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Emotion Regulation in Depression and Anxiety: Examining Diagnostic Specificity and Stability of Strategy Use

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Abstract Many psychological disorders are characterized by difficulties in emotion regulation. It is unclear, however, whether different disorders are associated with the use of specific emotion regulation strategies, and whether these difficulties are stable characteristics that are evident even after recovery. It is also unclear whether the use of specific strategies is problematic across all disorders or whether disorders differ in how strongly strategy use is associated with symptom severity. This study investigated (1) the specificity of use of emotion regulation strategies in individuals diagnosed with current major depressive disorder (MDD), with social anxiety disorder (SAD), and in never-disordered controls (CTL); and (2) the stability of strategy use in formerly depressed participants (i.e., remitted; RMD). Path analysis was conducted to examine the relation between strategy use and symptom severity across diagnostic groups. Compared to the CTL group, participants in both clinical groups endorsed more frequent use of rumination and expressive suppression, and less frequent use of reappraisal. Specific to SAD were even higher levels of expressive suppression relative to MDD, as well as a stronger relation between rumination and anxiety levels. In contrast, specific to MDD were even higher levels of rumination and lower levels of reappraisal. Interestingly, elevated rumination, but not decreased reappraisal, was found to be a stable feature characterizing remitted depressed individuals. These results may provide insight

into ways in which emotion regulation strategy use maintains psychological disorders.

Introduction

Difficulties in emotion regulation are proposed to be associated with a range of emotional disorders such as anxiety disorders and major depressive disorder (MDD) (Campbell-Sills and Barlow 2007; Hofmann et al. 2012; Mennin and Farach 2007). Emotion regulation is defined as the use of cognitive or behavioral strategies in order to modify the circumstances in which an emotion occurs, the experience of an emotional response (including its intensity and duration), or the way in which an emotion is overtly expressed (Gross 2002). Previous research suggests that emotion regulation strategies differ in their effectiveness in reducing negative affect (e.g. Gross 1998; Campbell-Sills et al. 2006b); consequently, these strategies may also differ in their association with emotional disorders. Few studies, however, have examined individual differences in the use of specific emotion regulation strategies across carefully diagnosed psychological disorders. This study examined whether participants diagnosed with depression and social anxiety disorder differ in the frequency of their use of emotion regulation strategies. In addition, we examined group differences in the association of the use of these strategies with the severity of depression and anxiety symptoms.

A strategy that has been linked to negative outcomes for individuals' mood and functioning is rumination, or the tendency to think repetitively about one's negative mood

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state and its causes and consequences (Nolen-Hoeksema 1991). Rumination can lead to increases in negative mood (see review by Nolen-Hoeksema et al. 2008) and is associated with the activation of negative cognitions in memory (Watkins and Teasdale 2001; Lyubomirsky and Nolen-Hoeksema 1995). Rumination also impairs problem solving and interpersonal functioning (Lyubomirsky et al. 1999; Nolen-Hoeksema and Davis 1999). Expressive suppression is frequently discussed as another maladaptive emotion regulation strategy (Gross 1998). Expressive suppression involves attempting to control emotional responses by avoiding expressing them outwardly. This strategy has been shown to be less effective in relieving negative emotions and to be associated with increased physiological arousal (Gross 1998; Campbell-Sills et al. 2006a, b; Hofmann et al. 2009). In addition, suppression is cognitively taxing, resulting in impaired memory and cognitive functioning (Richards and Gross 2000; Egloff et al. 2006). In contrast, reappraisal is widely regarded as an adaptive emotion regulation strategy, defined as thinking about a stressful event from a different perspective in a way that minimizes its negative impact (Gross 1998; Gross and John 2003). Reappraisal effectively reduces negative affect and is not associated with the increased or sustained physiological reactivity observed when individuals use suppression (Augustine and Hemenover 2009; Denson et al. 2012; Gross 1998; Gross and John 2003; Shiota and Levenson 2012). Reappraisal has been demonstrated to be less cognitively taxing than is suppression (Egloff et al. 2006; Richards and Gross 2000) and to be related to better physiological stress recovery (Jamieson et al. 2012; Mauss et al. 2007).

Given the differential effectiveness of these various emotion regulation strategies, it is possible that habitual use of specific strategies plays an important role in the onset and maintenance of clinical depression and other emotional disorders (Hofmann et al. 2012). Numerous studies have in fact demonstrated an association between rumination and depression (Nolen-Hoeksema et al. 2008). Specifically, rumination is correlated with a greater number of recurrences of depressive episodes over time, and in some studies longer duration of depressive episodes (Nolen-Hoeksema 1991; Roberts et al. 1998). Moreover, longitudinal studies have indicated that rumination can predict increased risk for developing depression in response to stressful events (Moberly and Watkins 2008). Beyond the well-established association between rumination and depression, more frequent use of expressive suppression and less frequent use of reappraisal have been found in individuals with elevated symptoms of depression (e.g. Moore et al. 2008; Nezlek and Kuppens 2008). In addition, a recent meta-analysis found elevated depression scores to be associated not only with greater use of rumination, but

also with greater suppression and, although to a lesser extent than the maladaptive strategies, less reappraisal (Aldao et al. 2010).

