Group CBT Versus MBSR for Social Anxiety Disorder: A Randomized Controlled Trial

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Objective: The goal of this study was to investigate treatment outcome and mediators of cognitive–behavioral group therapy (CBGT) versus mindfulness-based stress reduction (MBSR) versus waitlist (WL) in patients with generalized social anxiety disorder (SAD). Method: One hundred eight unmedicated patients (55.6% female; mean age = 32.7 years, SD = 8.0; 45.5% Caucasian, 39% Asian, 9.3% Hispanic, 8.3% other) were randomized to CBGT versus MBSR versus WL and completed assessments at baseline, posttreatment/WL, and at 1-year follow-up, including the Liebowitz Social Anxiety Scale—Self-Report (primary outcome; Liebowitz, 1987) as well as measures of treatment-related processes. Results: Linear mixed model analysis showed that CBGT and MBSR both produced greater improvements on most measures compared with WL. Both treatments yielded similar improvements in social anxiety symptoms, cognitive reappraisal frequency and self-efficacy, cognitive distortions, mindfulness skills, attention focusing, and rumination. There were greater decreases in subtle avoidance behaviors following CBGT than MBSR. Mediation analyses revealed that increases in reappraisal frequency, mindfulness skills, attention focusing, and attention shifting, and decreases in subtle avoidance behaviors and cognitive distortions, mediated the impact of both CBGT and MBSR on social anxiety symptoms. However, increases in reappraisal self-efficacy and decreases in avoidance behaviors mediated the impact of CBGT (vs. MBSR) on social anxiety symptoms. Conclusions: CBGT and MBSR both appear to be efficacious for SAD. However, their effects may be a result of both shared and unique changes in underlying psychological processes.

Keywords: social anxiety, cognitive–behavioral therapy, mindfulness, meditation, mediators

Social anxiety disorder (SAD) is highly prevalent (lifetime prevalence rate of 12.1%; Kessler et al., 2005) and has an early onset that often precedes the onset of other anxiety disorders, substance use, and major depression (Otto et al., 2001). SAD is associated with significant impairment in social, educational, and occupational functioning (Acarturk, de Graaf, van Straten, ten Have, & Cuijpers, 2008), and entails a substantial personal and societal burden (Acarturk et al., 2009; Patel, Knapp, Henderson, & Baldwin, 2002).

Although SAD is highly persistent when untreated (Blanco et al., 2011), several psychological interventions have been shown to reliably reduce social anxiety symptoms. For example, a recent meta-analysis of 32 randomized controlled trials (RCTs) of cognitive and/or behavioral interventions for SAD (N = 1,479) showed superior effects on social anxiety symptoms relative to waitlist (WL; Cohen’s d = 0.86), psychological placebo (d = 0.34), and pill-placebo (d = 0.36; Powers, Sigmarsson, & Emmelkamp, 2008), with treatment gains maintained at follow-up (d = 0.76). Interestingly, there were no significant differences among combined exposure and cognitive therapy (vs. control: d = 0.68), exposure (vs. control: d = 0.89), and cognitive treatments (vs. control: d = 0.80). In addition, no significant differences were observed for group (d = 0.68) versus individual (d = 0.69).
treatments. Effect sizes were not associated with sample size, publication year, or number of hours of treatment, further supporting the reliable and robust effects of cognitive and behavioral therapies for SAD.

Other more recent studies have shown the efficacy of nontraditional therapies, such as mindfulness-based stress reduction (MBSR). For example, a recent meta-analysis (Hofmann, Sawyer, Witt, & Oh, 2010) showed that mindfulness-based interventions reliably reduced anxiety symptoms across a variety of psychiatric and medical populations (Hedges’ $g = 0.63$), and even more so in the subgroup of patients with anxiety and mood disorders ($g = 0.97$). In adults with SAD, MBSR has demonstrated improvement in mood, functioning, social anxiety, and quality of life (Koszycki, Bener, Shilk, & Bradwejn, 2007), as well as self-esteem, negative self-views, trait anxiety, negative emotional reactivity, and depression (Goldin & Gross, 2010; Goldin, Ziv, Jazaieri, & Gross, 2012; Goldin, Ziv, Jazaieri, Hahn, & Gross, 2013). A recent review (Norton, Abbott, Norberg, & Hunt, 2015) concluded that mindfulness- and acceptance-based treatments significantly reduce social anxiety symptoms, but that methodological weaknesses strongly limit inferences and comparisons with gold-standard psychosocial interventions for SAD, such as cognitive–behavioral therapy (CBT).

