

Treating Social Anxiety Disorder with CBT: Impact on Emotion Regulation and Satisfaction with Life

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Published online: 5 March 2016
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Abstract We examined whether cognitive-behavioral therapy (CBT) would influence the relationship between two distinct forms of emotion regulation (cognitive reappraisal and expressive suppression) and satisfaction with life in patients with social anxiety disorder (SAD). When compared to healthy adults ($n = 42$) at baseline (Study 1), patients with SAD ($n = 128$) reported lesser use of cognitive reappraisal, greater use of expressive suppression, and lower levels of satisfaction with life. In a randomized controlled trial of CBT ($n = 40$) versus a waitlist control group ($n = 32$) (Study 2), results indicated in the CBT group significant group by time interactions for the use of cognitive reappraisal and satisfaction with life, but not for the use of expressive suppression. Regression analyses in Study 2 provide insight into the predictive value of expressive suppression emotion regulation on post-CBT life satisfaction.

Keywords Social anxiety disorder · CBT · Satisfaction with life · Subjective well-being · Emotion regulation · Cognitive reappraisal · Expressive suppression

Introduction

Social anxiety disorder (SAD) is associated with impairments in nearly every aspect of the person's life. When compared to individuals who do not meet criteria for SAD, results reveal difficulties across the board, including lower educational attainment, reduced work performance, greater unemployment, number of work hours missed due to social anxiety, lower rates of marriage, and higher rates of divorce (Wittchen et al. 2000). Affectively, SAD is associated with diminished positive experiences (Kashdan 2007; Kashdan and Breen 2008), and interpersonally, poorer relationships and fewer social connections (Alden and Taylor 2004). The prevalent (Kessler et al. 2005) and chronic (Cairney et al. 2007) nature of SAD makes it the fifth most common psychiatric disorder (Alonso et al. 2004), and a condition that has significant adverse effects in the lives of affected individuals (Eng et al. 2005; Frisch et al. 2005; Stein and Kean 2000). These numerous and chronic impairments that impact all aspects of one's inter- and intrapersonal life likely also affects one's ability to fully enjoy life (Jazaieri et al. 2012) and may contribute to the difficulties seen in regulating emotions in SAD (Goldin and Gross 2010), a topic we return to in greater detail in sections that follow.

Unfortunately, SAD is also an under-treated psychiatric condition (Wang et al. 2005): Many people who experience symptoms of SAD are unaware that there is a name and official diagnostic category for the symptoms they experience. Current estimates suggest that as many as 80 % of individuals meeting diagnostic criteria for SAD will not receive treatment over the course of their lifetime. Those who do pursue treatment typically do so nearly a decade after initial symptom onset (Grant et al. 2005). Several psychosocial treatments exist for SAD and have been

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shown to exhibit beneficial clinical outcomes for patients (e.g., Craske et al. 2014; Hofmann et al. 2014; Koszycki et al. 2007; Morgan et al. 2014). Nevertheless, while effective treatments exist, for many, SAD symptoms never *fully* disappear; thus, enhancing longer-term adaptive functioning and life satisfaction are important goals. Therefore, within the context of adults with SAD, we were interested in how a psychosocial treatment, such as cognitive behavioral therapy (CBT), affect emotion regulation and satisfaction with life, and also in examining how patterns of emotion regulation are related to satisfaction with life.

Emotion Regulation

Cognitive models of SAD (e.g., Clark and Wells 1995) and empirical evidence (e.g., Farmer and Kashdan 2012) suggest that individuals with SAD are afflicted by ineffective emotion regulation. Cognitive models suggest that individuals with SAD fear social situations and therefore often choose to avoid social situations altogether and the pervasive fear of negative evaluation persists (Clark and Wells 1995). Given the high proclivity to experience negative emotions (e.g., Kashdan 2007; Kashdan and Breen 2008; Kashdan and Steger 2006), maladaptive use of emotion regulatory strategies may be especially problematic for individuals with SAD (e.g., Hofmann et al. 2012; Jazaieri et al. 2015). Thus, understanding the profile of emotion regulation use and promoting adaptive use of emotion regulatory strategies in individuals with SAD is essential for understanding whether and how clinical interventions improve life for persons with SAD.

Emotion regulation refers to efforts made to influence the particular emotions one has, when one has them, and how these emotions are (or in some cases, are not) experienced and/or expressed (Gross 1998b, 2014). Difficulties regulating emotions have been closely tied to psychopathology, especially mood and anxiety disorders (Cole et al. 1994). By definition, emotion regulation refers to efforts to change one's emotional experience in some way, and yet in SAD, patients believe that they have very little control over their emotional responses (for a review see Hofmann 2007). If patients do not believe that they can influence their emotions then deploying effective emotion regulatory strategies seems improbable.