To date, studies that simultaneously examine more than one disorder and more than one type of emotion regulation strategy are rare, particularly studies utilizing diagnosed samples (Aldao et al. 2010). Thus, it is unclear whether the habitual use of certain strategies, such as rumination and expressive suppression, is specific to depression or is a general feature of psychopathology. The lack of studies examining more than one emotion regulation strategy and more than one diagnostic category also makes it difficult to examine whether the use of specific emotion regulation strategies is generally adaptive or maladaptive, or in contrast whether the consequences of using a particular strategy are moderated by characteristics of individuals and situations in which the strategies are deployed. For example, it is possible that rumination increases negative affect and cognition in general and, therefore, is associated with the severity of symptoms of anxiety and depression not only in depressed, but also in non-disordered participants. Alternatively, for non-depressed individuals, rumination may resemble reflection and problem-solving and, therefore, may not be strongly associated with symptoms of depression and anxiety. Indeed, recent studies have shown that strategies generally thought to be "maladaptive" are associated with positive outcomes when used by individuals with particular characteristics or in particular situations. For example, Liverant et al. (2008) reported that expressive suppression was effective in reducing sadness for individuals with low, but not with moderate to high, levels of anxiety. Likewise, recent evidence suggests that individuals' variability in strategies used across a range of situations, or their emotion regulation flexibility, may be important to consider, with individuals drawing from multiple strategies across different situations shown to exhibit lower symptom levels (Aldao and Nolen-Hoeksema 2012b). To answer these questions, however, it is necessary to examine multiple strategies and disorders simultaneously in order to understand how patterns of use across these strategies relate to various forms of psychopathology, a question which has not generally been addressed to date. One exception is a study conducted by Aldao and Nolen-Hoeksema (2010) which examined the relation between rumination, thought suppression and reappraisal with symptoms of depression, anxiety and disordered eating. The authors found that all three emotion regulation strategies loaded significantly onto one latent factor of cognitive emotion regulation and that the cognitive emotion regulation factor was significantly associated with symptoms of all three disorders. However, this study was limited by use of an undiagnosed college sample, results of which do not necessarily generalize to clinical populations.

It is also possible that clinical groups find it difficult to implement adaptive strategies such as reappraisal effectively and, thus, may exhibit a weaker relation between reappraisal use and symptom severity. In their meta-analysis, Aldao et al. (2010) found that reappraisal was more weakly associated with symptoms of various types of psychopathology including depression and anxiety; this finding has been replicated in several recent studies (Aldao and Nolen-Hoeksema 2010; Aldao and Nolen-Hoeksema 2012a), and one interpretation that has been put forth is that this may reflect difficulties with effective reappraisal or interference related to elevated use of rumination and suppression among individuals with psychopathology (McRae et al. 2012). Consistent with this idea, Sheppes et al. (2011) have found evidence that reappraisal may become more taxing and less helpful when individuals are regulating intense emotion, as is typically the case in the context of emotional disorders. Differences between depressed and non-depressed individuals in neural correlates of reappraisal have also been documented and are associated with less effective down-regulation of negative affect (Johnstone et al. 2007; Siegle et al. 2007). Similarly, one recent study demonstrated that, among college students who had recently experienced a stressor, higher levels of depressive symptoms were associated with reduced effectiveness of reappraisal in a laboratory film task (Troy et al. 2010). McRae et al. (2012) found that individuals higher in well-being exhibited more effective reappraisal in response to a laboratory task, and reappraisal effectiveness on this task interestingly was associated with more frequent habitual reappraisal use. However, results are mixed and some studies have found that reappraisal is equally effective in reducing subjective distress among individuals with psychopathology as healthy controls (Aldao and Mennin 2012; Campbell-Sills et al. 2011). Studies that examine differences in the strength of relations between particular emotion regulation strategies and symptom severity across different diagnostic groups are therefore critical because they may illuminate potential diagnostic group differences in the role of these strategies in the development and maintenance of these disorders.

Recent studies have shown that difficulties with emotion regulation also play a central role in anxiety disorders. In the present study we examined individuals with SAD as a comparison group because it is one of the most prevalent anxiety disorders which often co-occurs with and precedes MDD (Beesdo et al. 2007). MDD and SAD are both marked by significant interpersonal impairment (Murray and Lopez 1997; Schneier et al. 1994) and decreased positive affectivity (Brown et al. 1998; Kashdan and Steger 2006). Previous findings suggest that SAD, like MDD, is characterized by elevated rumination, often occurring in anticipation of feared social situations (Vassilopoulos

2005), or following feared situations in the form of post-event processing (Edwards et al. 2003; Abbott and Rapee 2004). Recent studies have also found evidence of difficulties with reappraisal in SAD (Goldin et al. 2009a; b). More frequent use of expressive suppression, however, may be particularly prevalent in individuals with SAD and is held to play a central role in the maintenance of this disorder (Erwin et al. 2003; Kashdan and Steger 2006; Turk et al. 2005).

The current study examines the self-reported use of several emotion regulation strategies (rumination, reappraisal, expressive suppression) in individuals diagnosed with current MDD, with MDD in full remission (RMD), with social anxiety disorder (SAD), and with healthy controls with no history of any DSM-IV Axis I disorder (CTL). The first aim of this study was to examine the specificity to MDD of the use of each strategy. We predicted greater use of maladaptive strategies (rumination, expressive suppression) and less frequent use of reappraisal, an adaptive strategy, in both the MDD and SAD groups, relative to the CTL group. We predicted further that rumination would be specific to MDD[1]; that is, MDD participants would report higher levels of rumination than would SAD participants. In contrast, given the centrality of suppression in recent conceptualizations of SAD, we predicted that we would find higher levels of suppression among SAD participants relative to MDD participants. As both MDD and SAD have been associated with reduced reappraisal use and effectiveness and studies contrasting these two disorders are lacking, analyses of the specificity of reappraisal to MDD or SAD were exploratory.

The second aim of this study was to examine the stability of the use of specific strategies of emotion regulation with recovery from a depressive episode. We expected to find that increased use of maladaptive strategies and decreased use of adaptive strategies are stable characteristics of individuals at risk for depression and, therefore, that the RMD participants do not differ from the MDD participants in their reported frequency of use of these strategies. Finally, we examined whether the relation between frequency of strategy use and severity of symptoms of depression and anxiety is comparable among the different groups. In particular, we conducted exploratory analyses to investigate whether MDD and SAD participants differ in the magnitude of the relation between the use of emotion regulation strategies and symptom severity in order to gain insight into potential unique factors that might contribute to the maintenance of these disorders.