It is important to further examine the comparative efficacy of CBT and MBSR, and to determine whether they produce their effects through similar or different psychological mechanisms of action. To date, few studies have directly addressed whether CBT and MBSR (or similar treatments) have comparable efficacy for treatment of SAD. One study compared cognitive–behavioral group therapy (CBGT; $n = 27$) to MBSR ($n = 26$) in patients with SAD. CBGT and MBSR were comparable in improving mood, functioning, and quality of life, but CBGT produced significantly greater improvement in social anxiety symptoms, as well as greater response and remission rates (Koszycki et al., 2007). However, inferences from this study are somewhat constrained because of methodological issues, including no control group, inclusion of measurement of treatment adherence, or measurement of follow-up outcomes, and inclusion of patients with concurrent use of psychotropic medications, and unequal duration of treatment. A recent RCT compared CBGT ($n = 53$) with mindfulness and acceptance-based group therapy (MAGT; $n = 53$) and to a WL control group ($n = 31$) (Kocovski, Fleming, Hawley, Huta, & Antony, 2013). MAGT combined abbreviated mindfulness exercises from mindfulness-based cognitive therapy (MBCT; Teasdale, Segal, & Williams, 1995), experiential and didactic components of acceptance and commitment therapy (Hayes, Strosahl, & Wilson, 1999), and in-session and in vivo exposure exercises. Both interventions were more efficacious than WL, but not different from each other in reducing social anxiety symptoms or scores on most of the secondary outcome variables. A different RCT compared individual CBT ($n = 40$) with individual acceptance and commitment therapy ($n = 34$) and to a WL control group ($n = 26$), and found a similar pattern of greater efficacy for both treatments than WL and no differential treatment effect on multiple indices of social anxiety (Craske et al., 2014). However, potential confounds include permitting participants with concurrent use of psychotropic medications and alternative (i.e., noncognitive or behavioral) psychotherapies.

Far less is known about the mechanisms of action of CBT and MBSR. Investigations of potential mechanisms of change during CBT for SAD have identified probability bias for negative social events (Smits, Rosenfield, McDonald, & Telch, 2006), estimated probability and estimated cost of negative social events, safety behaviors (Hoffart, Borge, Sexton, & Clark, 2009), and anticipated aversive social outcomes (Hofmann, 2004). Formal mediation analyses indicate that decreases in maladaptive interpersonal beliefs (Boden et al., 2012) and negative cognitions (Niles et al., 2014), as well as increases in cognitive reappraisal (Kocovski, Fleming, Hawley, Ho, & Antony, 2015), reappraisal success (Goldin et al., 2014), reappraisal self-efficacy (Goldin, Ziv, Jazaieri, Werner, et al., 2012), and positive self-views (Goldin, Jazaieri, Ziv, et al., 2013), mediate the effect of CBT on social anxiety symptoms. Other research has implicated rumination, specifically, the brooding subtype, as an important predictor of changes in social anxiety during CBT for SAD (Brozovich et al., 2015). Comparable studies of the mechanisms of action of mindfulness-based treatments are less plentiful. However, a recent meta-analysis of meditation studies examined the mechanisms underlying the therapeutic effects of MBSR and MBCT on psychological functioning and well-being (Gu, Strauss, Bond, & Cavanagh, 2015). This analysis found strong evidence for cognitive and emotional reactivity (stress reactivation of negative thinking and emotional patterns); moderate evidence for mindfulness, rumination, and worry; and preliminary but insufficient evidence for self-compassion and psychological flexibility as mediators of outcome. However, the authors state that most of the reviewed studies had key methodological shortcomings and highlight the need for more rigorous investigation of mediators of MBSR and MBCT, particularly given the recent emphasis on attention control, emotion regulation, self-awareness, and self-regulation as key variables (Tang, Hölzel, & Posner, 2015).

The Present Study

Our goals in this RCT of CBGT versus MBSR (vs. WL) were to examine (a) differential efficacy and durability of effect of CBGT versus MBSR on social anxiety symptoms (primary outcome) as well as measures of treatment-related processes, and (b) potential mediators of changes in social anxiety symptoms in patients with generalized SAD.

Hypothesis 1 (Outcomes): We expected greater statistical and clinically significant improvement on the primary outcome (social anxiety symptoms) for (a) both CBGT and MBSR (vs. WL), and (b) for CBGT (vs. MBSR) immediately and 1-year posttreatment.

Hypothesis 2 (Mediators): We expected that changes in cognitive reappraisal frequency and self-efficacy, subtle avoidance, and cognitive distortions would mediate the impact of CBGT versus WL, and that changes in mindfulness skills, attention focusing, attention shifting, and rumination would mediate the impact of MBSR versus WL on social anxiety symptoms immediately posttreatment. We further explored whether any of these variables differed in their mediational effect for CBGT versus MBSR.
Method

Participants

Patients met Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000) criteria for a principal diagnosis of generalized SAD based on the Anxiety Disorders Interview Schedule for the DSM-IV: Lifetime version (ADIS-IV-L; Di Nardo, Brown, & Barlow, 1994). Patients met criteria for the “generalized” subtype of SAD if they endorsed greater than moderate social fear in five or more distinct social situations assessed by the ADIS-IV-L. Furthermore, participants had to achieve a score greater than 60 on the Liebowitz Social Anxiety Scale—Self-Report (LSAS-SR), the cutoff score for the generalized subtype of SAD as determined by receiver operator characteristics analysis of the LSAS-SR (Rytwinski et al., 2009). Participants were excluded for pharmacotherapy or psychotherapy during the past year; participation in CBT for any anxiety disorder during the last 2 years; any previous MBSR course; previous participation in long-term meditation retreats; history of regular meditation practice of 10 min or more three or more times per week; history of neurological disorders, cardiovascular disorders, thought disorders, or bipolar disorder; as well as current substance and alcohol abuse or dependence.

