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Comparing Cognitive Styles in Social Anxiety and Major Depressive Disorders: An Examination of Rumination, Worry, and Reappraisal

Kimberly A. Arditte Hall^{1,2,*}, Meghan E. Quinn³, William M. Vanderlind⁴, and Jutta Joormann⁴

¹VA National Center for PTSD at VA Boston Healthcare System, Massachusetts, USA

²Boston University School of Medicine, Massachusetts, USA

³Vanderbilt University, Nashville, Tennessee, USA

⁴Yale University, New Haven, Connecticut, USA

Abstract

Objective: Social anxiety disorder (SAD) and major depressive disorder (MDD) are commonly occurring and frequently comorbid disorders. Though individuals with SAD and MDD are more likely to engage in rumination and worry, relatively few studies have compared individuals with SAD, MDD, or both disorders on their use of these cognitive styles. Similarly, the extent to which the disorders differ in their use of reappraisal remains unclear. Thus, the current study sought to systematically examine rumination, worry, and reappraisal in individuals with and without SAD, MDD, or both disorders.

Methods: The study comprised 330 participants recruited from the community ($n = 54$ with SAD, $n = 61$ with MDD, $n = 69$ with comorbid SAD/MDD, and $n = 146$ healthy controls). Following confirmation of diagnostic status via clinical interview, participants completed measures of rumination, worry, and reappraisal.

Results: Healthy controls reported less use of rumination (i.e., brooding and reflection) and worry than individuals with a psychiatric diagnosis. Individuals with SAD or MDD did not differ from each other, but participants in both groups reported less rumination, particularly brooding, than individuals with comorbid SAD/MDD. Diagnostic group differences in reappraisal only emerged when reappraisal was considered alongside other cognitive styles. Further, moderation

*Correspondence should be addressed to Kimberly A. Arditte Hall, 150 S. Huntington Ave. (116B-3), Boston, MA 02130, USA (kimberly.ardittehall@va.gov).

Footnotes

¹Listwise deletion was considered appropriate for handling missing data because data were determined to be missing completely at random (Little's MCAR test: $\chi^2 = 12.38$, $df = 7$, $p > .05$) and because the small percentage of missing data (6.0%) did not substantially reduce sample size or power to detect hypothesized effects.

²To ensure that this pattern of effects was not driven by the presence of dysthymia across clinical participants, ANOVAs were rerun excluding the 9% of clinical participants with a comorbid dysthymic disorder diagnosis. Results mirrored those presented in text. Healthy controls continued to report less brooding, reflection, and worry than the three clinical groups ($ps < .001$). Reported use of brooding, reflection, and worry did not differ significantly between individuals with SAD and individuals with MDD ($ps = 1.00$). Individuals with SAD or MDD reported less use of brooding and reflection ($ps < .009$), but not worry ($ps > .18$), than individuals with comorbid SAD/MDD. No significant differences emerged between the four groups on reported use of reappraisal ($ps > .17$).

analyses indicated that reappraisal was only associated with SAD or MDD when participants also reported high levels of rumination and worry.

Conclusions: Results support transdiagnostic conceptualizations of rumination and worry. They also suggest that reappraisal is only useful when it is used by people who experience frequent and habitual negative cognitions.

Keywords

Affective Disorders; Social Anxiety; Depression; Repetitive Negative Thinking; Transdiagnostic; Comorbidity

Lifetime and 12-month prevalence estimates for social anxiety disorder (SAD; 10.7% and 7.4%, respectively) and for major depressive disorder (MDD; 16.6% and 8.6%, respectively) make them two of the top three most prevalent anxiety and mood disorders in the United States (Kessler et al., 2012). Research also finds that these disorders frequently co-occur. In a large, international sample, MDD was present in approximately 20% of SAD cases, and individuals with SAD were 5.74 times more likely to experience a major depressive episode than individuals without SAD (Ohayon & Schatzberg, 2010). Individuals with comorbid SAD and MDD have a younger age of onset, a more severe and chronic course of illness, and greater social and occupational impairments (Adams et al., 2016; Wittchen et al., 2000). These findings highlight the need to identify vulnerability factors that contribute to the onset and maintenance of SAD and MDD. In particular, identifying both transdiagnostic and disorder-specific factors can improve our understanding of the etiology of these disorders and inform our approaches to prevention and intervention.