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[1] We use the term specificity to refer to *relative specificity*, indicating that use of a particular strategy is more elevated in one group than another, rather than present in one group and absent in another.

Method

Participants

Participants were 551 individuals with a mean age of 36 years who were recruited from the community. Four groups of participants completed this study: 189 participants diagnosed with current MDD; 48 participants diagnosed with at least one past episode of MDD who were currently in remission (RMD); 58 individuals diagnosed with SAD; and 256 CTLs with no history of Axis-I disorder. Participants were recruited from the community through online and newspaper advertisements.[2] Participants initially completed a brief telephone interview to determine eligibility. Exclusion criteria included severe head trauma and learning disabilities, a history of bipolar disorder, psychotic symptoms, and alcohol and substance use disorder within the past 6 months. Individuals who met inclusion criteria were invited to come into the laboratory to complete a diagnostic interview.

During the first study session, the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition Text Revision (DSM-IV-TR; American Psychiatric Association 2000) (SCID; First et al. 1997) was administered by trained interviewers with extensive diagnostic interview experience. To assess inter-rater reliability, an independent trained rater who was blind to group membership evaluated 15 randomly selected audiotapes of SCID interviews with depressed and social phobic participants, and with nonpsychiatric controls. In all 15 cases, diagnoses of depression, social phobia, and nonpsychiatric control matched the diagnosis made by the original interviewer, $\kappa = 1.00$. This indicates excellent inter-rater reliability, although we should note that the interviewers used the "skip out" strategy of the SCID, which may have reduced the opportunities for the independent

raters to disagree with the diagnoses. Participants were included in the MDD group if they met DSM-IV-TR criteria for current MDD but not SAD, in the SAD group if they met DSM-IV-TR criteria for current SAD but not MDD, and in the RMD group if they met DSM criteria for a past Major Depressive Episode. In addition, a slightly modified version of the SCID was used to verify that each participant in the RMD group had fully recovered from depression, following guidelines recommended by the NIMH Collaborative Program on the Psychobiology of Depression (e.g., Keller et al. 1992): 8 consecutive weeks with no more than 2 symptoms of no more than a mild degree (i.e., ratings of 1 [no symptoms] or 2 [minimal symptoms, no impairment]). Finally, participants were included in the CTL group if they did not meet DSM criteria for any current or past DSM-IV-TR Axis I disorder.

Measures

Emotion Regulation Questionnaire (ERQ; Gross and John 2003)

The ERQ is a 10-item self-report measure of an individual's habitual use of expressive suppression and reappraisal to regulate emotion. This measure is composed of a 4-item expressive suppression subscale and a 6-item reappraisal subscale. Each item is rated on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). Subscales were summed, with higher scores indicating greater use of the strategy. The ERQ has demonstrated high internal consistency (.79 for reappraisal and .73 for suppression) and test–retest reliability of .69 for both subscales (Gross and John 2003). The present sample demonstrated adequate internal consistency for both the reappraisal ($\alpha = .84$) and suppression subscales ($\alpha = .68$).

Ruminative Responses Scale (RRS; Nolen-Hoeksema and Morrow 1991; Treynor et al. 2003)

The tendency to respond to negative events or emotions by ruminating, or repetitively thinking about these events or the reasons one is upset, was assessed using the 22-item RRS. Each item is rated on a 4-point Likert scale (1 = almost never; 4 = almost always). The RRS has demonstrated adequate test–retest reliability (r = .67) and internal consistency ($\alpha = .90$) (Nolen-Hoeksema 2000), as well as good predictive validity (Nolen-Hoeksema and Morrow 1991). With regards to the present study sample, the RRS demonstrated good internal consistency ($\alpha = .89$).

Beck Depression Inventory, Second Edition (BDI-II; Beck et al. 1996)

The BDI-II is a 21-item scale that assesses self-reported severity of depressive symptoms. Each item assesses the

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[2] The data were collected as the first part of ongoing data collection in our labs. Participants were assigned to participate in additional tasks after completion of the diagnostic interview and the questionnaires, including tasks which were part of various sub- studies of depression and social anxiety. Separate advertisements targeting individuals currently experiencing (1) depression, (2) social anxiety, and (3) individuals with no current or past depression or psychiatric concerns (controls) were posted throughout the community. Individuals in the remitted depressed group were drawn from individuals responding to the depression ads who did not currently meet MDD criteria, but met criteria for a past episode. The ads described the symptoms of each disorder and invited individuals currently experiencing these symptoms to contact the lab if interested in taking part in the study. Throughout the course of enrollment, a greater number of depression ads were posted, reflecting a greater focus of studies in our lab on depression. This contributed to different sample sizes across diagnostic groups. Given the ads were identical with the exception of the symptoms being described, the nature of the ads should not have resulted in differential representativeness of the diagnostic groups.

severity of a specific symptom, with ratings ranging from 0 to 3. The BDI-II is a widely used self-report measure of depression with high internal consistency, ranging from .73 to .92 (Beck et al. 1996).

State-Trait Anxiety Inventory-Trait (STAI-T; Spielberger et al. 1983)

Self-reported trait anxiety, the general tendency to experience anxiety in daily life, was assessed using the 20-item STAI-T. Each item is rated on a 4-point scale (1 = almost never; 4 = almost always). The STAI-T has shown excellent internal consistency (α = .90) and test–retest reliability ranging from .73 to .86 (Spielberger et al. 1983).

