy trials. For baseline affective empathy, as expected, the main effect of valence was significant, with positive clips rated more positive than negative clips, $F(1, 78) = 355.87$, $p < .001$, $\eta_p^2 = .82$. The main effect of group was not significant, $F(2, 78) = 0.84$, $p = .44$, $\eta_p^2 = .02$, nor was the interaction of Group × Valence significant, $F(2, 78) = 0.71$, $p = .49$, $\eta_p^2 = .02$. For baseline cognitive empathy, results were the same. The main effect of valence was significant, with positive clips rated more positive, $F(1, 78) = 694.23$, $p < .001$, $\eta_p^2 = .90$. The main effect of group was not significant, $F(2, 78) = 0.95$, $p = .39$, $\eta_p^2 = .02$, and the main effect of valence was not moderated by treatment condition, $F(2, 78) = 0.13$, $p = .88$, $\eta_p^2 < .01$. Therefore, participants assigned to the three treatment conditions did not differ at baseline with regard to average affect ratings during the empathy task.

To check whether participants in the three treatment arms responded similarly to the task instructions to make continuous ratings while viewing clips, we examined the number of changes, or shifts, in ratings made by participants by conducting a 3 group (CBGT, MBSR, WL) × 2 valence (positive, negative) ANOVA with repeated measurement on the second factor on baseline affective and cognitive empathy trials. For baseline affective empathy trials, both main effects were nonsignificant (valence: $F(1, 78) = 0.84$, $p = .36$, $\eta_p^2 = .01$; group: $F(2, 78) = 0.03$, $p = .97$, $\eta_p^2 < .001$), as was

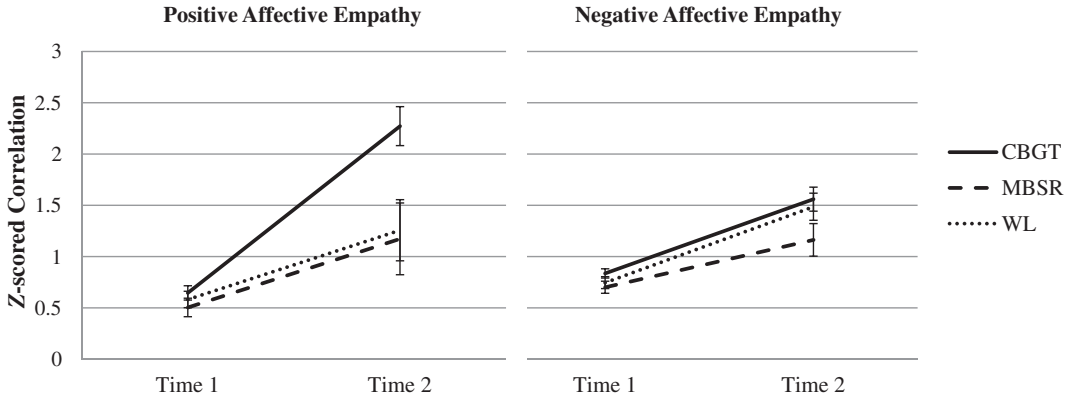

FIGURE 1 Significant group (CBGT, MBSR, WL) × Valence (positive, negative) × Time (baseline, posttreatment/wait-list) interaction on empathic congruence scores (i.e., affective empathy). For positive affective empathy, there was significantly greater improvement in the CBGT group from Time 1 to Time 2 than in the other two groups. No other group differences emerged. Error bars represent standard errors. CBGT = cognitive-behavioral group therapy; MBSR = mindfulness-based stress reduction; WL = wait-list.

the interaction, $F(2, 78) = 0.59$, $\eta_p^2 = .01$. For baseline cognitive empathy trials, the main effect of valence was significant, with more shifts for negative than for positive trials, $F(1, 78) = 17.49$, $p < .001$, $\eta_p^2 = .18$. However, the main effect of group, $F(2, 78) = 0.80$, $p = .45$, $\eta_p^2 = .02$, and the Group × Valence interaction, $F(2, 78) = 1.87$, $p = .16$, $\eta_p^2 = .05$, were both nonsignificant. Therefore, number of shifts made during the empathy task did not differ based on treatment condition.