From 2012 to 2014, 724 potential participants completed an online screener, of whom 307 were screened by telephone (see Consolidated Standards of Reporting Trials, Figure 1). The 173 who were potentially eligible were administered the ADIS-IV-L in person to determine whether they met diagnostic inclusion/exclusion criteria. After 65 patients were excluded because they did not meet diagnostic criteria or failed to complete baseline assessments, the remaining 108 patients were randomly assigned to CBGT (n = 36), MBSR (n = 36), or WL (n = 36). Dropout from treatment was low and did not differ, χ²(2, N = 108) = 1.05, p = .59, across CBGT (n = 2; 6%), MBSR (n = 3; 8%), and WL (n = 1; 3%).

Procedure

Potential patients were recruited through clinician referrals and community listings. After passing a telephone screening, a face-to-face diagnostic interview was used to determine current and past Axis I psychiatric disorders and current clinician-rated severity. After completing all baseline assessments, each set of six consecutive patients entered one group (CBGT, MBSR, or WL), which were sequenced randomly so that at the end of the study we had six groups of six patients each who were randomized to CBGT, MBSR, or WL. Patients completed assessments again at posttreatment and every 3 months during the 1-year follow-up. Patients received treatment at no cost and $150 for completing the 1-year follow-up behavioral session. All participants provided informed consent in accordance with the institutional review board.

Diagnostic Assessment

Diagnostic interviews were conducted at baseline using the ADIS-IV-L (Di Nardo et al., 1994). The ADIS-IV-L has demonstrated excellent interrater reliability (Brown, Di Nardo, Lehman, & Campbell, 2001) and provides clinician-rated severity for each assigned diagnosis on a 0 to 8 scale. To assess the interrater reliability of the ADIS-IV-L, we had doctoral clinical psychologists and doctoral students review 20% of the interviews. There

![Figure 1. Consolidated standards of reporting trials diagram for a randomized controlled trial of CBGT versus MBSR versus WL groups. CBGT = cognitive-behavioral group therapy; MBSR = mindfulness-based stress reduction; WL = waitlist.](image-url)
was 100% agreement with the original principal diagnosis of SAD ($\kappa = 1.0$).

**Measures**

*Primary outcome measure.* Severity of social anxiety symptoms was assessed with the LSAS-SR (Fresco et al., 2001; Liebowitz, 1987), which assesses patients’ reactions to 11 social interaction situations and 13 performance situations. A 4-point Likert-type scale is used for ratings of fear and avoidance, with a range from 0 (none and never, respectively) to 3 (severe and usually, respectively) for each situation during the past week. Ratings are summed for a total LSAS-SR score (range = 0 to 144). The LSAS-SR has good reliability and construct validity (Rytwinski et al., 2009), and its internal consistency was excellent in this study (Cronbach’s alpha = .92).

*Treatment-related processes.* For CBGT, we assessed four candidate mechanisms. We measured cognitive reappraisal frequency and cognitive reappraisal self-efficacy with an extended version of the Emotion Regulation Questionnaire (Goldin, Manber-Ball, Werner, Heimberg, & Gross, 2009; Gross & John, 2003). The instrument utilizes a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), and includes eight items assessing cognitive reappraisal frequency and eight items assessing cognitive reappraisal self-efficacy. Internal consistency for cognitive reappraisal frequency ($\alpha = .89$) and cognitive reappraisal self-efficacy ($\alpha = .93$) were good at baseline. We measured subtle avoidance using the Subtle Avoidance Frequency Examination (Cuming et al., 2009), a 32-item measure of safety behaviors. It has good discriminant and construct validity in patients with SAD, and internal consistency was good in this study at baseline ($\alpha = .91$). We measured cognitive distortions using the Cognitive Distortions Questionnaire (CD-Quest; De Oliveira, 2015), which is comprised of 15 items that assess the frequency and intensity of a variety of common cognitive errors. The CD-Quest has shown good internal consistency ($\alpha = .83$ to .86) and convergent validity with self-report measures of depression, anxiety, and automatic thoughts ($r = .51$ to .65; De Oliveira, 2015; Morrison et al., 2015). Internal consistency was excellent in this study at baseline ($\alpha = .91$).