Results

Participant Characteristics

Table 1 presents demographic and clinical characteristics for the four groups of participants. The mean age of participants was 35.95 (SD = 11.12), and one-third of the participants were male. As expected, the four groups differed significantly in BDI-II scores, $F(3,511) = 399.76$, $p < .001$, with the MDD group obtaining significantly higher BDI-II scores than did the CTL, RMD, and SAD groups. The SAD participants had higher BDI-II scores than did the RMD participants, who in turn had higher BDI-II scores than did the CTL participants. The four diagnostic groups also differed in trait anxiety levels, assessed by the STAI-T, $F(3,435) = 280.04$, $p < .001$. All four groups differed significantly from each other on STAI-T scores in the order MDD, SAD, RMD, and CTL. Unexpectedly, diagnostic groups differed in mean age; however, age was not found to be significantly associated with use of any of the three emotion regulation strategies we investigated (r's = −.03–.02, all ps >.05).

Given that we focused only on one anxiety disorder in the present study, we also examined rates of comorbidity of other anxiety disorders besides SAD among the MDD and SAD groups. One quarter (24.5 %) of depressed participants had at least one or more current comorbid anxiety disorders. In contrast, 25.9 % of socially anxious individuals and 8.4 % of participants in the RMD group met criteria for a comorbid anxiety disorder. MDD, RMD and SAD groups did not differ significantly in the presence of comorbid anxiety disorders, $X^2 = 7.43$, $p > .05$, thus differences between the MDD, RMD and SAD groups in emotion regulation were not confounded by differential rates of other comorbid anxiety disorders in these groups.

Use of Emotion Regulation Strategies

Table 1 presents mean scores on the RRS, ERQ-suppression, and ERQ-reappraisal measures by diagnostic group.[3] A multivariate analysis of variance (MANOVA) was conducted to test the hypothesis that the CTL, RMD, MDD, and SAD groups differ in the frequency with which they report using each strategy. The MANOVA yielded significant differences among the groups in the use of these strategies, Wilks's Λ = .48, $F(9,978.5) = 38.55$, $p = .000$, $\eta^2 = .22$. Analyses of variance (ANOVAs) were conducted on each dependent variable as follow-up tests to the MANOVA. The three ANOVAs all yielded significant group differences (RRS: $F(3,538) = 175.06$, $p < .001$; ERQ-suppression: $F(3,413) = 7.59$, $p < .001$; ERQ-reappraisal: $F(3,410) = 23.56$, $p < .001$). In follow-up analyses for each emotion regulation strategy, we first contrasted both clinical groups (MDD and SAD) with the CTL group. As expected, compared with the CTL participants, participants with a disorder (MDD and SAD participants combined), exhibited higher scores on the RRS, $t(492) = 17.69$, $p < .001$, $d = 1.75$, and the ERQ-suppression scale, $t(366) = 4.54$, $p < .001$, $d = .50$, and lower scores on the ERQ reappraisal scale, $t(368) = 6.70$, $p < .001$, $d = .76$.

We then conducted planned comparisons to evaluate whether the use of rumination is specific to MDD and expressive suppression specific to SAD. Indeed, the MDD group obtained significantly higher scores on the RRS than did the SAD group, $t(244) = 6.19$, $p < .001$, $d = .88$. Moreover, there was evidence for specificity of expressive suppression to SAD: SAD participants exhibited significantly higher ERQ-suppression scores than did MDD participants, $t(190) = 3.00$, $p = .003$, $d = .45$. Finally, MDD participants had lower levels of ERQ-reappraisal than did participants diagnosed with SAD, $t(188) = 2.02$, $p = .04$, $d = .31$.

To test the third hypothesis that greater use of rumination and expressive suppression, and decreased use of reappraisal, is stable following recovery from MDD, planned comparisons were conducted contrasting MDD, RMD, and CTL groups in their mean use of each strategy. In partial support of our hypothesis, the RMD participants obtained higher scores on the RRS than did CTLs, $t(294) = 6.27$, $p < .001$, $d = 1.01$, but had lower RRS scores than did the

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[3] As data on suppression and reappraisal was not collected until midway into enrollment for the study, this resulted in smaller sample sizes for analyses of these variables. Individuals missing this data were included in analyses of diagnostic group differences in rumination frequency, as well as in the SEM analyses, as missing data on these emotion regulation variables was missing at random.

Table 1 Mean emotion regulation strategy use and demographic characteristics by diagnostic category

	CTL (N = 256)	RMD (N = 48)	MDD (N = 189)	SAD (N = 58)
Age	35.10 (11.47)$_b$	36.40 (8.90)$_{bc}$	38.33 (10.73)$_c$	31.56 (10.87)$_a$
% Women	65$_a$	68$_a$	69$_a$	67$_a$
% Caucasian	64$_a$	77$_a$	74$_a$	71$_a$
RUM	1.54 (.46)$_c$	2.04 (.51)$_b$	2.64 (.53)$_a$	2.17 (.53)$_b$
SUPPRESS	13.63 (4.39)$_c$	14.64 (4.78)$_{bc}$	14.89 (5.23)$_b$	17.23 (5.57)$_a$
REAP	29.85 (6.05)$_a$	28.79 (6.22)$_{ab}$	23.67 (7.51)$_c$	26.08 (6.95)$_b$
STAIT	30.50 (6.82)$_d$	38.86 (11.12)$_c$	56.98 (10.10)$_a$	50.70 (10.55)$_b$
BDI	2.53 (3.88)$_d$	7.75 (10.66)$_c$	27.90 (9.07)$_a$	12.57 (9.51)$_b$

Diagnostic categories sharing a subscript are not significantly different from one another ($p < .05$; e.g. MDD and SAD groups differed in mean rumination levels, but RMD and SAD groups did not differ from one another). Values in parentheses represent standard deviations