Emotion regulatory processes can be organized into groups based on when they have their primary impact on the emotion-generative process (Gross 1998a). Two of the most commonly researched emotion regulatory strategies are cognitive change and response modulation. *Cognitive change* refers to efforts made to alter one's emotions by modifying the subjective meaning of the situation. *Response*

modulation refers to efforts made to alter physiological, experiential, or behavioral responses in a situation.

Cognitive change involves employing cognitive skills (e.g., perspective taking, reframing the meaning of thoughts and situations, challenging interpretations) to modify emotional reactions. Cognitive reappraisal is the most researched form of cognitive change and is largely considered to be an “adaptive” emotion regulatory strategy. When employed appropriately, cognitive reappraisal can modify emotional reactions to anxiety-provoking situations and enhance psychological flexibility and emotional well-being (Gross and Thompson 2007). On the other hand, difficulty employing reappraisal is considered to be a core mechanism in the maintenance of psychopathology in anxiety and mood disorders (Campbell-Sills and Barlow 2007). Cognitive factors have been posited to maintain social anxiety disorder (Hofmann 2007). When compared to healthy adults, individuals with SAD report lesser self-efficacy in implementing cognitive reappraisal (Werner et al. 2011).

Once an emotion has occurred, response modulation refers to strategies employed in an effort to modify one or more components of the emotional response (e.g., experience, behavior, physiology). One form of response modulation is expressive suppression, whereby the individual inhibits outward expressions of emotion(s), such as facial behavior. Expressive suppression is common in social anxiety; for example, research with undergraduate students suggests that those who endorse greater social anxiety tend to inhibit or control emotional expression more so than those students who endorse lesser social anxiety (Kashdan and Breen 2008; Spokas et al. 2009). Furthermore, research suggests that patients with SAD engage in response modulation to not only negative (Erwin et al. 2003) but also positive (Turk et al. 2005) emotions. When compared to healthy adults, individuals with SAD report greater utilization of expressive suppression when trying to regulate emotions (Werner et al. 2011).

It has been said that social anxiety paired with emotional suppression can be a “toxic” combination (Kashdan and Breen 2008). Suppression of one's experience (both positive and negative) has adverse consequences on one's health and well-being (John and Gross 2004); however, as we describe in the section below, the relationship between emotion regulation and one's subjective evaluation of life satisfaction has not been specifically investigated within the context of SAD. With respect to emotion regulation, similar to others (e.g., Gross and John 2003; Haga et al. 2009), we expect that cognitive reappraisal (largely considered to be an “adaptive” emotion regulation strategy) will promote a greater satisfaction with one's life, while the use of expressive suppression (largely considered to be a

“maladaptive” emotion regulation strategy) should be associated with lesser satisfaction with one’s life.

Satisfaction with Life

It has been noted that subjective well-being, of which life satisfaction is one part, can be divided into two broad categories, an affective component that encompasses both positive and negative emotions and a cognitive component that entails life satisfaction (Pavot and Diener 1993). In this context, life satisfaction is not domain specific (e.g., health, finances, etc.) but refers to a “judgmental process, in which individuals assess the quality of their lives on the basis of their own unique set of criteria” (Pavot and Diener 1993, p. 164). To our knowledge, aside from the work in our laboratory (Jazaieri et al. 2012), we are unaware of any published studies that specifically report on satisfaction with life in SAD. As we briefly review below, there has been some research conducted on quality of life more generally in anxiety disorders and in SAD.

Within the clinical literature it is important to understand whether psychosocial interventions such as CBT can contribute to improved life satisfaction above and beyond simply reducing problematic symptoms. Anxiety disorders have been shown to “markedly compromise quality of life and psychosocial functioning” in patients (Mendlowicz and Stein 2000, p. 669). A recent meta-analysis looking at 32 samples of anxiety patients yielded a large effect size ($d = 1.31$) indicating a poorer quality of life for patients compared to healthy controls (Olatunji et al. 2007). Another recent meta-analysis looking at the effects of CBT for anxiety disorders on quality of life has suggested that CBT is moderately effective in improving quality of life (Hofmann et al. 2014). According to one epidemiological study, when consider persons with social anxiety specifically, these individuals rate themselves as being “low functioning” on the Quality of Well-Being Scale (a combined index of morbidity and mortality) and report dissatisfaction with many aspects of their lives (Stein and Kean 2000). Specifically, within SAD when examining the Quality of Life Inventory, a domain-based “measure of life satisfaction, well-being, positive psychology, and positive mental health” (Frisch et al. 2005, p. 67), Eng et al. (2005) found that adults with SAD reported dissatisfaction in the domains of achievement and social functioning. In the present research, we are interested in examining satisfaction with life within the context of CBT for SAD and also in relation to specific emotion regulation strategies.