TREATMENT EFFECT ON EMPATHY

Affective Empathy

Affective empathy was indexed by the *Z*-transformed time-course correlation between targets' and participants' self-ratings of emotion (i.e., empathic congruence scores). To examine whether there was differential change in affective empathy across the three treatment arms from baseline to posttreatment/wait-list, we conducted a 3 group (CBGT, MBSR, WL) × 2 valence (positive, negative) × 2 time (baseline, Time 2) repeated measures ANOVA on empathic congruence scores. The three-way interaction was significant, $F(2, 78) = 3.64$, $p = .03$, $\eta_p^2 = .09$. It qualified significant two-way interactions of Group × Time, $F(2, 78) = 4.62$, $p = .01$, $\eta_p^2 = .11$, and Valence × Time, $F(1, 78) = 5.26$, $p = .03$, $\eta_p^2 = .06$, as well as significant main effects of group, $F(2, 78) = 4.56$, $p = .01$, $\eta_p^2 = .11$, and time, $F(1, 78) = 91.67$, $p < .001$, $\eta_p^2 = .54$. The main effect of valence and the two-way interaction of Group × Valence were not significant, $ps > .12$, $\eta_p^2 < .06$.

To probe the significant three-way interaction, we conducted a 3 group × 2 time repeated measures ANOVA within each valence (see Figure 1). For affective congruence for positive emotions, the interaction of Group × Time was significant, $F(2, 78) = 4.71$, $p = .01$, $\eta_p^2 = .12$, and modified a significant main effect of time, $F(1, 78) = 45.63$, $p < .001$, $\eta_p^2 = .37$, and main effect of group, $F(2, 78) = 3.99$, $p = .02$, $\eta_p^2 = .09$. At baseline, the three treatment conditions did not differ from one another, $F(2, 78) = 0.71$, $p = .49$, $\eta_p^2 = .02$, whereas they did differ at Time 2, $F(2, 78) = 4.55$, $p = .01$, $\eta_p^2 = .10$. Specifically, the CBGT group exhibited significantly better affective congruence for positive emotions at Time 2 than either the MBSR group, $t(38.61) = 2.75$, $p < .01$, $d = 0.89$, or the WL group, $t(45.57) = 2.87$, $p < .01$, $d = 0.85$, and MBSR and WL did not differ from each other, $t(52) = 0.19$, $p = .85$, $d = 0.05$.[1]

For affective congruence for negative emotions, the interaction of Group × Time was not significant, $F(2, 78) = 1.74$, $p = .18$, $\eta_p^2 = .04$. The main effect of group approached statistical significance, $F(2, 78) = 2.45$, $p = .09$, $\eta_p^2 = .06$, with the MBSR group exhibiting lower affective congruence for negative emotions than the CBGT group, contrast estimate = 0.27, $SE = 0.12$, $p = .03$. The main effect of time was significant, with higher affective congruence for negative emotions at Time 2 versus baseline, $F(1, 78) = 90.11$, $p < .001$, $\eta_p^2 = .54$, likely reflecting a repetition effect on the task given that congruence increased in the WL condition to the same degree as in the two treatment conditions.

In summary, there was a specific effect of CBGT on positive affective empathy. Individuals with SAD who completed CBGT showed improvements

[1] At the suggestion of an anonymous reviewer, we also explored whether controlling for pre to post changes in self-reported attentional focusing or attentional shifting accounted for treatment condition differences in changes in positive affective empathy. Controlling for changes in attentional focusing and shifting did not change results and so those analyses are not included here but are available on request from ASM.

in positive affective empathy from pre- to posttreatment compared to both the WL condition and to MBSR. In contrast, there was no effect of treatment on negative affective empathy.

Cognitive Empathy

Cognitive empathy was indexed by the *Z*-transformed time-course correlation between targets' and participants' ratings of the targets' emotions (i.e., empathic accuracy scores). To examine whether there was differential change in cognitive empathy across the three treatment arms from baseline to posttreatment/wait-list, we conducted a 3 group (CBGT, MBSR, WL) × 2 valence (positive, negative) × 2 time (baseline, Time 2) repeated measures ANOVA on empathic accuracy scores. The three-way interaction was not significant, $F(2, 78) = 1.34$, $p = .27$, $\eta_p^2 = .03$. The Valence × Time interaction was significant, $F(1, 78) = 299.91$, $p < .001$, $\eta_p^2 = .79$, and modified significant main effects of valence, $F(1, 78) = 145.35$, $p < .001$, $\eta_p^2 = .65$, and time, $F(1, 78) = 299.86$, $p < .001$, $\eta_p^2 = .79$. The remaining effects were not significant, ps > .60, $\eta_p^2 < .02$. Follow-up tests of the Valence × Time interaction revealed that cognitive empathy for negative emotions improved significantly from baseline to Time 2, $F(1, 80) = 491.54$, $p < .001$, $\eta_p^2 = .86$, likely reflecting repetition effects. In contrast, cognitive empathy for positive emotions did not change significantly from baseline to Time 2, $F(1, 80) = 0.14$, $p = .71$, $\eta_p^2 < .01$.