STAIT Spielberger Trait Anxiety Inventory-Trait, BDI Beck Depression Inventory-II, RUM rumination (Ruminative Responses Scale), Suppress expressive suppression (Emotion Regulation Questionnaire), Reap reappraisal (Emotion Regulation Questionnaire)

MDD participants, $t(234) = 7.52$, $p < .001$, $d = 1.16$.[4] With respect to expressive suppression, RMD participants did not differ from either the MDD, $t(188) = .17$, $p = .87$, or CTL, $t(223) = 1.41$, $p = .16$, participants. Contrary to hypotheses, RMD and CTL participants did not differ in their ERQ-reappraisal scores, $t(222) = 1.12$, $p = .27$, suggesting that less use of reappraisal is not a stable feature that endures beyond depressive episodes. Indeed, the RMD participants obtained higher scores on the ERQ-reappraisal scale than did MDD participants, $t(186) = 4.33$, $p < .001$, $d = .72$.

Specificity: Group Differences in Relations Among Strategy Use and Depression and Anxiety Symptoms

To examine whether the use of specific emotion regulation strategies is generally adaptive or maladaptive, we further examined whether the groups differed in their relation between strategy use and severity of anxiety and depression symptoms by conducting a path analysis using M plus Version 4 (Muthén and Muthén 2006). Specifically, we conducted multiple group comparisons to test whether the degree to which RRS, ERQ-suppression, and ERQ-reappraisal scores predict BDI and STAI-T scores differs among groups (see Kline 2005 for a description of this technique). This approach involved first testing the fit of a base model, in which mean RRS score, ERQ-suppression score, and ERQ-reappraisal scores predict BDI and STAI-T scores (see model displayed in Fig. 1). In the base model, paths from each strategy (RRS, ERQ-suppression, ERQ-reappraisal) to BDI and STAI-T, as well as relations among emotion regulation strategies, were estimated for each diagnostic group separately. We then compared the base model to a model in which different diagnostic groups were constrained to be equal on a given path linking an emotion regulation strategy with BDI/STAI-T scores. We conducted a Chi square test to determine whether constraining groups to be equal in these paths yielded a significantly higher model fit value, indicating a poorer fit to the data, compared to the base model.

The base model included three inter-correlated predictors (RRS score, ERQ-suppression score, ERQ-reappraisal score), each of which was proposed to predict both BDI-II and STAI-T scores. This model provided an excellent fit to the data, χ^2 (20, $N = 546$) = 14.54, $p = .80$, comparative fit index = 1.00, root mean square error of approximation = .00. As expected, higher RRS as well as lower ERQ-reappraisal scores predicted significantly higher BDI-II and STAI-T scores for all four diagnostic groups. The path from ERQ-suppression to BDI-II, and to STAI-T, however, was not significant for CTLs, MDDs, and SADs; for RMDs the relation between ERQ-suppression and STAI-T scores was statistically significant.

Table 2 displays complete results for the best-fitting final model that was retained for each diagnostic group after conducting all multi-group comparisons; in these models, paths on which diagnostic groups did not differ were constrained to be equal among groups, while paths on which groups were found to differ were estimated separately

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[4] As some prior studies have found different subcomponents of rumination to differ in relation to symptoms of psychopathology, we also examined diagnostic group differences in brooding, a subscale of the RRS assessing more maladaptive rumination, and reflection, the RRS subscale assessing a more adaptive form of rumination. Brooding and reflection were significantly correlated in the present sample, $r = .47$, $p = .00$. The MDD and SAD groups were elevated on both the brooding and reflection subscales compared to CTLs. However, the MDD compared to SAD group was elevated only in brooding, $t(244) = 3.47$, $p = .00$, not reflection, $t(244) = .1.65$, $p = .10$. In addition, compared to the CTL group, $t(297) = 5.23$, $p = .00$, only elevated brooding, but not reflection, $t(294) = 1.84$, $p = .07$, was seen in the RMD group. Both brooding and reflection showed significant positive correlations with BDI and STAI-T levels for all diagnostic groups, with the exception that only brooding, but not reflection, was correlated with BDI and STAI-T in the RMD group.
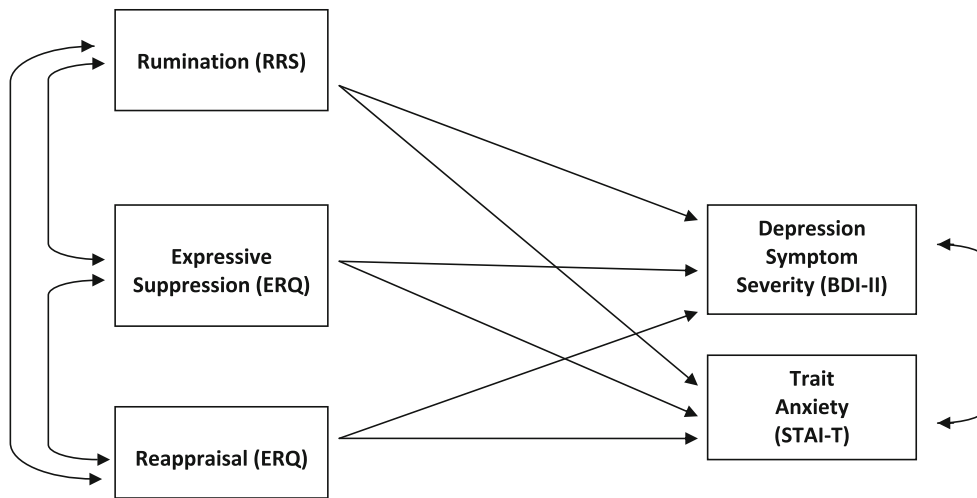
Fig. 1 Association among self-reported use of rumination, expressive suppression, and reappraisal with depression and anxiety symptom severity