The Present Studies

There is growing support for the notion that the type of emotion regulatory strategy one uses is related to health

and well-being outcomes (e.g., Gross and John 2003). However, no research has examined how the use of emotion regulatory strategies within the context of SAD influences satisfaction with life, and to what extent treatments influence emotion regulation, satisfaction with life, or the link between emotion regulation and satisfaction with life.

To address this important gap in the literature, we conducted a series of two studies. In Study 1, we examined the differences between healthy adults and patients with SAD on two emotion regulation strategies (cognitive reappraisal and expressive suppression) and satisfaction with life. We hypothesized that compared to healthy controls (HC), patients with SAD would endorse *lesser* cognitive reappraisal, *greater* expressive suppression, and *lesser* satisfaction with life. In Study 2, we examined these same variables within the context of an RCT of individual CBT versus a waitlist control condition (WL). We hypothesized that, compared WL, CBT would result in *greater* cognitive reappraisal, *lesser* expressive suppression, and *greater* satisfaction with life. We also sought to examine whether improvements in each emotion regulation strategy [defined as (a) increased cognitive reappraisal use, and (b) decreased expressive suppression use] following CBT would predict satisfaction with life after treatment.

Study 1

Emotion Regulation and Satisfaction in Life in Social Anxiety Disorder

Subjective well-being more broadly has been associated with many positive outcomes (Diener and Chan 2011). Thus, if subjective well-being is indeed comprised of affective and cognitive components (Pavot and Diener 1993), then it is fitting to examine how emotion regulation (an affective component) and life satisfaction (a cognitive component) differ in individuals with SAD versus healthy controls. The goal of the current study was to test for differences between healthy adults and adults with SAD on the use of two emotion regulation strategies (cognitive reappraisal and expressive suppression) and satisfaction with life.

Methods

Participants

Participants were 128 patients (61 men, 67 women; 50.8 % Caucasian, 32 % Asian, 9.4 % multiracial, 3.9 % Latino, 1.6 % Filipino, 1.6 % declined to state, and 0.8 % Pacific

Islander) who met the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association 1994) criteria for a principal diagnosis of generalized SAD, and 42 healthy control (HC) participants (22 men, 20 women; 52.4 % Caucasian) with no history of DSM-IV psychiatric disorders. All participants were between 21 and 53 years of age [SAD: $M = 33.09$ years, standard deviation (SD) = 8.49 years; HC: $M = 32.94$, SD = 9.24].

Procedure

Both HC participants and patients with SAD underwent diagnostic screening prior to selection including telephone screening and an in-person diagnostic interview based on the Anxiety Disorders Interview Schedule Lifetime Version (ADIS-IV-L; Di Nardo et al. 1994) for the DSM-IV. Patients had to meet criteria for a principal diagnosis of generalized SAD. HC participants were included if they did not meet criteria for any current or lifetime psychological disorder. Diagnoses were made by Ph.D. level clinical psychologists who were trained (via training tapes and test cases) to administer the ADIS-IV-L. The ADIS-IV-L is a structured interview designed to assess for current and lifetime diagnoses of anxiety disorders and permits differential diagnosis among the anxiety disorders according to DSM-IV criteria. In addition to anxiety disorders, the ADIS-IV-L assesses current mood, somatoform, substance use disorders, and medical and psychiatric treatment history, and includes screening questions for psychotic and conversion symptoms as well as familial psychiatric history. Because all participants were part of a larger neuroimaging study, participants also had to be right-handed and pass a magnetic resonance imaging (MRI) safety screen. Patients were excluded if they reported prior or current CBT, MBSR, regular aerobic exercise, a history of medical disorders, head trauma, current pharmacotherapy, or current psychotherapy. All participants provided informed consent in accordance with Stanford University Human Subjects Committee rules.

Measures

Emotion Regulation Questionnaire (ERQ) we utilized a 16-item extended version (Goldin et al. 2009, 2012; Jazaieri et al. 2014) of the original 10-item ERQ (Gross and John 2003), a widely used and validated individual difference measure assessing expressive suppression and cognitive reappraisal. The instrument utilizes a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree) for each statement. Ratings are averaged for a mean score for each subscale.

Cognitive reappraisal The 8-item cognitive reappraisal subscale asks individuals to rate their degree of disagreement or agreement to various reappraisal methods over the past month. Sample items include: “I control my emotions by changing the way I think about the situation I’m in”; “When I’m faced with a stressful situation, I make myself think about it in a way that helps me stay calm”. Internal consistency was excellent in the current samples (Cronbach’s alphas: HC = .91; SAD = .94).