POSTTREATMENT TO 12-MONTH FOLLOW-UP CHANGES IN EMPATHY

Affective Empathy

To examine whether there was differential change in affective empathy between CBGT and MBSR during the 1-year follow-up phase, we conducted a 2 group (CBGT, MBSR) × 2 valence (positive, negative) × 2 time (posttreatment, 12-month follow-up) repeated measures ANOVA on empathic congruence scores. The three-way interaction was not significant, $F(1, 39) = 0.14$, $p = .71$, $\eta_p^2 = .004$, indicating that there was not significant differential change (i.e., there was similar maintenance of gains) in affective empathy for positive versus negative emotions for the CBGT versus MBSR group. The Valence × Time interaction was also not significant, $F(1, 39) < 0.01$, $p = .99$, $\eta_p^2 < .001$. The main effect of group was significant, $F(1, 39) = 8.04$, $p < .01$, $\eta_p^2 = .17$, with the CBGT group exhibiting higher congruence scores, consistent with posttreatment results, and the Time × Group interaction approached statistical significance, $F(1, 39) = 3.85$, $p = .057$, $\eta_p^2 = .09$, with a marginally significant decline in the CBGT group from posttreatment to follow-up, $F(1, 21) = 3.24$, $p = .09$, $\eta_p^2 = .13$, and no change in the MBSR group from posttreatment to follow-up, $F(1, 18) = 1.32$, $p = .27$, $\eta_p^2 = .07$. The Valence × Group interaction also approached statistical significance, $F(1, 39) = 3.94$, $p = .054$, $\eta_p^2 = .09$, with the groups not differing in congruence for negative emotions, $F(1, 39) = 2.24$, $p = .14$, $\eta_p^2 = .05$, and with the CBGT group showing higher congruence for positive emotions than the MBSR group, $F(1, 39) = 6.96$, $p = .01$, $\eta_p^2 = .15$, consistent with posttreatment results. The main effects of time and valence were not significant, Fs < 2.66, ps > .11, η_p^2s < .07.

Cognitive Empathy

To examine whether there was differential change in cognitive empathy between CBGT and MBSR during the 1-year follow-up phase, we conducted a 2 group (CBGT, MBSR) × 2 valence (positive, negative) × 2 time (posttreatment, 12-month follow-up) repeated measures ANOVA on empathic accuracy scores. The three-way interaction was not significant, $F(1, 39) = 3.28$, $p = .08$, $\eta_p^2 = .08$, nor were either of the two-way interactions or main effects of group or time, Fs < 0.45, ps > .50, η_p^2s < .01. The main effect of valence was significant, $F(1, 39) = 235.22$, $p < .001$, $\eta_p^2 = .89$, with better empathic accuracy for negative than for positive emotions.

POSITIVE AFFECTIVE EMPATHY AS A MEDIATOR OF CHANGE IN SOCIAL ANXIETY

Only positive affective empathy was evaluated as a mediator of change in social anxiety given that this was the only index of empathy that changed differentially in an active treatment versus WL. Change in positive affective empathy from baseline to Time 2 did not significantly mediate change in social anxiety from baseline to Time 2 in CBGT (vs. WL; indirect effect = 1.29, 95% CI [–2.66, 6.36]) or MBSR (vs. WL; indirect effect = –0.06, 95% CI [–3.84, 2.45]); however, it did differentially mediate change in social anxiety during treatment in CBGT versus MBSR, indirect effect = –4.54, 95% CI [–11.66, –0.47]. CBGT was associated with greater improvements in positive affective empathy from baseline to Time 2, ß = .30, $t(47) = 2.28$, $p = .03$, and greater improvement in positive affective empathy during treatment was associated with greater reductions in social anxiety during treatment when controlling for treatment condition, ß = –.36, $t(46) = 2.44$, $p = .02$.

In addition to mediating within-treatment change in social anxiety, improvements in positive affective empathy during treatment differentially mediated change in social anxiety from baseline to 12-month follow-up in CBGT versus MBSR, indirect effect = –8.23, 95% CI [–18.24, –1.97]. In the sample of

participants with 12-month follow-up data on the empathy task, CBGT was associated with significantly greater improvement in positive affective empathy than MBSR from baseline to posttreatment, ß = .42, $t(35) = 2.77$, $p = .009$, and greater improvement in positive affective empathy during treatment was associated with lower social anxiety at 12-month follow-up when controlling for treatment condition, ß = –.42, $t(34) = 2.39$, $p = .02$.

