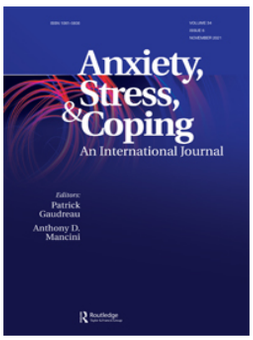

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Emotion regulation strategy correlates with discrete state emotion in major depression

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ABSTRACT

Background and Objectives: Research has shown that state emotion can affect emotion regulation strategies in healthy samples. Emotion regulation plays an important role in depression. We hypothesized that for depressed individuals, experiencing anxiety or anger affects emotion regulation strategy use differently than experiencing sadness.

Design and Methods: Individuals diagnosed with chronic or recurrent depression ($N = 386$) responded to vignettes of hypothetical stressors and reported their state emotions and emotion regulation strategies in a thought-listing procedure. We modeled the effect of reporting anger or anxiety compared to sadness on the use of seven emotion regulation strategies: avoidance, distraction, other-blame, problem-solving, rumination, self-blame, and social support.

Results: Compared to sadness, anger was associated with a greater likelihood of using other-blame, and a lower likelihood of using avoidance, rumination, or self-blame. Compared to sadness, anxiety was associated with a greater likelihood of using self-blame. Responses with anger or anxiety did not significantly differ from sadness in coder-rated adaptiveness.

Conclusions: Differences in observed emotion regulation strategy use were correlated with the discrete emotions experienced, and not overall adaptiveness of a response. These results highlight the importance of assessing for emotion type when studying emotion regulation strategy use in depression.

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Introduction

Emotion regulation is hypothesized to be an important mechanism in the development and maintenance of depression (Gross & Jazaieri, 2014; Hofmann et al., 2012). Research has shown that emotion regulation is often impaired in major depressive disorder (Aldao et al., 2010; Visted et al., 2018), and maladaptive emotion regulation strategy use has been found to predict later depressive symptomatology (Aldao & Nolen-Hoeksema, 2012; Berking et al., 2014; Fehlinger et al., 2013; Garnefski & Kraaij, 2007). Individuals who have recovered from depression show more maladaptive emotion regulation strategy use than individuals who have never been depressed (Ehring et al., 2008; Visted et al., 2018), suggesting that depression may be linked to underlying vulnerabilities in emotion regulation. Given this body of evidence suggesting that emotion regulation plays a key role in major depression, our goal for the present study was to clarify how discrete state emotion correlates with emotion regulation strategy use in individuals experiencing a major depressive episode.

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Emotion regulation strategy

Emotion regulation strategies are often used to regulate negative emotions after a stressful life event (Gross, 2013). A variety of emotion regulation strategies have been studied, some of which are hypothesized to be adaptive and others as maladaptive. Aldao et al. (2010) identified reappraisal, acceptance, and problem-solving as adaptive strategies; and suppression, avoidance, and rumination as maladaptive strategies. Other researchers have identified other adaptive strategies, such as social support (Nolen-Hoeksema & Aldao, 2011; Zaki & Williams, 2013), maladaptive strategies such as self-blame and other-blame (Garnefski & Kraaij, 2006), and strategies that may be either adaptive or maladaptive, such as distraction (Nolen-Hoeksema & Morrow, 1993; Wolgast & Lundh, 2017).

State emotion

Research in non-depressed samples has shown that state emotion can affect emotion regulation strategy use. Rivers et al. (2007) found that college undergraduates were more likely to recall using a greater variety of emotion regulation strategies when they were angry, relative to when they were sad. Dixon-Gordon et al. (2015) asked college undergraduate participants to report on the extent to which they used various emotion regulation strategies following stressful life events that had evoked anger, anxiety, and sadness. They found that suppression was associated with sadness-inducing stressors, and that avoidance, rumination, suppression, and reappraisal were less when recalling an anger-related stressor. They were also less likely to report problem-solving when recalling an anxiety-related stressor, and more likely to report using suppression when recalling a sadness-related stressor. Zimmermann and Iwanski (2014) studied the effects of emotion type on emotion regulation strategy in "healthy, low-risk" individuals by presenting hypothetical situations designed to elicit either sadness, fear, or anger. Sadness was associated with greater use of social support, avoidance, and passive emotion regulation strategies, as well as less use of rumination; fear was associated with greater expressive suppression; and anger was associated with greater emotional dysregulation. In all three of these studies, emotion regulation strategy was shown to be affected by state emotion type.

The present study

Each of these studies examined the effects of state emotion on emotion regulation strategy use in non-clinical, healthy samples. Whereas emotion regulation is known to be affected in major depressive disorder (Aldao et al., 2010; Visted et al., 2018), the relation of specific emotional states with emotion regulation strategy use in major depression has not yet been studied.