For MBSR, we assessed four candidate mechanisms. We measured mindfulness skills using the Five Facet Mindfulness Questionnaire (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), a 39-item self-report measure of five mindfulness factors: Observing, Describing, Acting With Awareness, Nonreactivity to Inner Experience, and Nonjudging of Inner Experience. Items are rated on a 5-point Likert-type scale. The instrument has good internal consistency in general (Baer et al., 2006), and it was excellent in this study at baseline ($\alpha = .91$). We used the Attentional Control Scale (Derryberry & Reed, 2002) to measure attention focusing (nine items) and shifting (10 items). Internal consistency is good for the Focusing subscale ($\alpha = .82$) and acceptable for the Shifting subscale ($\alpha = .68$; Ólafsson et al., 2011). In this study, internal consistency was good for both subscales (Focusing $\alpha = .85$; Shifting $\alpha = .74$).

We used the Brooding subscale of the Ruminative Responses Scale (Treynor et al., 2003) to examine this maladaptive form of rumination. Brooding is depicted as moody rumination or “a passive comparison of one’s current situation with some unachieved standard” (Treynor et al., 2003, p. 256). Five items are rated on Likert-type scales ranging from 1 (almost never) to 4 (almost always). The Brooding subscale has been shown to have good reliability in other studies ($\alpha = .77$; Treynor et al., 2003), as well as in the current study ($\alpha = .76$).

**CBT**

CBGT was delivered by two doctoral clinical psychologists trained by Richard Heimberg to implement his CBGT for SAD protocol (Heimberg & Becker, 2002). Groups of six individuals met for 12 sessions of 2.5 hr each (total time = 30 hr). The participants also used selected portions of the client workbook developed by Hope, Heimberg, and Turk (2010) to supplement relevant portions of the protocol. The treatment comprised four major components: (a) psychoeducation and orientation to CBGT; (b) cognitive restructuring skills; (c) graduated exposure to feared social situations, within session and as homework; and (d) relapse prevention and termination. Further details are available elsewhere (Heimberg & Becker, 2002).

**MBSR**

MBSR followed the standard curriculum outline compiled in 1993 by Jon Kabat-Zinn, except that the 1-day meditation retreat was converted to four additional weekly group sessions between the standard Class 6 and 7 so that there were 12 weekly 2.5-hr sessions. This was done to match the CBGT protocol in duration and time. The MBSR intervention was delivered by a University of Massachusetts Center for Mindfulness certified MBSR instructor with more than 30 years of teaching experience. To support the practice, each participant was given A Mindfulness-Based Stress Reduction Workbook (Stahl & Goldstein, 2010), which includes descriptions of mindfulness exercises together with prerecorded audio files to support ongoing practice.

**Adherence and Treatment Completer Status**

To assure treatment adherence, a trained rater was present in every CBGT and MBSR session to conduct real-time rating of adherence using adherence scales developed for CBGT and for MBSR. Adherence ratings indicated that the CBGT therapists and MBSR instructor were “in protocol” (rating >4 of 5 for each session) with no between-groups differences, $t(11) = 0.83$, $p = .43$, in adherence for CBGT ($M \pm SD = 4.92 \pm 0.27$) versus MBSR ($M \pm SD = 4.81 \pm 0.17$). Based on a criterion of nine of 12 sessions attended for treatment completer status, 33 (92%) patients completed CBGT and 33 (92%) completed MBSR. Mean number of sessions attended for CBGT ($M \pm SD = 10.47 \pm 1.56$) and MBSR ($M \pm SD = 10.37 \pm 2.09$) were not significantly different, $t(71) = 0.22$, $p = .82$. The mean number of in-session exposures per patient in CBGT was 4.5 ($SD = 0.84$).

**Statistical Analyses**

**Outcomes.** All results were analyzed using an intention-to-treat approach based on treatment assignments. Longitudinal analysis was used to assess change over time and relate the changes to treatment group assignment. We implemented linear mixed-effects models (LMMs) for continuous outcomes in SPSS (Version 22)
with the MIXED procedure to examine change pre versus post-CBGT versus MBSR, CBGT versus WL, and MBSR versus WL, with maximum likelihood as the method of estimation. The parameters of main interest were the fixed effect interaction terms between groups and times, describing whether the patients had differential change from pre- to posttreatment groups. The model included random intercepts and identity covariance structure. We report effect sizes as Cohen’s $d$ (Cohen, 1988), computed as the mean difference divided by the pooled standard deviation of the difference score. Cohen’s $d$ for paired sample statistical tests (e.g., within-groups $t$ tests comparing baseline with posttreatment) was computed as the mean difference divided by the standard deviation of the difference score.

To determine clinically significant improvement, we computed reliable change (RC) and clinically significant change (CSC) for the primary outcome measure (LASAS-SR). RC was computed as $1.96 \times$ standard error of change, which resulted in a criterion of reduction in LASAS-SR greater than 13.83. CSC consists of RC plus a shift from dysfunctional to the functional range. Using Jacobson’s Method C (Jacobson, Roberts, Berns, & McGlinchey, 1999; Jacobson & Truax, 1991), the CSC criterion was determined by an LASAS-SR score lower than the halfway point (47.68) between two standard deviations above the mean of nonanxious healthy adults ($M \pm SD = 14.35 \pm 12.7$; Fresco et al., 2001) and two standard deviations below the baseline mean of SAD patients ($M \pm SD = 90.89 \pm 17.64$) measured in this study.