Table 2 Path coefficients from ER strategies to BDI and STAI-T levels by diagnostic category

	CTL	RMD	MDD	SAD
Rumination to BDI	.35**$_a$	.41**$_{ab}$	.49**$_b$	.54**$_b$
Rumination to STAIT	.57**$_a$	.42**$_a$	.49**$_a$	.76**$_b$
Reappraisal to BDI	−.17*$_a$	−.20**$_b$	−.28**$_b$	−.29**$_b$
Reappraisal to STAIT	−.27**$_a$	−.19**$_a$	−.25**$_a$	−.23**$_a$
R square (BDI)	.17	.23	.35	.36
R square (STAI-T)	.42	.29	.33	.61

Path coefficients are standardized B's. Diagnostic categories sharing a subscript do not significantly differ from one another

* $p < .05$, ** $p < .01$

Table 3 Multiple groups comparisons results: Chi square difference values between diagnostic groups constrained versus unconstrained in paths from ER strategies to BDI and STAI-T

Comparison	Δ χ^2
Rumination to BDI	
CTL versus MDD	10.91***
CTL versus SAD	18.74***
MDD versus SAD	3.15
CTL versus RMD	3.52
RMD versus MDD	.02
Rumination to STAIT	
CTL versus MDD	.03
CTL versus SAD	8.73**
MDD versus SAD	17.03***
CTL versus RMD	.26
RMD versus MDD	.00
Reappraisal to BDI	
CTL versus MDD	5.89*
CTL versus SAD	5.86*
MDD versus SAD	.31
CTL versus RMD	7.52**
RMD versus MDD	.27
Reappraisal to STAIT	
All groups constrained versus unconstrained	1.23

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

across those groups. We first examined whether the diagnostic groups differ in the degree to which RRS predicts BDI-II. Elevated RRS scores more strongly predicted elevated BDI-II scores among both MDD and SAD participants than CTL participants (see Tables 2, 3). There was no evidence for specificity, however, in that SAD versus MDD individuals did not differ from one another in the path from RRS to BDI-II. With regard to the relation between RRS levels and trait anxiety, however, we did find evidence for specificity. RRS scores more strongly predicted elevated STAI-T levels in SAD than in CTL participants. Further, RRS predicted STAI-T levels more strongly among SAD than among MDD participants.

ERQ- suppression (expressive suppression) was not a significant predictor of scores on the BDI-II or STAI-T, regardless of diagnosis. Therefore, we did not conduct multiple group comparisons including ERQ-suppression. Finally, we examined whether ERQ-reappraisal differentially predicts BDI-II and STAI-T across different diagnostic categories. We found the relation between elevated

ERQ- reappraisal and lower BDI-II scores to be stronger among both MDD and SAD participants than CTL participants but did not find evidence of specificity, with MDD and SAD participants not differing from one another in this path. With regard to trait anxiety, self-reported reappraisal predicted lower STAI-T levels to a comparable degree in CTL, MDD and SAD groups.

Stability: Differences Across MDD, RMD, and CTL Groups in the Strength of Association Among Emotion Regulation Strategies and Symptom Severity

To test whether the strength of the relation between emotion regulation strategy use and symptom severity remains stable following a depressive episode, multigroup comparisons among MDD, RMD, and CTL groups were conducted (see Table 3). We first examined whether the stronger relation between RRS scores and symptoms observed in the MDD group would also be evident in the RMD group, indicating stability in these paths. In fact, RMD participants did not differ significantly from MDD participants in the path from RRS to BDI-II scores, nor from RRS to STAI-T scores. However, evidence for stability was mixed in that RMD participants also did not differ significantly in these paths from CTLs. With regards to reappraisal, we found evidence for stability among the RMD group in the relation between reappraisal and BDI scores, but not reappraisal and STAI-T scores. ERQ-reappraisal more strongly predicted lower BDI-II scores among RMD participants than among CTLs, with RMD and MDD participants not differing from one another. RMD, MDD, and CTL groups did not differ in the path between ERQ-reappraisal and STAI-T, and no groups differed from one another.

Discussion

Previous studies have helped to elucidate differences among various emotion regulation strategies in their effectiveness in regulating negative affect. This study expanded on previous research by examining the frequency of use of emotion regulation strategies in diagnosed samples and by addressing whether greater use of maladaptive strategies, and less use of an adaptive strategy, is specific to SAD or MDD, or a general feature of psychopathology. Given that both MDD and SAD participants reported greater use of expressive suppression and rumination and less frequent use of reappraisal than did CTLs, the use of maladaptive strategies is, to some degree, a general feature of these disorders. Diagnostic groups also differed, however, in their use of rumination, reappraisal and expressive suppression, providing support for diagnostic specificity. In particular, MDD participants reported more frequent use of rumination and less frequent use of reappraisal than did SAD participants, who in turn reported more use of expressive suppression than did their MDD counterparts.

The finding that rumination is particularly common in the MDD group is not surprising given that the majority of research on rumination has demonstrated that rumination plays a significant role in risk for and maintenance of this

disorder (Nolen-Hoeksema et al. 2008). SAD is also characterized by self-focused attention and negative self-evaluation, however, and in recent years research has emerged showing evidence of elevated rumination in individuals with SAD in anticipation of (Vassilopoulos 2005) and following feared social situations (Edwards et al. 2003), even when controlling for depressive symptoms (e.g. Abbott and Rapee 2004). Rumination in SAD and MDD may involve similar processes characterized by repetitive, self-focused thinking about personal shortcomings. Indeed, in this study, rumination was associated with more severe depressive symptoms in both groups. Rumination in SAD, however, frequently termed post-event processing or post-event rumination, typically focuses on perceived shortcomings, or negative images of oneself or one's performance, during a recent social-evaluative situation and may differ slightly in its content from depressive rumination. Post-event rumination, however, has been found to have similar consequences as depressive rumination, prolonging anxiety and increasing negative cognitions surrounding a social situation (Wong and Moulds 2009; Morgan and Banerjee 2008). This is consistent with the results obtained in this study that the relation between rumination and anxiety was specifically strong in the SAD participants. These results suggest that rumination in SAD plays an important role in maintaining both elevated depression and anxiety.