Sad mood is one of the defining symptoms of major depression (APA, 2013), but anxiety (Dobson, 1985; Fava et al., 2000; Mineka et al., 1998; Starcevic, 1995) and anger are often observed in depression (Fava & Rosenbaum, 1998; Koh et al., 2002; Pasquini et al., 2004; Riley et al., 1989). In the present study, we aimed to explore how different negative state emotions affect the use of emotion regulation strategies in individuals with major depression. Given that research in non-clinical populations has found that specific state emotions are associated differentially with emotion regulation strategy use (Dixon-Gordon et al., 2015; Rivers et al., 2007; Zimmermann & Iwanski, 2014), we hypothesized that state emotion types would also affect emotion regulation strategy use in a sample of depressed individuals. Because sadness is a defining symptom of depression, we were specifically interested in how emotion regulation strategy use differed when depressed individuals experienced anger or anxiety. Based on prior research conducted in non-clinical samples, we formulated three primary hypotheses. We hypothesized that if associations between state emotion and emotion regulation strategy use followed the same patterns in depressed

individuals as in non-depressed individuals, sadness would be associated with a greater likelihood of using social support, and lower likelihood of using rumination (Zimmermann & Iwanski, 2014), when compared to anger and anxiety. Second, we hypothesized that, compared to sadness, anxiety would be related to a lower likelihood of problem-solving (Dixon-Gordon et al., 2015). And third, we hypothesized that, compared to sadness, anger would be related to a lower likelihood of using avoidance (Dixon-Gordon et al., 2015) and self-blame (Martin & Dahlen, 2005), and a great likelihood of using other-blame (Zimmermann & Iwanski, 2014).

Materials and methods

Sample

Data were drawn as a secondary analysis from a completed three-site randomized clinical trial of 452 English speaking, adult outpatients (mean age: 43.2; 59% female) diagnosed with chronic (major depressive episode duration ≥ 2 years) or recurrent (at least one prior lifetime major depressive episode) DSM-IV major depressive disorder (Hollon et al., 2014). Other inclusion criteria and demographic information are described in Hollon et al. (2014). All participants provided written informed consent, and the study was approved by the UPenn Institutional Review Board. As our goal was to examine the relationship between emotions and emotion regulation strategy use in depressed individuals, only data from the intake phase were analyzed; i.e., while individuals were still experiencing a major depressive episode.

Measures

WOR questionnaire

The Ways of Responding questionnaire (WOR; Barber & DeRubeis, 1992) is a thought-listing task that was originally designed to assess the use of coping and compensatory skills that are taught in cognitive therapy. Participants are presented with six vignettes of stressful negative scenarios (e.g., "You have been applying for jobs, and you just received a phone call saying the position you applied for has been filled by someone else. It's the third such call you've received in the last week"). Participants are asked to imagine themselves in each scenario, then asked to imagine experiencing an initial negative cognitive prompt (e.g., "Will I ever get a job? There just doesn't seem to be any point in applying."). After being provided the vignette and initial negative prompt, participants are asked to rate how vividly they are imagining the situation on a scale from 0 to 100 (prompt A; where 0 indicates that "you are completely unable to imagine the situation," 50 indicates that "you can imagine the situation fairly well but without great intensity," and 100 indicates that "you are able to imagine the situation almost as if you were actually there"), to "describe [their] mood(s) as you imagine yourself in the situation" (prompt B), and then to write and describe their "further thoughts" and potential actions (prompt C). By providing an initial negative cognitive prompt in addition to the vignette, the WOR attempts to emulate the automatic negative thinking patterns often seen in depression (Barber & DeRubeis, 1992). Depressed patients completed the WOR as part of a larger intake battery for the clinical trial. One strength of the WOR is that, as a thought-listing procedure, it allows capturing participants' emotion regulation responses as a real-time reaction, albeit to hypothetical stressors.

Emotion regulation strategy use

Patients' written responses on prompt C (further thoughts and potential actions) were coded by a team of nine trained undergraduate raters. Raters were blind to participants' reported emotions on prompt B. Each response was coded by three raters following the procedures described by Barber and DeRubeis (1992). Responses are broken down into thought units that fall into 25

categories of responding, which were designed to exhaustively capture all types of potential responses to a stressor. The first two raters make blind, independent ratings of thought units, and a third rater makes an unblinded consensus decision integrating information provided from the ratings of the first and second raters. The scores given by the third rater are considered a final consensus judgment, and used for all subsequent analyses. The 25 thought categories broadly fall into groups of adaptive, maladaptive, or neutral thought responses, and a total score on the WOR is traditionally calculated by subtracting the total number of maladaptive thoughts from adaptive thoughts, reflecting the relative frequency to which a response is consistent with adaptive thinking and coping patterns. Each rater also independently makes an Overall Quality Judgement on a 1–7 Likert scale reflecting the rater's impression of whether a response is overall more adaptive or maladaptive.

In order to assess emotion regulation strategy use, we identified and extracted the WOR thought categories that were consistent with emotion regulation strategies identified by past research: avoidance (Aldao et al., 2010), distraction (Nolen-Hoeksema & Morrow, 1993), other-blame (Garnefski & Kraaij, 2006), problem-solving (Aldao et al., 2010), rumination (Aldao et al., 2010; Garnefski & Kraaij, 2006), self-blame (Garnefski & Kraaij, 2006), and social support (Nolen-Hoeksema & Aldao, 2011). Avoidance was coded for thoughts or plans of withdrawing from or ignoring a stressful situation. Distraction was coded for thoughts or plans to pursue an unrelated activity for the purpose of distracting oneself. Other-blame was coded for thoughts involving generating explanations that shifted the blame or responsibility for a negative event to extrinsic factors such as the world or other individuals. Problem-solving was coded for thoughts or plans of concrete actions or solutions meant to directly address the stressful situation. Rumination was coded for depressogenic thoughts and perseverative negative thinking. Self-blame was coded for thoughts reflecting an individual's assigning blame or moral responsibility for a negative event to himself or herself. Social support was coded for thoughts or plans of seeking instrumental or emotional social support. Examples of each emotion regulation strategy type are included in Table 1. The WOR also included thought categories describing acceptance (Garnefski & Kraaij, 2006) and affective suppression (Aldao et al., 2010); however, these were each reported in less than 3% of responses, and thus were not examined as the relative frequency did not allow for meaningful statistical analysis.