**Mediation.** We implemented mediation models to investigate mediators (M) of the effects of treatment group (G) on treatment outcome (O), namely, residualized social anxiety symptoms (LSAS-SR) immediately following treatment/WL. We investigated four putative CBGT-related mediators (reappraisal frequency, reappraisal self-efficacy, subtle avoidance, cognitive distortions) as well as four putative MBSR-related mediators (mindfulness skills, attention focusing, attention shifting, and rumination), computed as residualized scores. We used Hayes’s (2013) SPSS MEDIATE macro, which uses ordinary least squares regression to estimate direct (impact of G on O) and indirect (impact of G on O mediated by M) effects, and allows analysis of three groups simultaneously when coded as categorical variables. Statistical significance was determined at $p < .05$ if the 95% bias-corrected percentile bootstrapped confidence interval (with 5,000 resamples) of the indirect effect point estimate did not contain zero (see Hayes, 2013). Effect size for the mediation effect ($PM$) is the ratio of the indirect effect ($ab$) to the total effect ($c = ab + c’$) (Preacher & Kelley, 2011; Wen & Fan, 2015).

## Results

### Preliminary Analyses

The three groups did not differ significantly (all $p > .05$) in gender, age, education, ethnicity, marital status, income, current or past Axis I comorbidity, past psychotherapy or pharmacotherapy, age at SAD symptom onset, and years since symptom onset (see Table 1).

### Treatment Effects on Social Anxiety Symptoms

LMMs revealed significantly greater reduction (all $t > 5.36$, all $p < .001$) of social anxiety symptoms (LSAS-SR) for CBGT (raw score change from baseline $= -44$; percent change from baseline level $= 48$%; Cohen’s $d = 1.56$) and MBSR ($-36.5$; $40$% $d = 1.43$) compared with WL ($-12.5$; $14$%). However, there were no significant differences for CBGT versus MBSR ($t = 1.36, df = 68, p = .18$), indicating similar treatment efficacy. Furthermore, to examine the durability of clinical improvement, we tested whether there was equivalent maintenance of reduced social anxiety symptoms from immediately to 1-year posttreatment. An LMM showed no significant differences ($t = 1.63, df = 52, p = .11$), suggesting similar sustained clinical improvement during the 1-year post-CBGT and MBSR period (see Figure 2).

Clinically significant improvement was defined as having occurred for patients who met criteria for both reliable change (LASAS reduction >14 points) and clinically significant change (LSAS-SR score <48 at posttreatment). Immediately posttreatment or WL, compared with WL (11.1%), CBGT (44.4%), $\chi^2(1, N = 72) = 9.97, p = .002, \Phi = .37$, and MBSR (38.9%), $\chi^2(1, N = 72) = 7.41, p = .006, \Phi = .32$, yielded higher rates of clinically significant improvement, but did not differ significantly from each other, $\chi^2(1, N = 72) = 0.23, p = .63, \Phi = .06$.

### CBGT- and MBSR-Related Psychological Processes

**CBGT-related processes.** For cognitive reappraisal frequency, LMMs demonstrated significantly greater increases (all $t > 2.60, all p < .05$) for CBGT (+1.1; 30%; $d = 0.59$) and for MBSR (+1.2; 33%; $d = 0.71$) compared with WL (+0.4; 10%), with no significant CBGT versus MBSR differences ($t = 0.04, df = 59, p = .97$; Table 2). For cognitive reappraisal self-efficacy, LMMs demonstrated significantly greater increases (all $t > 2.24, p < .05$) for CBGT (+1.4; 40%; $d = 1.05$) and for MBSR (+0.8; 22%; $d = 0.58$) compared with WL (+0.2; 5%), with no significant CBGT versus MBSR difference ($t = 1.77, df = 56, p = .08$). For subtle avoidance behaviors, LMMs demonstrated significantly greater decreases (all $t > 2.59, all p < .05$) for CBGT (−20.1%; 24%; $d = 1.27$) and for MBSR (−9.8; 12%; $d = 0.64$) compared with WL (−1%; 1%), and significantly greater decreases for CBGT versus MBSR ($t = 2.30, df = 66, p = .025$). For cognitive distortions, LMMs demonstrated significantly greater decreases (all $t > 2.40, p < .05$) for CBGT (−9.1; 32%; $d = 0.59$) and for MBSR (−8.3; 27.5%; $d = 0.67$) compared with WL (−1%; 3%), with no significant CBGT versus MBSR differences ($t = 0.20, df = 59, p = .84$).