The results of this study also show that socially anxious individuals attempt to suppress their emotions to a significantly greater degree than depressed individuals. These findings are consistent with results of a recent study that documented that expressive suppression is more common among university students who are high versus low in social anxiety; this study further demonstrated that greater use of expressive suppression was mediated by beliefs about the consequences of expressing emotions (Spokas et al. 2009). Concerns about physical symptoms of anxiety, including sweating, blushing, and shaking, being noticed and judged negatively by other people are common in, and may be unique to, SAD (Scholing and Emmelkamp 1993). This finding is also consistent with cognitive models of SAD, which predict that worries about the negative consequences of anxiety symptoms becoming visible to others may prompt socially anxious people to suppress their anxiety as a safety behavior to prevent embarrassment (Clark and Wells 1995; Rapee and Heimberg 1997). Such safety behaviors are predicted to play a central role in the maintenance of SAD by preventing disconfirmation of fearful thoughts. It is important to note that a greater tendency to suppress emotion has also been found to be associated with other anxiety disorders aside from SAD, such as panic disorder (Baker et al. 2004; Tull and Roemer 2007) and PTSD (Moore et al. 2008). In fact, reducing use

of suppression and replacing it with more adaptive strategies, such as acceptance and approach-related behaviors, is a central target of acceptance-based psychotherapy approaches for a range of psychological disorders (e.g. acceptance and commitment therapy, ACT, Hayes et al. 1999). Therefore, in future studies it will be important to examine differences in the implementation and consequences of this strategy across multiple anxiety disorders in comparison to depression.

Interestingly, in this study the frequency of use of expressive suppression was not associated with increased severity of depression or anxiety symptoms in the SAD group. This result is surprising given previous studies that have found an association among use of suppression and increased depression and anxiety, and given that elevated suppression frequency was found among the SAD participants relative to MDD and CTL participants (Aldao et al. 2010). As we examined a clinical sample of individuals with SAD who on average were elevated in suppression, it is possible that restricted variability in suppression within the SAD group and the relatively small SAD group size prevented the detection of an association with symptom severity. It is also possible that this reflects a limitation in our measure of anxiety severity and that stronger relations between suppression and symptom severity would be seen with a measure which assesses social anxiety specifically, as opposed to a more general measure of anxiety such as the STAI. Alternatively, it is possible that suppression is not uniformly related to greater symptom severity among all individuals and that we may have omitted important variables moderating the relation between suppression and symptom severity; in fact, prior studies have found that suppression frequency is not uniformly related to negative outcomes. Eftekhari et al. (2009), who classified participants on the basis of their frequency of both suppression and reappraisal use and examined associations with symptom levels, found that people classified as frequent users of both strategies represented the most common pattern of emotion regulation. Although people high in reappraisal and low in suppression reported the lowest symptom levels among the categories examined, people high in use of both strategies also reported effective ER and relatively low symptom levels. Thus, a subset of individuals who are coping effectively may frequently draw from both suppression and reappraisal (also see Lam et al. 2009, who found a positive correlation between reappraisal and suppression use). Future research is needed to examine the role of expressive suppression in SAD and the relation between the use of this emotion regulation strategy and symptom severity.

Decreased use of reappraisal was reported by both SAD and MDD participants. Unexpectedly, the results of this study also provide support for the specificity of reappraisal,

in that depressed individuals reported using reappraisal significantly less frequently than did socially anxious participants. One explanation for this finding is that individuals with MDD may have more difficulty reappraising, which could result in less frequent use of reappraisal. Previous studies have documented impairment in the ability to inhibit the processing of negative emotional material in MDD, a deficit that is also associated with greater use of rumination in MDD. In a recent study, Joormann and Gotlib (2010) demonstrated that difficulty with inhibition, present to a greater degree in MDD participants, was also associated with less frequent use of reappraisal. However, results did not support the hypothesis that reappraisal exhibits a weaker inverse relationship with depression and anxiety symptoms among depressed individuals, which could reflect reduced effectiveness of this strategy.

The present results also demonstrate that some difficulties with emotion regulation documented in MDD are a stable feature that endures beyond a depressive episode. Specifically, RMD participants reported higher levels of rumination than did CTLs. This finding is consistent with the results of a recent study reporting greater use of rumination in RMD individuals than in never-depressed controls (Ehring et al. 2008). This finding is important because the overuse of strategies, such as rumination, is often conceptualized as a vulnerability factor which contributes to the development and maintenance of depression, yet few studies to date have investigated whether problematic emotion regulation strategies precede or persist beyond the acute depressive episode. Our finding suggests that the use of rumination may not be merely a symptom of MDD, but may possibly play a role in the development and maintenance of this disorder. It is important to point out the limitations of using a remitted depression design to infer that the use of rumination is a risk factor which may be causally related to depression, however (see review by Just et al. 2001). The experience of depression may lead to important changes in cognitive and biological processes, or *scarring*, which in turn fuels increased rumination persisting beyond the offset of the disorder. However, our finding is consistent with a growing literature supporting that by adolescence elevated rumination serves as a trait-like vulnerability factor which is associated with increased risk for subsequent increases in depression (Abela et al. 2012; Hankin 2009; Hilt et al. 2010). High trait rumination has been linked to stable characteristics such as deficits in executive control processes (Hilt et al. 2012; Joormann 2006; Joormann and Gotlib 2010). Moreover, given the highly recurrent nature of MDD, elevated rumination enduring beyond the offset of a depressive episode may be an important factor influencing depressed individuals' risk for future recurrences. Interestingly, however, RMD and