Because the WOR allows for multiple thought units in response to a vignette, a given emotion regulation strategy may be reported multiple times in the same vignette. In order to prevent confounding the amount of emotion regulation strategy use with the verbosity of a response, we created binary variables, coding whether or not a response to a vignette contained a thought unit representing a given emotion regulation strategy. Interrater reliability between the first two independent raters' judgments of whether or not a response contained an emotion regulation strategy was calculated using Cohen's κ, and varied by emotion regulation strategy (range: $\kappa = .51$ to $\kappa = .87$; see Table 1), with most values falling between $\kappa = .60$ and.80, which is considered to be "substantial" interrater agreement (Landis & Koch, 1977).

Table 1. Emotion regulation strategy use by acute mood type.

			Anxiety vs sadness			Anger vs sadness		
Emotion regulation strategy	Rate of strategy use	Cohen's κ	OR	95% CI	*P*	OR	95% CI	*P*
Avoidance	24.2%	.63	0.87	0.58–1.28	0.482	**0.61**	**0.35–0.97**	**0.0445***
Distraction	17.0%	.74	1.19	0.75–1.88	0.420	1.31	0.81–2.10	0.261
Other-blame	13.4%	.67	1.39	0.93–2.06	0.094†	**1.72**	**1.07–2.77**	**0.021***
Problem-solving	39.1%	.51	1.18	0.82–1.69	0.341	0.95	0.63–1.46	0.844
Rumination	56.4%	.79	0.72	0.50–1.04	0.084†	**0.60**	**0.39–0.92**	**0.020***
Self-blame	13.1%	.71	**0.55**	**0.34–0.87**	**0.009***	**0.45**	**0.24–0.82**	**0.008***
Social support	8.3%	.87	1.75	0.98–3.14	0.057†	1.74	0.92–3.25	0.083†

Note: Rate of strategy use refers to the percentage of responses where an emotion regulation strategy is reported at least once. Rows that are statistically significant a p<0.05 are bolded for ease of reading. Note that these rows also have an * asterisk by the p-value denoting the statistical significance, as described in the note. The bold is just a visual convenience for the reader.
*$p < .05$; †$p < .10$.

Emotion type

To assess for emotion type, we applied the Linguistic Inquiry Word Count's (LIWC; Tausczik & Pennebaker, 2010) affective dictionary to categorize patients' reported emotions in their written responses to prompt B of the WOR. The LIWC is a computer-based text analysis method, and has been shown to have validity and reliability in classifying words into psychologically meaningful categories (Tausczik & Pennebaker, 2010). The LIWC includes a dictionary that classifies affective words into two broad categories of positive emotion words and negative emotion words; the category of negative emotion words can be further broken down into three subcategories of anxiety, anger, and sadness.

An aggregated list of every word recorded in prompt B was created. Misspellings were corrected, and responses containing negating words (e.g., "don't" and "not") were recoded. After corrections, word counts of each category of affective words (sad, angry, anxious, and positive) were obtained for each response to a vignette. Words not classified as affective words in the LIWC affective dictionary (e.g., "I," "feel," "and," etc.) were not used in subsequent analyses.

Because patients were allowed to freely describe their emotions in writing, the number of affective words reported varied across responses. In order to reduce the risk of confounding patients' verbosity with the intensity of emotion that might occur if simply modeling the count of affective words, we categorized each response into predominant emotion profiles of: predominantly sad, predominantly angry, predominantly anxious, predominantly positive, and mixed. Responses were classified as the respective predominant emotion profile if more than 50% of affective words were from a single emotion category, or if a response consisted of 50% of affective words from one emotion category and no other emotion category reached 50% of affective words. Responses were classified as mixed if a response consisted of at least 50% of affective words in one emotion category; or if a response was evenly split between 50% of one emotion category and 50% of another emotion category. Thus, responses were classified as a predominant emotion profile where it was clear that the majority of affective words consisted of a single emotion type, and classified as mixed where there was no clear majority emotion. Responses that did not contain any effective words as identified through the LIWC dictionary were excluded from analyses. Because we were only interested in differences in negative emotion types (i.e., sadness, anxiety, and anger) on emotion regulation strategy use, we excluded responses classified as positive or mixed emotion profiles from further analyses, as we a priori decided that any observed effects of positive or mixed responses on emotion regulation would be difficult to interpret.

The authors (CX and HG) blindly coded 200 responses for the predominant emotion profile. Reliability for nominal categorizations was calculated at Krippendorff's $\alpha = 0.88$, revealing that the use of the LIWC to categorize predominant emotion profile has strong reliability with clinical judgment (Hallgren, 2012; Krippendorff, 1980).

Statistical analysis

Because each patient was presented with six vignettes in the WOR, six response pairs of emotion profile and emotion regulation strategy use were recorded for each patient. In order to analyze the relationship between emotion type and emotion regulation strategy use, within-subjects hierarchical generalized linear models were created using the "lme4" package (Bates et al., 2014) in R 3.4.0. Hierarchical logistic regression models for each type of emotion regulation strategy (avoidance, distraction, other-blame, problem-solving, rumination, self-blame, and use of social support) were created with the dependent variable specified as whether or not an emotion regulation strategy was observed in a response. Predominant emotion profile was entered as a fixed effect, with sadness as the reference group, and anxiety and anger as dummy coded predictors. To control for vividness (prompt A), vividness was modeled as a fixed effect in all models. Because we were interested in the relationship between emotion type and emotion regulation strategy use, between-persons base rate variability in emotion regulation strategy use was accounted for by

entering a random intercept of patient. Between-vignettes variability was also accounted for by entering a random intercept of vignette. The model equations used for each emotion regulation strategy as thus reported:

$$\begin{aligned}\text{Emotion Regulation Strategy Use} = {} & \text{Predominant Emotion} + \text{Vividness} \\ & + \text{Random Intercept (Participant)} \\ & + \text{Random Intercept (Vignette Number)}\end{aligned}$$