Expressive suppression The 8-item expressive suppression subscale asks participants to rate their degree of disagreement or agreement to various suppression methods over the past month. Sample items include: “I regulate my emotions by hiding what I’m feeling inside”; “I keep my emotions to myself”. Internal consistency was excellent in the current samples (Cronbach’s alphas: HC = .96; SAD = .95).

Satisfaction with life scale (SWLS; Diener et al. 1985). The SWLS is the most widely used measure to assess overall satisfaction with life as a whole. This 5-item measure asks global (rather than specific) questions about one’s life, with higher scores indicating greater satisfaction with life. It has exhibited high internal consistency, test-retest reliability, and convergent and discriminant validity (Pavot and Diener 2008). Internal consistency was very good in the current samples (Cronbach’s alphas: HC = .88; SAD = .92).

Results and Discussion

Correlations of the three study variables for both the SAD and HC groups are reported in Table 2. Below, we report group differences in emotion regulation (cognitive reappraisal and expressive suppression) and satisfaction with life.

Between-groups t test showed that, compared to HC, patients with SAD reported lesser use of cognitive reappraisal [$t(157) = -4.82$, $p < .001$; SAD: $M = 3.73$, SD = 1.41; HC: $M = 4.91$, SD = 1.07, $\eta_p^2 = .13$] and greater use of expressive suppression [$t(157) = 4.90$, $p < .001$; SAD: $M = 5.22$, SD = 1.25; HC: $M = 4.06$, SD = 1.43, $\eta_p^2 = .13$]. As expected, a between-groups t test showed that, compared to HC, patients with SAD reported lesser satisfaction with life [$t(163) = -5.14$, $p < .001$; SAD: $M = 14.88$, SD = 8.38; HC: $M = 21.83$, SD = .68, partial η^2 (η_p^2) = .14].

The results from this study contribute to the growing literature on the difficulties with emotion regulation in individuals with psychopathology (Gross and Jazaieri 2014; Jazaieri et al. 2013). The results from this study also suggest that without intervention, individuals with SAD may continue to rely on using maladaptive emotion

regulation strategies such as expressive suppression rather than more adaptive strategies such as cognitive reappraisal. The results from this study also coincide nicely with what others have suggested (e.g., Hofmann 2007)—if people with SAD do not believe that they can influence their emotions then it is unlikely that they will choose to utilize skillful emotion regulatory strategies. Furthermore, as shown in Table 2, it is possible that an important and potentially unique relationship exists between life satisfaction and expressive suppression in those patients who meet criteria for SAD compared to healthy controls. Although the current study documents interesting relationships and associations, the cross-sectional nature of this study prevents us from making any causal inferences.

Study 2

Impact of CBT on Emotion Regulation and Satisfaction in Life

Though several psychosocial and pharmacological treatments are available for patients with SAD, one of the most promising and widely used non-pharmacological interventions is cognitive-behavioral therapy (CBT; Beck et al. 1985, 1979). CBT utilizes both cognitive and behavioral strategies to help patients break the detrimental cycle that exists amongst distorted thoughts, problematic emotions, and maladaptive behaviors. CBT includes training in cognitive restructuring of maladaptive beliefs (cognitive change) and behavioral strategies such as exposure to highly feared and commonly avoided situations. CBT is regarded as an effective treatment for many types of psychological problems and is considered to be the “gold-standard” intervention for SAD (Heimberg 2002).

Emotion regulatory strategies have been shown to predict, moderate, and mediate treatment response to CBT and there is some evidence that CBT may be mediated by top-down regulation and decreased emotional reactivity (Klumpp et al. 2014). Interestingly, prior research suggests that the use of emotion suppression strategies during CBT is not a marker of treatment response in patients with SAD (Moscovitch et al. 2012), perhaps this is because CBT does not extensively address expressive suppression—as much emphasis in CBT is placed on cognitive change strategies (Heimberg 2002). Aside from the expected clinical benefits, there is some evidence to suggest that cognitive behavioral group therapy (CBGT) can be beneficial in improving quality of life in adults with SAD (Eng et al. 2001, 2005; Safren et al. 1996). However to our knowledge, no published research has examined satisfaction with life and emotion regulation specifically within the context of individual CBT for SAD.