**MBSR-related processes.** For mindfulness skills, LMMs demonstrated significantly greater increases (all $t > 5.79, all p < .001$) for CBGT (+14.4; 13%; $d = 1.67$) and for MBSR (+17.6; 17%; $d = 1.44$) compared with WL (−5.6; 5%), with no significant CBGT versus MBSR differences ($t = 0.78, df = 61, p = .44$). For attention focusing, LMMs demonstrated greater increases (all $t > 2.21, all p < .05$) for CBGT (+1.0; 4.5%; $d = 0.50$) and for MBSR (+1.1; 5%; $d = 0.62$) compared with WL (−0.8; 3.5%), with no significant CBGT versus MBSR differences ($t = 0.02, df = 63, p = .99$). For attention shifting, LMMs showed greater increases ($t > 2.56, p = .01$) for CBGT (+1.5; 6.5%; $d = 0.64$) and no significant difference ($t = 1.90, p = .06$) for MBSR (+0.5; 2%; $d = 0.46$) compared with WL (−0.9; 4%), with no significant CBGT versus MBSR differences ($t = 0.90, df = 64, p = .37$). For rumination, LMMs revealed significantly greater decreases (all $t > 2.01, all p < .05$) for CBGT (−2.9; 22%; $d = 0.94$) and for
MBSR (−1.5; 11%; $d = 0.46$) compared with WL (+0.3; 2%), with no significant CBGT versus MBSR differences ($t = 1.27, df = 67, p = .21$).

### Mediators of CBGT and MBSR Effects

As shown in Table 3, increases in reappraisal frequency, mindfulness skills, attention focusing, and attention shifting, as well as decreases in safety behaviors and cognitive distortions, each mediated the effect of CBGT versus WL and MBSR versus WL on social anxiety symptoms. Increases in reappraisal self-efficacy and decreases in rumination mediated the effect of CBGT versus WL, but not MBSR versus WL. For the contrast of the two interventions, there was evidence that increases in reappraisal self-efficacy and decreases in safety behaviors mediated the effect of CBGT (vs. MBSR) on social anxiety symptom reduction.

### Discussion

The goals of this study were to investigate the comparative effects of CBGT versus MBSR (vs. WL) on treatment outcome, and to test for mediators of responses to CBGT and MBSR in adults with SAD. CBGT and MBSR resulted in significant reduction in social anxiety symptoms (LSAS-SR) compared with WL. Thus, the prediction that CBGT would result in greater reduction in social anxiety symptoms compared with MBSR was not supported, either immediately or 1-year posttreatment. Furthermore, analysis of reliable and clinically significant change on the LSAS-SR showed similar rates of clinically significant improvement for CBGT and MBSR. These results converge with the results of a study reporting equivalent impact of CBGT versus MAGT on social anxiety and secondary outcomes (Kocovski et al., 2013), but diverge from a prior finding of greater reduction in...
social anxiety symptoms for CBGT versus MBSR (Koszycki et al., 2007). The use of more refined methods in our RCT, including matching CBGT and MBSR dose, excluding concurrent psychotropic medication use, and confirming protocol adherence, may have contributed to the equivalent efficacy of the two treatments. This pattern of results suggests that MBSR may be as efficacious as CBGT at reducing social anxiety symptoms and maintaining treatment gains.

Measures of treatment-related psychological processes provided additional evidence for similar effects of CBGT and MBSR, specifically, decreasing cognitive distortions and ruminating, and increasing reappraisal frequency and self-efficacy, mindfulness skills, and attention focusing and shifting. These results are contrary to our hypotheses of greater clinical impact for CBGT versus MBSR. The only differential improvement was greater reduction in the frequency of subtle avoidance behaviors after CBGT (vs. MBSR). Safety behaviors are considered to maintain social anxiety in persons with SAD (Piccirillo, Dryman, & Heimberg, in press). CBT explicitly discusses the role of avoidance, as well as trains patients to counter avoidance by engaging in, and vicariously learning from, multiple exposures to feared situations. The frequency of safety behaviors has previously been shown to decrease more following CBT compared with a stress management control (Cuming et al., 2009). Unlike CBT, MBSR does not explicitly address safety behaviors and, specifically, avoidance behaviors.

One unexpected finding was the similar level of improvement after MBSR and CBGT in cognitive distortions, reappraisal frequency, and reappraisal self-efficacy. Across studies of mindfulness meditation, there is preliminary evidence for improvement in cognitive distortions (Sears & Kraus, 2009) and increases in mindfulness and emotion regulation, as well as decreases in attention in emotional experience (Chiesa, Anselmi, & Serretti, 2014). Overall, the pattern of changes found in this study suggests more similarity than differences for the impact of CBGT and MBSR in adults with SAD.