To assess whether emotion type was related to the overall adaptiveness of a response, a similar model was constructed using hierarchical linear modeling with the WOR overall quality score specified as the dependent variable. Similarly, to check whether potential differences in emotion regulation strategy were driven by differences in the total variety strategies endorsed, we constructed an HLM model where the total number of emotion regulation strategies in a response was specified as the dependent variable. These two models served as checks to determine whether differences observed between emotions and specific emotion regulation strategy use were driven by overall differences in adaptiveness of an emotional response.

Results

Descriptive statistics

After data cleaning, 386 patients had complete intake WOR data, with six vignette responses each, providing a total of 2316 responses. 66 of the 452 patients did not have intake WOR data that was able to be rater-coded, due to incompleteness. The mean number of affective words per response was 2.1 (SD = 1.31, median = 2, range: 0–8). 270 responses had no affective words as coded by the LIWC dictionary, and were thus not included in subsequent analyses. Sadness was the most frequently reported affective word type, comprising 51.5% of all affective words, followed by anxiety (23.9%), anger (20.7%), and positive emotion (3.8%). The most common response profile was predominant sad (44.7%), followed by predominant anxious (17.2%), predominant angry (13.7%), and predominant positive (1.6%). 22.2% of responses were classified as mixed. Response classified as mixed or positive state emotion profiles were removed from further analyses. To maximize validity, we additionally removed responses where participants reported a vividness rating of less than 50 on prompt A ("how vividly are you imagining this situation") from analyses, resulting in a total of 1262 responses for statistical analysis.

Base rate of emotion regulation strategy use varied: of the seven emotion regulation strategies examined, rumination was coded in the greatest number of responses (56.4%) and social support appeared in the fewest number of responses (8.3%; see Tables 1 and 2).

Emotion regulation strategy use: anxiety vs sadness

Compared to sadness, anxiety was significantly associated with a lower likelihood of self-blame (OR = 0.55, $z = -2.577$, $p = .009$). There were marginally significant associations between experiencing

Table 2. Descriptive statistics of affective words and predominant emotion profiles.

Emotion	Number of affective words (%)	Responses with at least one affective word (%)	Predominant emotion profiles (%)	Emotion profiles used in final analysis after filtering for vividness (%)
Sad	2104 (51.5%)	1365 (66.7%)	914 (44.7%)	773 (61.3%)
Anxious	978 (23.9%)	766 (37.9%)	351 (17.2%)	273 (21.6%)
Angry	845 (20.7%)	705 (34.4%)	281 (13.7%)	215 (17.0%)
Positive	157 (3.8%)	132 (6.4%)	46 (2.2%)	–
Mix	–	–	454 (22.2%)	–
Total	4084	2046	2046	1262

anxiety and increased likelihood of using social support (OR = 1.75, $z = 1.900$, $p = .057$) other-blame (OR = 1.39, $z = 1.671$, $p = .094$) emotion regulation strategies, and a lower likelihood of using rumination (OR = 0.72, $z = -1.727$, $p = .084$). There were no significant differences between anxiety and sadness for likelihood of using avoidance, distraction, or problem-solving (see Table 1).

No significant difference was found between anxiety and sadness in the overall rated quality of the response ($b = 0.10$, $t = 1.25$, $p = .21$) or the total number of emotion regulation strategies reported ($b = 0.02$, $t = 0.32$, $p = .75$), suggesting that differences observed in emotion regulation strategy use are not driven by differences in adaptiveness or verbosity between anxiety and sadness.

Emotion regulation strategy use: anger vs sadness

Compared to sadness, anger was significantly associated with a greater likelihood of other-blame (OR = 1.72, $z = 2.31$, $p = .021$), and a lower likelihood of avoidance (OR = 0.61, $z = -2.00$, $p = .04$), rumination (OR = 0.60, $z = -2.32$, $p = .02$), and self-blame (OR = 0.45, $z = -2.62$, $p = .008$). There were marginally significant associations between experiencing anger and greater likelihood us using social support (OR = 1.74, $z = 1.74$, $p = .083$) emotion regulation strategies. There were no significant differences between anger and sadness for likelihood of using distraction or problem-solving (see Table 1).

No significant difference was found between anger and sadness in the overall rated quality of the response ($b = 0.15$, $t = 1.59$, $p = .11$) or the total number of emotion regulation strategies reported ($b = -0.09$, $t = -1.10$, $p = .26$), suggesting that differences observed in emotion regulation strategy use are not driven by differences in adaptiveness or verbosity between anger and sadness.

Discussion

The present study is the first examination of how the negative emotions of anger, anxiety, and sadness are associated differentially with the use of emotion regulation strategies in a sample of patients diagnosed with depression. We found that the relationships between discrete state emotion and emotion regulation strategies used within this sample of patients with chronic or recurrent depression were consistent with what has been found in non-clinical samples. Specifically, compared to sadness, anger was associated with a lower likelihood of using avoidance, rumination, and self-blame and a greater likelihood of using other-blame. Anxiety, relative to sadness, was associated with a lower likelihood of using self-blame.