Methods

Participants

This RCT of CBT consisted of patients meeting diagnostic criteria for generalized SAD, defined as, based on rating scales in the ADIS-IV-L (Di Nardo et al. 1994), of greater than moderate fear for five or more distinct social and performance situations and a clinician’s severity rating of 4 or greater for SAD on these 0–8 scales. Seventy-two patients (34 men, 38 women) who met criteria for a principal diagnosis of generalized SAD were invited to participate. Patient’s gender, age, ethnicity, education, current and past Axis-I comorbidity, past psychotherapy, and past pharmacotherapy are reported in Table 1. Six patients (16 %) dropped during CBT, and five patients (14 %) dropped during WL (Table 2).

Procedure

As reported in Goldin et al. (2012), patients were recruited through clinician referrals and community bulletin boards. Because patients were part of a larger neuroimaging study, they had to be right handed and pass an MRI safety screening. Patients were excluded for any current pharmacotherapy or psychotherapy, history of medical disorders, or head trauma. Patients were also excluded for any current psychiatric disorders except principal diagnoses of SAD or secondary generalized anxiety disorder, obsessive–compulsive disorder, agoraphobia without a history of panic attacks, or specific phobia. After patients made contact with our laboratory and expressed interest in the study, an initial telephone screen and ADIS-IV-L were used to assess inclusion/exclusion criteria. After completion of baseline assessments, patients were randomly assigned to either 16 weeks of CBT or WL using Efron’s biased coin randomization procedure (Efron 1971). This method removes potential confounds related to unequal assignment at different time points over a multiyear study. All participants provided informed consent in accordance with Stanford University Human Subjects Committee rules.

CBT Intervention

Standard CBT for SAD was delivered using the “Managing Social Anxiety: A Cognitive-Behavioral Therapy Approach”, a manualized treatment protocol which included a therapist guide (Hope et al. 2006) and a client workbook (Hope et al. 2000). This CBT protocol consists of 16 individual, approximately 1-h sessions (with the exception of the first in-session exposure session, which lasted approximately 1.5 h) administered weekly over the course of 4 months. The treatment covers five major areas:

Table 1 Demographic characteristics for patients with social anxiety disorder (SAD) in cognitive behavioral therapy (CBT) and the wait-list control (WL) groups

	WL N = 32	CBT N = 40	t test or χ^2
Females, n (%)	19 (59.4 %)	19 (47.5 %)	$\chi^2 = 1.01$
Age (M years \pm SD)	33.44 \pm 9.80	33.13 \pm 7.68	t = $-.15$
Ethnicity, n (%)			$\chi^2 = 4.30$
Caucasian	19 (59.4 %)	23 (57.5 %)	
Asian	7 (21.9 %)	9 (22.5 %)	
Multiracial	5 (15.6 %)	3 (7.5 %)	
Filipino	1 (3.1 %)	1 (2.5 %)	
Latino	0 (0 %)	1 (2.5 %)	
Pacific Islander	0 (0 %)	1 (2.5 %)	
Declined to state	0 (0 %)	2 (5.0 %)	
Education (M years \pm SD)	17.08 \pm 2.64	16.67 \pm 2.15	t = $-.72$
Current Axis-I comorbidity			$\chi^2 = .93$
Generalized anxiety disorder	6 (18.8 %)	6 (15 %)	
Major depressive disorder	0	0	
Dysthymia	2 (6.3 %)	1 (2.5 %)	
Specific phobia	1 (3.1 %)	4 (10 %)	
Panic disorder	1 (3.1 %)	2 (5 %)	
Agoraphobia	0	0	
Obsessive–compulsive disorder	0	0	
Past Axis-I comorbidity			$\chi^2 = .03$
Major depressive disorder	5 (15.6 %)	9 (22.5 %)	
Dysthymia	1 (3.1 %)	0	
Panic disorder	1 (3.1 %)	0	
Obsessive–compulsive disorder	0	0	
Substance abuse	1 (3.1 %)	3 (7.5 %)	
Eating disorder	1 (3.1 %)	0	
Past psychotherapy	13 (40.6 %)	23 (57.5 %)	$\chi^2 = 2.28$
Past pharmacotherapy	13 (40.6 %)	11 (27.5 %)	$\chi^2 = 1.63$

All F and χ^2 tests are non-significant

Table 2 Correlations of Study 1 variables at baseline

Variable	Correlations		
	1	2	3
Healthy controls			
1. Satisfaction with life scale (SWLS)	–	.09	–.19
2. ERQ—cognitive reappraisal		–	.07
3. ERQ—expressive suppression			–
Social anxiety disorder			
1. Satisfaction with life scale (SWLS)	–	.08	–.26**
2. ERQ—cognitive reappraisal		–	.06
4. ERQ—expressive suppression			–

** $p < .01$

(1) psychoeducation of SAD and orientation to CBT and treatment rationale; (2) cognitive restructuring skills; (3) gradual exposure to feared social and performance situations (occurring both in session in role plays and also in vivo as part of the weekly homework assignment); (4)

examination and modification of core beliefs; and (5) relapse prevention and termination.