With regard to mediation, increases in reappraisal frequency, mindfulness skills, and attention focusing and shifting, as well as decreases in subtle avoidance and cognitive distortions, each mediated the effect of CBGT versus WL, and also MBSR versus WL, on social anxiety symptoms. These mediation results suggest multiple shared psychological mechanisms of change for both CBT and MBSR that span attention, cognitive, and behavioral processes. In contrast, reappraisal self-efficacy and subtle avoidance differentially mediated the impact of CBT (vs. MBSR) on social anxiety symptoms. This result converges with a prior RCT study in which increases in reappraisal self-efficacy mediated the effect of individual CBT for SAD on social anxiety symptoms (Goldin, Ziv, Jazaieri, Werner, et al., 2012). One explanation of this mediation result is that CBT provides challenging but safe opportunities to face long-held social fears in the context of in-session and in vivo exposures. The shift in metacognition, namely, awareness of and belief in one’s ability to use reappraisal effectively when needed (i.e., reappraisal self-efficacy), is a fundamental learning lesson in CBT and likely contributes to social anxiety symptom reduction.

Decreases in subtle avoidance and cognitive distortions both mediated the impact of CBGT and MBSR (vs. WL). Avoidance and cognitive distortions have been found to be mediators of CBT for SAD (Hedman et al., 2013; Smits et al., 2006) and accords with cognitive–behavioral models of SAD. What is more novel is that reductions in avoidance and cognitive distortion mediated the impact of MBSR at the same level of CBGT. One key component of MBSR training that may account for the reduction in avoidance behaviors is the emphasis on radical acceptance of experience. Although there is one study showing evidence for cognitive distortions as a mediator of mindfulness-based interventions (Gu et al., 2015), it is not yet clear whether CBT and MBSR arrive at reduction in cognitive distortions via different underlying mechanisms.

Contrary to our prediction, increases in attention focusing and shifting mediated the effect of CBGT and MBSR (vs. WL). This suggests that both CBT and MBSR may increase executive ability to direct attention, albeit via different types of training methods. Enhanced attention regulation may be one shared mechanism by which both CBT and MBSR helps adults with SAD to modify overlearned
attentional biases and flexibly shift between threat and nontreat stimuli. Although enhancement of mindfulness skills during CBT may be, at first glance, surprising, this is not a novel finding. Changes in mindfulness have been found to be a mediator of MBSR and MBCT across clinical samples (Gu et al., 2015), and specifically in patients with generalized anxiety disorder (Hoge et al., 2015).

These results highlight the many shared underlying psychological processes that are modulated during CBT and MBSR, and may help explain why both are equivalently effective for SAD. The clinical implications of this study are that both CBT and MBSR are efficacious treatments for adults with SAD. They have both shared and unique changes in underlying psychological processes that mediate or predict treatment outcome. This provides clinicians and clinics with stronger confidence in integrating MBSR into their set of interventions to treat SAD.

It is important to note that the 56.5% of the patient sample was non-White (39% Asian American, 9% Latino American, 6.5% multiple ethnicities, 1% African American, 1% Native American). Although there was significant ethnic diversity, there was under-representation of African Americans in this sample. However, there was a wide range of socioeconomic status as indicated by yearly income. Thus, these results are highly generalizable.

The focus of this study was on the effects of CBGT versus MBSR (vs. WL) on traditional outcomes and treatment-related psychological processes in adults with generalized SAD. Our study attempts to balance the frequency and dose of treatments in our attempt to replicate the results of this study. The focus of this study was on the effects of CBGT versus MBSR (vs. WL) on traditional outcomes and treatment-related psychological processes in adults with generalized SAD. Our study attempts to balance the frequency and dose of treatments in our attempt to replicate the results of this study.
CBT and MBSR, particularly given that mechanisms may differ between individual and group formats (Hedman et al., 2013).

Finally, experimental dismantling studies are needed to examine whether hypothesized treatment-specific mechanisms, such as cognitive reappraisal and mindfulness, differentially change (and mediate improvements) following implementation of treatment-specific techniques (e.g., cognitive restructuring vs. mindful breath awareness). It may be that the essential “ingredients” in practice are an ability to (a) distance oneself from one’s thoughts, whether through questioning the evidence consistent with a troubling thought or through decentering; and (b) approach previously avoided situations, whether as an attempt to gather disconfirmatory information about these situations or engage in valued action.