Our finding that observer ratings of the adaptiveness of participants' responses did not differ between discrete emotions suggests that differences in specific emotion regulation strategies used is not due to the overall adaptiveness or maladaptiveness of sadness compared to anxiety or anger. Similarly, using observers' classifications of emotion regulation strategies, we did not find that any anxiety or anger was associated with using a greater number of different regulation strategies. These findings suggest that differences observed in emotion regulation strategy use are due to the phenomenological differences between the discrete emotions of anger, anxiety, and sadness rather than the adaptiveness of the strategies that are associated with them.

Our finding that state sadness was associated with a greater likelihood of using self-blame aligns with other research in individuals with depression. Zahn et al. (2015) found that self-blame in depression is more strongly correlated to thoughts of inadequacy, hopelessness, and depressed mood than other-blaming emotions such as anger or disgust. Martin and Dahlen (2005) found that tendencies to rely use self-blame were positively associated with trait levels of depression and anxiety, but not with trait levels of anger. Interestingly, while Martin and Dahlen (2005) studied trait levels of depression, anxiety, and anger; our results suggest that, within the realm of state emotions, the use of self-blame in depression may be more strongly associated with sadness than other state negative emotions of anger and anxiety.

Our finding of an association of anger with use of other-blame accords with studies of emotion regulation strategy use in non-clinical samples. Zimmermann and Iwanski (2014) found that participants were more likely to endorse items such as "I blame others, even if they are not responsible" when asked to imagine situations that elicit anger, relative to situations constructed to elicit fear or sadness. Martin and Dahlen (2005) found that participants reporting higher trait levels of anger and anger expression also reported a greater tendencies to using other-blame in stressful situations. The present findings suggest that, in individuals with chronic or recurrent depression, state anger may also increase the likelihood of engaging in other-blame in stressful situations.

The finding that anger was associated with a lower likelihood of avoidance is consistent with findings in non-depressed samples (Dixon-Gordon et al., 2015; Zimmermann & Iwanski, 2014). However, inconsistent with findings from Zimmermann and Iwanski (2014), we did not observe a difference in the use of avoidance between times when our participants reported anxious versus sad emotions. Avoidance has been widely understood to play a critical role in the development and maintenance of anxiety (Berman et al., 2010; Dymond & Roche, 2009; Salters-Pedneault et al., 2004), and is a common feature of many anxiety disorders (American Psychiatric Association, 2013). Nevertheless, some researchers have suggested that avoidance also plays an important role in depression (e.g., Cribb et al., 2006; Jacobson, Martell, & Dimidjian, 2006). Given that we found no significant differences between experiencing anxiety and sadness on the use of avoidance, it is possible that within depressed patients, sadness and anxiety lead to similar use of avoidance, and that only anger is associated with lower likelihood of avoidance compared to sadness.

In contrast to findings by Zimmermann and Iwanski (2014) that, in non-clinical samples, sadness was associated with a lower likelihood of using rumination compared to fear or anger, we found that sadness was associated with a greater likelihood of using rumination compared to anger. Given past research showing the significant role that rumination plays in depression (e.g., Nolen-Hoeksema, 2000), it is likely that in the context of a depressed sample, experiencing state sadness may elicit further rumination. It is worth noting, however, that there was no difference found between sadness and anxiety in the likelihood of using rumination. Nevertheless, these findings highlight an important implication of the current results, as it suggests that the relationship between discrete state emotions and emotion regulation strategy use in depressed samples may not always mirror the pattern between state emotion and emotion regulation strategy use in non-depressed samples. Rather, it appears that there may be unique relationships between state emotion and emotion regulation strategy use that occur for depressed individuals which are absent in healthy populations.

The present research has several strengths. Past research (Dixon-Gordon et al., 2015; Rivers et al., 2007; Zimmerman & Iwanski, 2014) has found that emotion type can affect the use of emotion regulation strategies in non-clinical samples. Two of these studies (Dixon-Gordon et al., 2015; Rivers et al., 2007) relied on retrospective reports of emotional state and emotion regulation strategy use, which may be affected by emotional recall biases (Bower, 1981; Levine & Safer, 2002; Thomas & Diener, 1990). Notably, emotional recall biases have been observed to be especially pronounced in depression (Beck, 1967; Urban et al., 2018; Wenze et al., 2012) Thus, relying on a retrospective reports of emotional state and emotion regulation may be especially problematic when studying individuals experiencing an ongoing major depressive episode. The present study used a vignette-based approach to assess both emotion type and emotion regulation, which, although limited to hypothetical stressors, allowed for patients to report spontaneous emotional experience and emotion regulation strategy use.

Another advantage of the methods used in this study is that patients reported their emotions and thoughts in an open-ended written prompt. Compared to the closed-ended questionnaire used to assess emotion regulation by Zimmerman et al. (2014), an open-ended prompt to assess emotion regulation may better reflect the real use of emotion regulation strategies for patients with depression. Specifically, cognitive models of depression hypothesize that depressed individuals often fall into a depressogenic thinking patterns, where they may experience biased cognitive processing, including failures to consider alternative responses to a stressor (Beck, 1967; Beck, 1979;

Beck, 2002). A closed-ended questionnaire listing possible emotion regulation strategies may artificially prompt depressed individuals, more than others, to consider using strategies they may not have otherwise considered; whereas an open-ended questionnaire allows an unprimed and, potentially, less biased assessment of a depressed patient's thought process (Barber & DeRubeis, 1992). Another advantage of using a vignette-based approach to assessing spontaneous emotion regulation strategy use is that it may better tap into state emotion regulation, as opposed to trait emotion regulation that is often measured when using retroactive self-report measures of emotion regulation strategy use (Katz et al., 2017).