The reverse mediations were not significant. Change in social anxiety from baseline to Time 2 did not mediate change in empathy from baseline to Time 2 in CBGT (vs. WL; indirect effect = –0.14, 95% CI [–0.64, 0.31]) or MBSR (vs. WL; indirect effect = 0.39, 95% CI [–0.12, 1.17]), nor did it differentially mediate change in empathy in CBGT versus MBSR, indirect effect = 0.17, 95% CI [–0.04, 0.58]. Likewise, change in social anxiety from baseline to Time 2 did not mediate change in empathy from baseline to 12-month follow-up for CBGT versus MBSR, indirect effect = 0.14, 95% CI [–0.07, 0.66].

Discussion

Compared to nonanxious individuals, individuals with SAD exhibit less sharing of the positive emotions of others (Morrison et al., 2016) and may experience enhanced sharing of negative emotions (Auyeung & Alden, 2016) and/or have difficulty accurately perceiving others' emotions (e.g., Hezel & McNally, 2014). Therefore, our primary aim was to examine whether efficacious treatments for SAD, including CBT and MBSR, can improve empathy in individuals with SAD. Consistent with our hypothesis, we found that CBGT for SAD resulted in significant improvements in the vicarious sharing of positive emotions (i.e., positive affective empathy) relative to a wait-list condition. In addition, gains in positive affective empathy during CBGT were maintained at 1-year follow-up and changes in positive affective empathy during CBGT statistically mediated improvements in social anxiety both at posttreatment and at 1-year follow-up, with the latter finding meeting timeline requirements for status of positive affective empathy as a mechanism of change of social anxiety in CBGT (e.g., Kazdin, 2009; Tryon, 2018). Inconsistent with our hypothesis, MBSR for SAD did not result in improved positive affective empathy. Likewise, compared to wait-list, neither CBGT nor MBSR improved affective empathy for negative emotions, nor positive or negative cognitive empathy. However, the latter null effects are not entirely surprising, as only one previous study has used the empathic accuracy task to measure empathy in SAD and that study observed a specific difficulty in positive affective empathy—individuals with SAD did not differ from healthy control participants in the other three types of empathy assessed (Morrison et al., 2016).

To date, no study to our knowledge has examined whether CBT increases empathy for individuals with SAD. One notable feature of our results is that CBGT, relative to both wait-list and MBSR, resulted in improvements in the one component of empathy that our prior work suggested was lower in individuals with SAD. Moreover, this one aspect of empathy also statistically mediated improvements in social anxiety in CBGT relative to MBSR at posttreatment and at 1-year follow-up. We believe the current results underscore our previous finding of the relevance of positive affective empathy in SAD. Moreover, these results suggest a specific way in which CBGT for SAD may be superior to MBSR for SAD, a finding that stands in contrast to our previous work showing the many similarities in outcomes and mediators across CBGT and MBSR (Goldin et al., 2016, 2017). For example, CBGT and MBSR resulted in similar improvements in cognitive reappraisal frequency and mindfulness and these constructs similarly mediated improvements in social anxiety in both treatments (Goldin et al., 2016). The current results suggest a specific mechanism through which CBGT may confer benefits to individuals with SAD. Because so little research has investigated positive affective empathy in SAD, replication of these findings is needed.

One question is why MBSR did not improve any aspect of empathy, or at least positive affective empathy. Many more theories support the role of MBSR in the cultivation of empathy compared to CBGT. For example, Block-Lerner et al. (2007) suggest that MBSR may enhance metacognitive awareness of one's own emotions, and this awareness may eventually extend to others' emotions. This theory, we think, rightfully recognizes that MBSR is primarily intrapersonal in nature, which stands in contrast to CBGT, which is relatively more interpersonal than intrapersonal (e.g., with the majority of sessions and homework devoted to exposures). In the typical MBSR course, like ours, mindfulness in interpersonal contexts is not introduced until approximately midtreatment and it is the focus in only one session. Likewise, interpersonal consequences of empathy (i.e., compassion) are an explicit target in formal loving-kindness meditation practices. In the current MBSR protocol, loving-kindness meditation was introduced about midway through treatment, practiced in several sessions, and assigned as homework after one session. It could be argued that there was

insufficient time for the interpersonal or loving-kindness meditation practices to have an effect on empathy. However, CBGT did not explicitly address empathy during any session and empirical data suggest that individual differences in mindfulness, which did improve during MBSR (and CBGT), are correlated with individual differences in empathy (Beitel et al., 2005; but see Birnie et al., 2010). One significant gap in prior literature is the study of empathy for others' *positive* emotions. This specific aspect of empathy may not be as closely tied to the concept of mindfulness as affective empathy for negative emotions or cognitive empathy for negative or positive emotions. Future research is needed to further test this hypothesis.