References


Table 3

Mediators of the Impact of CBGT and MBSR On Social Anxiety Symptoms

<table>
<thead>
<tr>
<th>Mediator</th>
<th>Group contrast</th>
<th>IE, SE [95% CI]</th>
<th>DE</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reappraisal frequency</td>
<td>CBGT (vs. WL)</td>
<td>−3.46, 2.17 [−9.62, −0.47]</td>
<td>−25.86</td>
<td>.12</td>
</tr>
<tr>
<td></td>
<td>MBSR (vs. WL)</td>
<td>−3.78, 2.20 [−9.98, −0.73]</td>
<td>−17.35</td>
<td>.18</td>
</tr>
<tr>
<td></td>
<td>CBGT (vs. MBSR)</td>
<td>−3.3, 1.52 [−3.50, 2.71]</td>
<td>8.51</td>
<td>.04</td>
</tr>
<tr>
<td>Reappraisal self-efficacy</td>
<td>CBGT (vs. WL)</td>
<td>−5.70, 2.67 [−12.42, −0.68]</td>
<td>−23.62</td>
<td>.19</td>
</tr>
<tr>
<td></td>
<td>MBSR (vs. WL)</td>
<td>−2.23, 1.89 [−7.44, 3.2]</td>
<td>−18.90</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>CBGT (vs. MBSR)</td>
<td>−3.46, 1.96 [−6.66, 8.73]</td>
<td>4.72</td>
<td>.42</td>
</tr>
<tr>
<td>Safety behaviors</td>
<td>CBGT (vs. WL)</td>
<td>−16.53, 4.09 [−25.79, −9.52]</td>
<td>−12.76</td>
<td>.56</td>
</tr>
<tr>
<td></td>
<td>MBSR (vs. WL)</td>
<td>−8.28, 2.78 [−14.56, −3.54]</td>
<td>−12.85</td>
<td>.42</td>
</tr>
<tr>
<td></td>
<td>CBGT (vs. MBSR)</td>
<td>8.25, 3.86 [2.13, 17.80]</td>
<td>−0.9</td>
<td>1.01</td>
</tr>
<tr>
<td>Cognitive distortions</td>
<td>CBGT (vs. WL)</td>
<td>−9.26, 3.63 [−18.50, −3.68]</td>
<td>−20.03</td>
<td>.32</td>
</tr>
<tr>
<td></td>
<td>MBSR (vs. WL)</td>
<td>−7.76, 2.75 [−14.20, −3.20]</td>
<td>−13.37</td>
<td>.37</td>
</tr>
<tr>
<td></td>
<td>CBGT (vs. MBSR)</td>
<td>1.50, 2.74 [−3.12, 7.92]</td>
<td>6.66</td>
<td>.17</td>
</tr>
<tr>
<td>Mindfulness skills</td>
<td>CBGT (vs. WL)</td>
<td>−9.70, 3.37 [−17.69, −4.10]</td>
<td>−19.62</td>
<td>.33</td>
</tr>
<tr>
<td></td>
<td>MBSR (vs. WL)</td>
<td>−10.31, 4.09 [−20.36, −3.91]</td>
<td>−11.52</td>
<td>.47</td>
</tr>
<tr>
<td></td>
<td>CBGT (vs. MBSR)</td>
<td>−0.61, 2.40 [−5.91, 3.83]</td>
<td>8.10</td>
<td>.08</td>
</tr>
<tr>
<td>Attention focus</td>
<td>CBGT (vs. WL)</td>
<td>−2.83, 2.12 [−9.12, −1.1]</td>
<td>−26.48</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>MBSR (vs. WL)</td>
<td>−3.12, 2.00 [−8.48, −3.2]</td>
<td>−18.71</td>
<td>.14</td>
</tr>
<tr>
<td></td>
<td>CBGT (vs. MBSR)</td>
<td>−2.9, 1.72 [−4.08, 3.04]</td>
<td>7.77</td>
<td>.04</td>
</tr>
<tr>
<td>Attention shifting</td>
<td>CBGT (vs. WL)</td>
<td>−5.09, 2.90 [−13.31, −1.17]</td>
<td>−24.22</td>
<td>.17</td>
</tr>
<tr>
<td></td>
<td>MBSR (vs. WL)</td>
<td>−3.50, 1.90 [−8.50, −7.1]</td>
<td>−18.33</td>
<td>.16</td>
</tr>
<tr>
<td></td>
<td>CBGT (vs. MBSR)</td>
<td>1.59, 2.38 [−1.77, 8.26]</td>
<td>5.89</td>
<td>.21</td>
</tr>
<tr>
<td>Ruminatio</td>
<td>CBGT (vs. WL)</td>
<td>−5.40, 3.19 [−12.77, −6.9]</td>
<td>−23.89</td>
<td>.18</td>
</tr>
<tr>
<td></td>
<td>MBSR (vs. WL)</td>
<td>−2.93, 2.29 [−9.10, −0.02]</td>
<td>−18.19</td>
<td>.14</td>
</tr>
<tr>
<td></td>
<td>CBGT (vs. MBSR)</td>
<td>2.46, 2.18 [−3.9, 8.83]</td>
<td>5.70</td>
<td>.30</td>
</tr>
</tbody>
</table>

Note. CBGT = cognitive-behavioral group therapy; WL = waitlist; MBSR = mindfulness-based stress reduction; IE = indirect effect (a × b) of group on social anxiety symptoms through mediator; SE = standard error; CI = bias-corrected bootstrap confidence intervals; DE = direct effect (c’) of group on social anxiety symptoms; ES = effect size ratio of the indirect effect to the total effect (P_M = ab / [ab + c’]).


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