Additionally, patients were presented multiple vignettes, allowing us to capitalize on a repeated-measures design to control for between-patient variability in trait-level mood and emotion regulation strategy use. For example, in a between-subjects design, it is possible that an individual who is more prone to rely on other-blame as an emotion regulation strategy is also more likely to independently report feeling angry in response to stressors. However, by modeling individual differences in baseline emotion regulation strategy use as random effects, we can be more confident that the observed differences in emotion regulation strategy use result from differences in within-patient acute emotional experiences, rather than from trait-level individual differences. Similarly, models also controlled for the effect of vignette, thus isolating the differences found in emotion regulation strategy use to the effects of discrete state emotion.

Limitations and future directions

There are some limitations to this study. First, because this study was a secondary analysis of an already-collected dataset, we were only able to obtain responses to the Ways of Responding questionnaire as a measure of emotion regulation. Our findings should be replicated with other measures of emotion regulation such as the Ruminative Responses Scale (Treynor et al., 2003) or the Cognitive Emotion Regulation Questionnaire (Garnefski & Kraaij, 2007), allowing for a better comparison of our results with those obtained in previous research with non-clinical samples. Secondly, our use of vignettes to elicit emotions and emotion regulation strategies likely resulted in less intense reactions than are provoked by real-life stressors. As Dixon-Gordon et al. (2015) observed, the intensity of emotions affects regulation strategies. With this in mind, we analyzed only the vignettes for each participant in which they indicated that they were able to imagine the situation fairly well, at minimum. Thirdly, the coding of affective words into predominant emotion profiles using the LIWC dictionary relies on the assumption that the words a participant used reflected accurately their emotional experience. In an attempt to maximize internal validity in our independent variable of discrete emotion type, we excluded responses classified as mixed emotional profiles; a future study using a better method of characterizing the predominant emotions of patients' responses should examine how responses with multiple mixed negative emotions affect emotion regulation strategy use.

Because this study was a secondary analysis of data collected for a randomized clinical trial of individuals with major depression, we did not have a non-depressed control sample to compare these findings against. While our findings were consistent with previous research in non-depressed samples, that discrete state emotion affects emotion regulation strategy use (Dixon-Gordon et al., 2015; Rivers et al., 2007; Zimmermann & Iwanski, 2014), a replication of our findings, comparing both depressed against non-depressed individuals is still warranted. Additionally, the original trial from which the present data was drawn was limited to individuals with chronic or recurrent depression, and thus characteristics of our sample may not capture the full range of individuals with major depressive disorder (Hollon et al., 2014). While our study is the first to examine the relationship between acute emotion type and emotion regulation strategy use in depressed individuals, it is possible that our sample of individuals with chronic and/or recurrent depression may have evidenced more maladaptive emotion regulation strategy use than individuals with first-episode major depression.

Emotion regulation has been theorized to play an important role in depression (Hofmann et al., 2012; Visted et al., 2018). The current study is the first to shed light on how emotion type can affect emotion regulation strategies in persons experiencing a major depressive episode. Results showed that in response to stressors presented in a vignette format, depressed individuals often experience other acute negative emotions such as anger and anxiety, in addition to sadness. Results also suggested that variations in emotional responding to a stressor can play an important role in the use of emotion regulation strategies, and has implications for future research into the roles of emotion regulation in depression. For instance, the commonly used Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski & Kraaij, 2007) asks individuals to "indicate what you generally think when you experience negative or unpleasant events." The present findings suggest that additionally assessing the discrete emotion type associated with a stressor – whether it is sadness, anger, anxiety, or some other negative emotion – may provide a more precise understanding of the associated emotion regulation strategies reported. For instance, our study found that the use of self-blame was especially pronounced when experiencing sadness; while other strategies such as other-blame were more likely when experiencing anger. This suggests it is important to assess the emotion type associated with a stressor when examining the effects of stressors on emotion regulations strategy use, especially when assessing emotion regulation strategy use in individuals with major depression.

Conclusion

Emotion regulation is gaining recognition as a potential transdiagnostic process affecting many disorders (Aldao et al., 2010; Fernandez et al., 2016). Many psychological therapies (Linehan, 1993; Mennin & Fresco, 2014; Segal et al., 2002) include modules broadly targeting emotion regulation strategies as part of treatment. It is important for future research on emotion regulation in clinical disorders to consider the role discrete state emotions can have on emotion regulation strategy use. Future research may also consider how state emotion can inform treatments in which emotion regulation is a specific target; for instance, by focusing on training different emotion regulation strategies for targeting different negative state emotions, as opposed to broadly training emotion regulation strategies for general stressors.

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References

Aldao, A., & Nolen-Hoeksema, S. (2012). When are adaptive strategies most predictive of psychopathology? *Journal of Abnormal Psychology*, *121*(1), 276. https://doi.org/10.1037/a0023598

Aldao, A., Nolen-Hoeksema, S., & Schweiser, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*(2), 217–237. https://doi.org/10.1016/j.cpr.2009.11.004

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. American Psychiatric Publising.

Barber, J. P., & DeRubeis, R. J. (1992). The ways of responding: A scale to assess compensatory skills taught in cognitive therapy. *Behavioral Assessment*, *14*(1), 93–115. https://www.researchgate.net/publication/232593172_The_Ways_of_Responding_A_scale_to_assess_compensatory_skills_taught_in_cognitive_therapy

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2014). Fitting linear mixed-effects models using lme4. arXiv preprint arXiv:1406.5823.

Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. Hoeber Medical Division, Harper & Row.

Beck, A. T. (Ed.). (1979). *Cognitive therapy of depression*. Guilford Press.