CTL participants did not differ in their use of reappraisal, suggesting it is possible that difficulty reappraising is confined to the acute depressive episode. Reappraisal may become more cognitively demanding and thus more difficult to effectively implement when it is used to regulate intense emotions (Sheppes et al. 2011). Reappraisal may therefore be easier for individuals to implement once they are no longer depressed, accounting for the increased use of this strategy reported in the RMD relative to the MDD group. It is further possible that individuals in the RMD group may have been more likely to receive prior treatment focused on increasing reappraisal use, such as cognitive therapy; as we do not have data on participants' prior experience in cognitive therapy, this would be an interesting question for future research. As previously noted, few studies have examined reappraisal ability in clinically depressed samples, and even less is known about both the use and effectiveness of reappraisal in remitted individuals. Reappraisal has been shown to be less consistently related to symptoms of psychopathology (Aldao et al. 2010), and some studies have failed to find reduced reappraisal ability in clinical samples (e.g. Aldao and Mennin 2012). Converging with these prior studies, the magnitude of relations between reappraisal use and both BDI and STAI in the present study were all small. The consequences of reappraisal may be more sensitive to contextual factors and other individual traits, thus it may be premature to conclude that difficulties with reappraisal do not characterize remitted individuals. Clearly, more research on the stability of the use of emotion regulation strategies is needed.

Despite the strengths of this study, perhaps most notably that it permitted the examination of the role of multiple strategies in different diagnostic groups, we should note several limitations. First, this study relied on self-report measures of the frequency of strategy use. There are many challenges in assessing the dispositional use of emotion regulation strategies, such as limitations in individuals' awareness and ability to report accurately on their daily strategy use. Therefore, we cannot be sure that participants' self-reported use of emotion regulation strategies corresponds to characteristics of their actual use of these strategies in their daily life. In addition, it has been argued that single emotion regulation strategies are not likely to be universally adaptive or maladaptive, but that a person's ability to select strategies which appropriately fit a situation at hand and to flexibly draw from a wide variety of strategies are more important indicators of adaptive emotion regulation (e.g. Hofmann et al. 2012). An experience sampling approach would allow investigation of these variables, as well as ensuring greater generalizability of results to participants' day to day lives. In addition, given that the present study was cross-sectional and did not include laboratory measures which assess diagnostic group differences in the deployment and effectiveness of each strategy, this limits our ability to draw conclusions about specific ways in which elevated use of specific maladaptive strategies and underuse of reappraisal may contribute to MDD and SAD. However, self-reported use of these strategies has been found in recent studies to be related to other laboratory measures of emotion regulation, including psychophysiological measures of stress response (e.g. Mauss et al. 2007) and recently, to enhanced reappraisal ability (McRae et al. 2012).

Second, as the STAI is a general measure of anxiety severity, as opposed to a specific measure of social anxiety symptoms, this presented a limitation in drawing conclusions about emotion regulation specificity to MDD versus SAD. For instance, it is possible that use of a SAD symptom-specific measure would have yielded significant relations between suppression and symptom severity. In addition, depression is often characterized by elevated general anxiety symptoms, and the MDD group was comparably elevated on the STAI as the SAD group in the present study. In contrast, as the BDI is a measure that is more specific to MDD, it is difficult to gauge whether MDD and SAD groups differed in clinical severity, which may also be associated with the use of emotion regulation strategies. Therefore, it would be important to replicate our results using a measure of anxiety specific to social anxiety symptoms. Third, while the use of "pure" MDD and SAD groups was necessary in the present study in order to address the question of which features of emotion regulation are specific to one disorder versus the other, a limitation of this approach is reduced external validity. Given the high rates of comorbidity of MDD and SAD, it would be ideal in future studies also to include a comorbid MDD-SAD group in order to better understand the role of emotion regulation in this subpopulation. In addition, due to the nature of participant recruitment, we obtained small SAD and RMD samples relative to the MDD and CTL groups, reducing power to detect significant effects in these groups particularly within the multiple group comparisons. Finally, it is possible that restricted variability in anxiety and depression symptom severity within the CTL group compared to the clinical groups may have contributed to the weaker relationships between emotion regulation strategy use and symptom severity observed within this group.

This study increases our knowledge of the use of emotion regulation strategies in MDD and SAD. The results indicate that individual differences in the use of emotion regulation strategies may play a significant role in the maintenance of both SAD and MDD, although these disorders may differ in the types of strategies most commonly used and in the mechanisms underlying the relation among strategy use and symptom severity. To summarize, both SAD and MDD are characterized by increased use of both

of the maladaptive emotion regulation strategies, rumination and suppression, as well as less use of an adaptive strategy, reappraisal. Specific to MDD, rates of rumination were even higher among individuals with MDD compared to SAD, although rumination was comparably related to increased depression severity in all groups. Further, elevated rumination was also found to be present in a remitted sample, which suggests it may potentially be a stable trait marker of MDD. Specificity to MDD was also seen in the use of reappraisal in that frequency of reappraisal was lower in MDD than SAD; in contrast with rumination, however, decreased reappraisal was not found among remitted individuals. With regards to features of emotion regulation that are specific to SAD, expressive suppression was found to be more elevated in SAD than MDD. Interestingly, the relation between rumination and anxiety levels in the SAD group was stronger than the other diagnostic groups, suggesting that rumination may be a transdiagnostic maintenance factor which also plays an important role in exacerbating anxiety symptoms in the context of social anxiety. These findings point to the need to address emotion regulation strategies in interventions for these disorders, an effort that is currently in progress (Campbell-Sills and Barlow 2007; Mennin and Farach 2007).

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