Measures

The measures in Study 2 were identical to those administered in Study 1—the Satisfaction with Life Scale (SWLS; Diener et al. 1985) and the extended Emotion Regulation Questionnaire (ERQ; Goldin et al. 2009, 2012; Gross and John 2003; Jazaieri et al. 2014). Internal consistency was excellent in the current sample (Cronbach's alphas: SWLS = .91; ERQ cognitive reappraisal = .94; ERQ expressive suppression = .93).

Results and Discussion

Within group analyses for CBT and WL for all three dependent variables are reported in Table 3. Results indicated that the WL group did not change on any of the three

Table 3 Within group results for pre- to post-WL, and pre- to post-CBT

Measure	Group	Pre mean (SD)	Post mean (SD)	Pre to post F, <i>p</i> , effect size
Satisfaction with life scale (SWLS)				
	WL	14.33 (5.48)	15.93 (7.14)	2.80, .11, .10
	CBT	14.78 (6.59)	22.00 (6.16)	34.32, .001, .61
Emotion Regulation Questionnaire (ERQ)				
Cognitive reappraisal				
	WL	3.43 (1.39)	3.25 (1.51)	.81, .38, .03
	CBT	3.70 (1.44)	5.29 (.91)	26.51, .001, .54
Expressive suppression				
	WL	4.71 (1.52)	4.50 (1.70)	.43, .52, .02
	CBT	5.61 (.89)	5.11 (1.08)	4.25, .05, .16

Bold values indicate statistically significant ($p < .05$)

Italic values indicate exact p values

Bold italic values indicate statistically significant p -value (exact value shown)

SD standard deviation, *effect size* partial η^2 (η_p^2), WL waitlist control condition, CBT cognitive behavioral therapy

variables—satisfaction with life, cognitive reappraisal, or expressive suppression. On the other hand, the CBT group demonstrated significant changes on all three variables from pre-to-post CBT—improvements on satisfaction with life ($\eta_p^2 = .61$), cognitive reappraisal ($\eta_p^2 = .54$), and expressive suppression ($\eta_p^2 = .16$). Between group analyses for emotion regulation and satisfaction with life are reported below.

Effects of CBT

For the emotion regulation measures, a 2 Group (CBT, WL) \times 2 Time (baseline, post) repeated-measures ANOVA of cognitive reappraisal yielded a significant group by time interaction ($F_{1,47} = 23.52, p < .001, \eta_p^2 = .33$), a significant main effect of time ($F_{1,47} = 14.94, p < .001, \eta_p^2 = .24$), and a significant main effect of group ($F_{1,47} = 11.89, p < .001, \eta_p^2 = .20$). These results suggest that the CBT group, but not the WL group, improved significantly from pre-to-post-CBT on cognitive reappraisal (see Fig. 1a).

A 2 Group (CBT, WL) \times 2 Time (baseline, post) repeated-measures ANOVA of expressive suppression yielded no significant group by time interaction ($p > .50$), a non-significant effect of time ($p > .09$), and a significant main effect of group ($F_{1,46} = .15, p < .03, \eta_p^2 = .10$) (see Fig. 1b).

For satisfaction with life, a 2 Group (CBT, WL) \times 2 Time (baseline, post) repeated-measures ANOVA of SWLS yielded a significant group by time interaction ($F_{1,48} = 13.43, p < .001, \eta_p^2 = .22$), a significant main effect of time ($F_{1,48} = 32.95, p < .001, \eta_p^2 = .41$), and a significant main effect of group ($F_{1,48} = 3.97, p < .05, \eta_p^2 = .08$). These results suggest that the CBT group, but not the WL group, improved significantly from pre-to-post-CBT on the SWLS (see Fig. 1c).

CBT-Related Changes in Emotion Regulation Predict Satisfaction with Life

We examine whether CBT-related changes in emotion regulation (cognitive reappraisal or expressive suppression) predicted CBT-induced increases in satisfaction with life. First, we calculated standardized residualized post-CBT scores for the predictor variables (cognitive reappraisal and expressive suppression) and the outcome variable (satisfaction with life) using a simple linear regression model in which pre-CBT scores predicted post-CBT scores. We then correlated the post-CBT residualized values of the predictor and outcome variables (Mackinnon 2008).

The correlation of the residualized cognitive reappraisal and residualized SWLS was small ($r = .34$) and non-significant ($p > .17$). However, residualized expressive suppression was inversely correlated to residualized SWLS ($r = -.56, p = .015$).