Beck, A. T. (2002). Cognitive models of depression. In R. L. Leahy, & E. T. Dowd, (Eds.), *Clinical advances in cognitive psychotherapy: Theory and application* (pp. 29–61). Springer Publishing.

Berking, M., Wirtz, C. M., Svaldi, J., & Hofmann, S. G. (2014). Emotion regulation predicts symptoms of depression over five years. *Behaviour Research and Therapy*, *57*, 13–20. https://doi.org/10.1016/j.brat.2014.03.003

Berman, N. C., Wheaton, M. G., McGrath, P., & Abramowitz, J. S. (2010). Predicting anxiety: The role of experiential avoidance and anxiety sensitivity. *Journal of Anxiety Disorders*, *24*(1), 109–113. https://doi.org/10.1016/j.janxdis.2009.09.005

Bower, G. H. (1981). Mood and memory. *American Psychologist*, *36*(2), 129. https://doi.org/10.1037//0003-066x.36.2.129

Cribb, G., Moulds, M. L., & Carter, S. (2006). Rumination and experiential avoidance in depression. *Behaviour Change*, *23*(3), 165–176. https://doi.org/10.1375/bech.23.3.165

Dixon-Gordon, K. L., Aldao, A., & De Los Reyes, A. (2015). Emotion regulation in context: Examining the spontaneous use of strategies across emotional intensity and type of emotion. *Personality and Individual Differences*, *86*, 271–276. https://doi.org/10.1016/j.paid.2015.06.011

Dobson, K. S. (1985). An analysis of anxiety and depression scales. *Journal of Personality Assessment*, *49*(5), 522–527. https://doi.org/10.1207/s15327752jpa4905_10

Dymond, S., & Roche, B. (2009). A contemporary behavior analysis of anxiety and avoidance. *The Behavior Analyst*, *32*(1), 7–27. https://doi.org/10.1007/BF03392173

Ehring, T., Fischer, S., Schnülle, J., Bösterling, A., & Tuschen-Caffier, B. (2008). Characteristics of emotion regulation in recovered depressed versus never depressed individuals. *Personality and Individual Differences*, *44*(7), 1574–1584. https://doi.org/10.1016/j.paid.2008.01.013

Fava, M., Rankin, M. A., Wright, E. C., Alpert, J. E., Nierenberg, A. A., Pava, J., & Rosenbaum, J. F. (2000). Anxiety disorders in major depression. *Comprehensive Psychiatry*, *41*(2), 97–102. https://doi.org/10.1016/s0010-440x(00)90140-8

Fava, M., & Rosenbaum, J. F. (1998). Anger attacks in depression. *Depression and Anxiety*, *8*(S1), 59–63. https://doi.org/10.1002/(SICI)1520-6394(1998)8:1+<::AID-DA9>3.0.CO;2-Y

Fehlinger, T., Stumpenhorst, M., Stenzel, N., & Rief, W. (2013). Emotion regulation is the essential skill for improving depressive symptoms. *Journal of Affective Disorders*, *144*(1–2), 116–122. https://doi.org/10.1016/j.jad.2012.06.015

Fernandez, K. C., Jazaieri, H., & Gross, J. J. (2016). Emotion regulation: A transdiagnostic perspective on a new RDoC domain. *Cognitive Therapy and Research*, *40*(3), 426–440. https://doi.org/10.1007/s10608-016-9772-2

Garnefski, N., & Kraaij, V. (2006). Relationships between cognitive emotion regulation strategies and depressive symptoms: A comparative study of five specific samples. *Personality and Individual Differences*, *40*(8), 1659–1669. https://doi.org/10.1016/j.paid.2005.12.009

Garnefski, N., & Kraaij, V. (2007). The cognitive emotion regulation questionnaire. *European Journal of Psychological Assessment*, *23*(3), 141–149. https://doi.org/10.1027/1015-5759.23.3.141

Gross, J. J. (Ed.). (2013). *Handbook of emotion regulation*. Guilford Publications.

Gross, J. J., & Jazaieri, H. (2014). Emotion, emotion regulation, and psychopathology: An affective science perspective. *Clinical Psychological Science*, *2*(4), 387–401. https://doi.org/10.1177/2167702614536164

Hallgren, K. A. (2012). Computing inter-rater reliability for observational data: An overview and tutorial. *Tutorials in Quantitative Methods for Psychology*, *8*(1), 23. https://doi.org/10.20982/tqmp.08.1.p023

Hofmann, S. G., Sawyer, A. T., Fang, A., & Asnaani, A. (2012). Emotion dysregulation model of mood and anxiety disorders. *Depression and Anxiety*, *29*(5), 409–416. https://doi.org/10.1002/da.21888

Hollon, S. D., DeRubeis, R. J., Fawcett, J., Amsterdam, J. D., Shelton, R. C., John, Z., Young, P. R., & Robert, G. (2014). Effect of cognitive therapy with antidepressant medications vs antidepressants alone on the rate of recovery in major depressive disorder: A randomised clinical trial. *JAMA Psychiatry*, *71*(10), 1157–1164. https://doi.org/10.1001/jamapsychiatry.2014.1054

Jacobson, N. S., Martell, C. R., & Dimidjian, S. (2006). Behavioral activation treatment for depression: Returning to contextual roots. *Clinical Psychology-science and Practice*, *8*, 255–270.