Several limitations of the present study are worth noting. The first is that empathy was assessed with the same video clips at each time point. This may have had implications for our study findings. We believe the most likely outcome was that repetition (e.g., practice) effects on the task were larger than they would have been had different videos been presented at each time point. A second limitation is that the sample size was relatively small for the tests of mediation (i.e., N = 44–54 for tests of mediation of posttreatment social anxiety, N = 37 for tests of mediation of follow-up social anxiety). We believe the sample size was not problematically small in these analyses, however, given the consistency of findings and effect sizes. Specifically, positive affective empathy was the only index of empathy on which individuals with SAD differed from healthy controls (Morrison et al., 2016) and was the only index that changed significantly during treatment. Another methodological limitation is that tests of mediation of posttreatment improvements in social anxiety did not meet standards for testing empathy as a mechanism of treatment given that the mediator and outcome were measured at the same time (e.g., Kazdin, 2009; Tryon, 2018). However, this is not the case for the tests of mediation of social anxiety at 12-month follow-up, which measured predictor, mediator, and outcome in the proper sequence.

Another limitation with regard to our MBSR is that MBSR adherence (reported in Goldin et al., 2016) was rated with a tool developed for this study, and since the commencement of the current RCT, an adherence scale has been developed and validated, called the Mindfulness-Based Intervention Teacher Assessment of Competence (MBI:TAC; Crane et al., 2013). The MBI:TAC includes assessment of the domains relational skills and embodiment of mindfulness, which are important in relational constructs such as empathy. Future studies on empathy changes during MBSR should assess relevant adherence domains. Another limitation is that the current sample was not an intent-to-treat sample. Only those who completed the empathy task at posttreatment were included in analyses on posttreatment empathy and only those who completed treatment were contacted for the 12-month follow-up. Analyses comparing our different subsamples to the larger samples on various characteristics yielded no differences except that those in the 12-month follow-up analyses exhibited lower social anxiety at posttreatment than those excluded from these analyses. Finally, our sample was selected with a number of exclusionary criteria in mind (e.g., age between 21 and 55, no current substance use or recent major depressive episode) and so care should be taken in generalizing the current findings.

Future studies are needed to disentangle several questions. First, as mentioned previously, it is unclear why MBSR did not result in improvements in empathy. Given previous research suggesting a relationship between MBSR training and empathy in unselected samples (e.g., Shapiro et al., 1998), one question is whether standard MBSR is not sufficient to change empathy in individuals with mental disorders, such as SAD. It may also be that the method of measurement of empathy affected the outcome (e.g., self-report may be more amenable to change than behavioral measurement) or that positive affective empathy is a specific aspect of empathy not assessed in prior studies, which is more resistant to change. Another area in need of further research is the exact means through which CBGT improves positive affective empathy in individuals with SAD. Given the number of shared mechanisms across CBGT and MBSR for SAD (Goldin et al., 2016), the current study suggests the need for dismantling studies to better understand the ways in which CBGT specifically supports the improvement of positive affective empathy. Related, future studies should address whether the observed improvement in positive affective empathy is related to improvement in interpersonal outcomes, such as relationship quality or satisfaction. In particular, improvements in positive affective empathy may increase socially anxious partners' provision of capitalization support in romantic relationships.

Finally, it is possible that CBGT does not actually improve the *ability* of individuals with SAD to share others' positive emotions, but rather, it reduces their reliance on safety behaviors (e.g., avoiding eye contact, suppressing experience and/or expression of positive emotion) sufficiently for them to be able to engage in the sharing of others' positive emotions. In other words, perhaps CBGT enhances willingness to share the positive emotions of others.

In sum, we observed evidence of specificity in CBGT relative to MBSR. Individuals with SAD

who completed CBGT exhibited improvements in positive affective empathy and maintained these gains at 1-year follow-up, and these improvements mediated improvement in social anxiety symptoms. In contrast, MBSR did not improve positive affective empathy in individuals with SAD. Future research is needed to replicate and extend the current findings. Of particular importance, the present results suggest one way in which CBGT may improve the positive psychological functioning of individuals with SAD.

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