Follow-up regression analyses of standardized residualized scores of cognitive reappraisal and residualized SWLS demonstrated that cognitive reappraisal did not account for a significant amount of variance in post-CBT SWLS [$\Delta R^2 = .06, F(1,17) = 2.03, p > .17$], unstandardized beta weight (B) = .33, standard error (SE) $B = .23$, standardized beta weight (β) = .34, 95 % confidence interval (CI) = $[-.16, .82]$, and $R^2 = .11$.

Follow-up regression analyses of standardized residualized scores of expressive suppression and residualized SWLS demonstrated that expressive suppression *did* account for a significant amount of variance in post-CBT SWLS [$\Delta R^2 = .27, F(1, 17) = 7.41, p = .015$], $B = -.55$, SE $B = .20$, $\beta = -.56$, 95 % CI = $[-.99, -.12]$, and $R^2 = .32$.

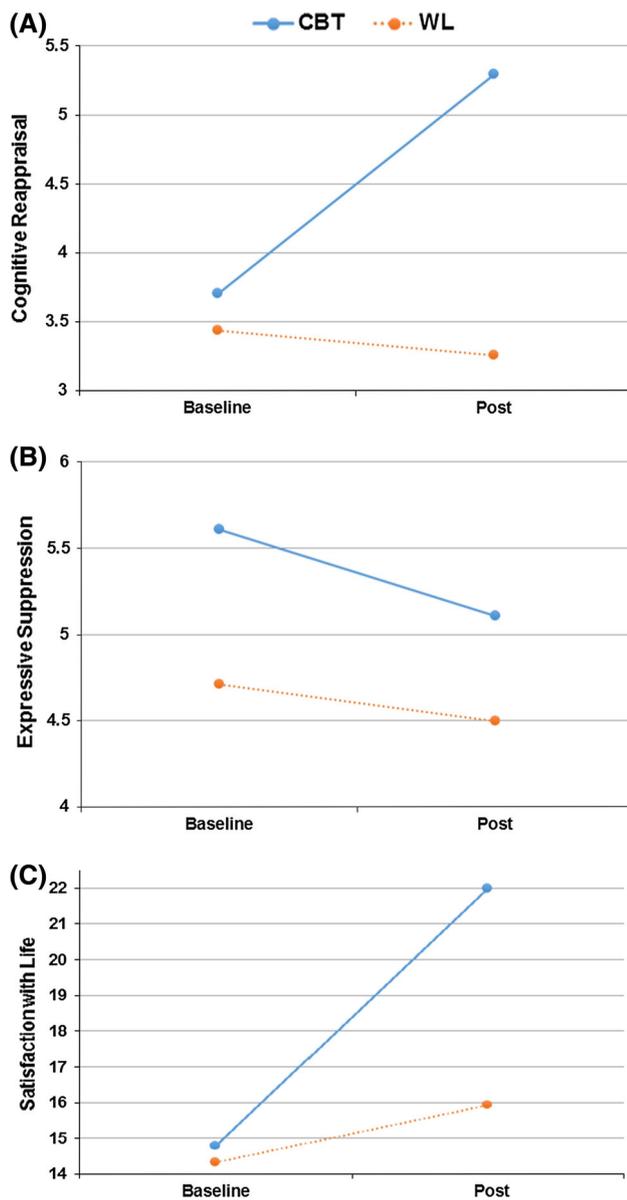


Fig. 1 Study 2 interactions of pre-to-post CBT and WL on ERQ cognitive reappraisal (a), ERQ expressive suppression (b), and satisfaction with life (c)

Discussion

In partial support of our hypotheses, when compared with a WL control condition, SAD patients in the CBT treatment reported increased cognitive reappraisal and improved satisfaction with life. There were no significant interactions for expressive suppression use (see Fig. 1b). Given the focus in CBT on cognitive change strategies, it is no surprise that patients with SAD endorsed greater cognitive reappraisal following treatment. Although we also expected there to be improvements with the expressive suppression emotion regulatory strategy, when considering the

content of the 16-week CBT intervention, very little attention is paid to this aspect of emotion regulation.

When considering the regression analyses we conducted, in partial support of our hypotheses, changes in expressive suppression significantly predicted 16 % of unique variance in post-CBT SWLS. Contrary to our expectations, changes in cognitive reappraisal (one of the main treatment components of CBT) did not significantly predict variance in post-CBT SWLS. Unsurprisingly, baseline SWLS significantly predicted post-treatment SWLS over and above any of the baseline emotion regulation variables. The results from this investigation suggest that changes in use of expressive suppression specifically may play an important role in life satisfaction in adults with SAD. Given that current CBT treatments do not explicitly focus on this maladaptive emotion regulation strategy, it is possible that by explicitly targeting emotional acceptance in CBT patients may receive greater benefit from the treatment (at least with regards to enhancing life satisfaction). This is an important area for continued investigation.