Katz, B. A., Lustig, N., Assis, Y., & Yovel, I. (2017). Measuring regulation in the here and now: The development and validation of the State Emotion Regulation Inventory (SERI). *Psychological Assessment*, *29*(10), 1235. https://doi.org/10.1037/pas0000420

Koh, K. B., Kim, C. H., & Park, J. K. (2002). Predominance of anger in depressive disorders compared with anxiety disorders and somatoform disorders. *The Journal of Clinical Psychiatry*, *63*(6), 486–492. https://doi.org/10.4088/JCP.v63n0604

Krippendorff, K. (1980). Validity in content analysis. In E. Mochmann (Ed.), *Computerstrategien für die Kommunikationsanalyse* (pp. 69–112). Campus Frankfurt.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 159–174. https://doi.org/10.2307/2529310

Levine, L. J., & Safer, M. A. (2002). Sources of bias in memory for emotions. *Current Directions in Psychological Science*, *11*(5), 169–173. https://doi.org/10.1111/1467-8721.00193

Linehan, M. M. (1993). *Skills training manual for treating borderline personality disorder*. Guilford Press.

Martin, R. C., & Dahlen, E. R. (2005). Cognitive emotion regulation in the prediction of depression, anxiety, stress, and anger. *Personality and Individual Differences*, *39*(7), 1249–1260.

Mennin, D. S., & Fresco, D. M. (2014). Emotion regulation therapy. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 469–490). Guilford Press.

Mineka, S., Watson, D., & Clark, L. A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology*, *49*(1), 377–412. https://doi.org/10.1146/annurev.psych.49.1.377

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology*, *109*(3), 504. https://doi.org/10.1037/0021-843X.109.3.504

Nolen-Hoeksema, S., & Aldao, A. (2011). Gender and age differences in emotion regulation strategies and their relationship to depressive symptoms. *Personality and Individual Differences*, *51*(6), 704–708. https://doi.org/10.1016/j.paid.2011.06.012

Nolen-Hoeksema, S., & Morrow, J. (1993). Effects of rumination and distraction on naturally occurring depressed mood. *Cognition & Emotion*, *7*(6), 561–570. https://doi.org/10.1080/02699939308409206

Pasquini, M., Picardi, A., Biondi, M., Gaetano, P., & Morosini, P. (2004). Relevance of anger and irritability in outpatients with major depressive disorder. *Psychopathology*, *37*(4), 155–160. https://doi.org/10.1159/000079418

Riley, W. T., Treiber, F. A., & Woods, M. G. (1989). Anger and hostility in depression. *Journal of Nervous and Mental Disease*, *177*(11), 668–674. https://doi.org/10.1097/00005053-198911000-00002

Rivers, S. E., Brackett, M. A., Katulak, N. A., & Salovey, P. (2007). Regulating anger and sadness: An exploration of discrete emotions in emotion regulation. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being*, *8*(3), 393–427. https://doi.org/10.1007/s10902-006-9017-2

Salters-Pedneault, K., Tull, M. T., & Roemer, L. (2004). The role of avoidance of emotional material in the anxiety disorders. *Applied and Preventive Psychology*, *11*(2), 95–114. https://doi.org/10.1016/j.appsy.2004.09.001

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. Guilford Press.

Starcevic, V. (1995). Pathological worry in major depression: A preliminary report. *Behaviour Research and Therapy*, *33*(1), 55–56. https://doi.org/10.1016/0005-7967(93)e0028-4

Tausczik, Y. R., & Pennebaker, J. W. (2010). The psychological meaning of words: LIWC and computerised text analysis methods. *Journal of Language and Social Psychology*, *29*(1), 24–54. https://doi.org/10.1177/0261927X09351676

Thomas, D. L., & Diener, E. (1990). Memory accuracy in the recall of emotions. *Journal of Personality and Social Psychology*, *59*(2), 291. https://doi.org/10.1037/0022-3514.59.2.291

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, *27*, 247–259.

Urban, E. J., Charles, S. T., Levine, L. J., & Almeida, D. M. (2018). Depression history and memory bias for specific daily emotions. *PLoS One*, *13*(9). https://doi.org/10.1371/journal.pone.0203574

Visted, E., Vøllestad, J., Nielsen, M. B., & Schanche, E. (2018). Emotion regulation in current and remitted depression: A systematic review and meta-analysis. *Frontiers in Psychology*, *9*, 756. https://doi.org/10.3389/fpsyg.2018.00756

Wenze, S. J., Gunthert, K. C., & German, R. E. (2012). Biases in affective forecasting and recall in individuals with depression and anxiety symptoms. *Personality and Social Psychology Bulletin*, *38*(7), 895–906. https://doi.org/10.1177/0146167212447242

Wolgast, M., & Lundh, L. G. (2017). Is distraction an adaptive or maladaptive strategy for emotion regulation? A person-oriented approach. *Journal of Psychopathology and Behavioral Assessment*, *39*(1), 117–127. https://doi.org/10.1007/s10862-016-9570-x

Zahn, R., Lythe, K. E., Gethin, J. A., Green, S., Deakin, J. F. W., Young, A. H., & Moll, J. (2015). The role of self-blame and worthlessness in the psychopathology of major depressive disorder. *Journal of Affective Disorders*, *186*, 337–341. https://doi.org/10.1016/j.jad.2015.08.001

Zaki, J., & Williams, W. C. (2013). Interpersonal emotion regulation. *Emotion*, *13*(5), 803. https://doi.org/10.1037/a0033839

Zimmermann, P., & Iwanski, A. (2014). Emotion regulation from early adolescence to emerging adulthood and middle adulthood: Age differences, gender differences, and emotion-specific developmental variations. *International Journal of Behavioral Development*, *38*(2), 182–194. https://doi.org/10.1177/0165025413515405