General Discussion

The significant impairments for individuals with SAD have been documented (Wittchen et al. 2000). While emotion regulation and satisfaction with life are not impairment related variables, there is growing evidence that emotion dysregulation is a key feature of nearly all mood and anxiety disorders (e.g., Gross and Jazaieri 2014; Jazaieri et al. 2013). More specifically, the cognitive models of SAD (e.g., Clark and Wells 1995) as well as recent empirical evidence (e.g., Farmer and Kashdan 2012) support the notion that individuals with SAD are afflicted by ineffective emotion regulation. However, the relationship between emotion regulation and life satisfaction has thus far gone unexamined.

Results from study 1 indicate that when compared to healthy adults, adults with SAD report greater use of maladaptive emotion regulatory strategies (expressive suppression). These findings are consistent with what others have found with suppression in undergraduate samples (e.g., Kashdan and Breen 2008; Spokas et al. 2009) and consistent with the cognitive models of SAD which suggest maladaptive emotion regulation (Clark and Wells 1995). In addition to greater use of expressive suppression, Study 1 results also suggest lesser use of adaptive emotion regulatory strategies (cognitive reappraisal), as well as lower levels of satisfaction with life.

Prior research with group CBT has indicated that quality of life can improve with treatment (Eng et al. 2001, 2005; Safren et al. 1996). Results from Study 2 extend the

literature to specifically examine the role of individual therapy in improving life satisfaction. Findings indicate that following 16-weeks of individual CBT, when compared to a WL control condition, patients with SAD report greater use of adaptive emotion regulatory strategies (cognitive reappraisal) and higher levels of satisfaction with life. Regression analyses from Study 2 suggest that changes in expressive suppression emotion regulation predict approximately 16 % of unique variance in post-CBT life satisfaction. The findings from Study 2 indicate that although no group level changes existed in the use of expressive suppression, to the extent expressive suppression changes, it tends to drive post-treatment satisfaction with life.

While some have suggested that the use of suppression during CBT is not a marker of *treatment response* in patients with SAD (Moscovitch et al. 2012), we believe that it nevertheless may be an important factor to consider with regards to promoting adaptive functioning in SAD. The role of reducing maladaptive emotion regulation (such as expressive suppression) in improving subjective well-being outcomes (such as life satisfaction) is an important area for clinical research to continue to examine. Moving beyond simply improving clinical symptoms and examining how longer-term adaptive functioning can be enhanced is a fruitful area for clinical science. Taken together, the results from these two studies suggest that without intervention, adults with SAD experience poorer emotion regulation and life satisfaction (Study 1); however, with effective psychosocial interventions such as CBT, emotion regulation can improve, and specifically, improvement in expressive suppression may in fact enhance satisfaction with life (Study 2).

Several study limitations should be noted. Both studies relied on self-report measures to examine satisfaction with life and emotion regulation. In addition to self-report inventories, future studies should employ other methods of assessing satisfaction with life and emotion regulation strategies including experimental tasks, and more objective measures of satisfaction with life. Relatedly, future research would benefit from a more specific hypotheses and analysis regarding the relationship between SAD and expressive suppression. For example, future studies could examine whether patients presenting with greater fear of physical symptoms or fear of negative evaluation present with higher levels of expressive suppression. This study focused on the two most common forms of emotion regulatory strategies, cognitive reappraisal use and expressive suppression use. Future studies would benefit from examining how other forms of emotion regulatory strategies impact life satisfaction in patients with SAD. In Study 2 we utilized a WL control condition; future studies may find it beneficial to also utilize an active intervention [e.g.,

mindfulness-based stress reduction (Kabat-Zinn 1990)] in an effort to address the potential of differential mechanisms of various treatment modalities. Finally, because the WL group started treatment after the 16-week waitlist period, we were unable to examine the longer-term effects of CBT following treatment when compared to the WL control condition. When possible, future studies should employ longitudinal data collection on WL control conditions to truly assess whether CBT gains are maintained when compared to the WL condition.

Acknowledgments This research was supported by the National Institute of Mental Health (NIMH) Grant MH76074 and the National Center for Complementary and Alternative Medicine (NCCAM) Grant AT003644 awarded to James J. Gross.

Compliance with Ethical Standards

Conflict of Interest Hooria Jazaieri, Philippe R. Goldin, and James J. Gross declare that they have no conflicts of interest.

Informed Consent Informed consent was obtained from all individual participants included in these studies.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Animal Rights No animal studies were carried out by the authors for this article.

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