Theory and research has long supported the existence of shared *and* unique vulnerabilities for anxiety and depression. For example, the tripartite model posits that anxiety and depression are both characterized by elevated levels of negative affect, but are differentiated by a tendency toward physiological hyperarousal in anxiety and toward reduced positive affect in depression (Clark & Watson, 1991). Similarly, cognitive theories of social anxiety and depression highlight the critical role of negative cognitions in exacerbating and maintaining symptoms of both SAD and MDD (Beck, 1964; Heimberg, Brozovitch, & Rapee, 2010). However, the content of negative cognitions may differ across the disorders. Whereas individuals with SAD may be especially concerned about judgement from others, individuals with MDD may be more concerned about experiences of personal failure and worthlessness (American Psychiatric Association [APA], 2013).

Individuals with SAD and MDD may also exhibit difficulty controlling negative cognitions. For instance, they may be prone to perseverate on negative thoughts about the past, a cognitive style termed rumination (Nolen-Hoeksema et al., 2008; Penney & Abbott, 2014). Factor analytic studies have identified multiple types of rumination, most commonly *brooding*, in which negative thoughts focus on self-criticism or social comparison, and *reflection*, which focuses on passive problem-solving (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Whereas brooding is consistently associated with poorer psychological outcomes, research on the use of reflection is more mixed. One study found that among individuals with MDD, reflection was associated with greater concurrent symptom severity,

but also greater likelihood of depression remission over time (Arditte & Joormann, 2011). Individuals with SAD and MDD may also perseverate on future experiences, referred to as worry (Hong, 2007; Koscovski et al., 2005). Though previous research has found rumination and worry to be similar cognitive processes, they can be differentiated by their time-orientation, as well as several other factors associated with the content of negative thoughts (Watkins, Moulds, & Mackintosh, 2005). Perhaps because individuals with social anxiety and depressive disorders have more difficulty controlling negative cognitions, research also suggests that they have difficulty reappraising them (i.e., modifying them so that thought content is more neutral or positive and, thus, associated with less intense negative emotions; e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010). Investigating the ways in which individuals with SAD or MDD typically respond to negative thoughts is critical to our understanding of why these disorders maintain over time, as well as to our understanding of why certain individuals may be more or less responsive to cognitive behavioral therapy (CBT) interventions (e.g., Watkins, 2016).

Examination of rumination, worry, and reappraisal has most often occurred in separate lines of research on individuals with SAD or individuals with MDD, which prevents conclusions about how they may differ across the two disorders. However, two recent papers directly compared individuals with SAD and MDD on their tendency to engage in these cognitive styles. McEvoy and colleagues (2013) found that individuals with SAD and MDD reported similar levels of brooding, reflection, and worry. Participants were not compared against a non-disordered, control group. D'Avanzato and colleagues (2013) found that individuals with MDD reported greater use of brooding, but not reflection, and less use of reappraisal than individuals with SAD, and both clinical groups reported greater use of brooding and reflection and less use of reappraisal as compared to healthy controls.

These studies suggest that individuals with SAD or MDD engage in more rumination and less reappraisal than do healthy controls. However, given the limited available data and some inconsistency across study results, it remains unclear whether individuals with SAD or MDD differ from each other on rumination, worry, or reappraisal. Further, neither study directly compared individuals with comorbid SAD/MDD to individuals with SAD or MDD alone, although McEvoy et al. (2013) provided preliminary evidence to suggest that comorbidity is associated with greater use of brooding and worry. A direct comparison of individuals with SAD, MDD, and comorbid SAD/MDD is needed to understand whether elevated levels of brooding and worry among those with comorbid SAD/MDD are driven by more severe symptomatology or, instead, reflect cognitive styles that are unique to SAD/MDD comorbidity independent of symptom severity.

It should also be noted that rumination and worry often co-occur within the same individual. Indeed, previous research has found evidence for a bifactor model in which measures of rumination and worry load onto a shared "repetitive negative thinking" factor, as well as discrete brooding, reflection, and worry factors (McEvoy & Brans, 2013). Further, reappraisal may be used in response to rumination or worry as a strategy for managing negative thoughts and emotions. Results from a large, unselected, community sample, indicated that "adaptive" strategies, including reappraisal, were not associated with psychopathology at the zero-order level, but were protective against psychopathology when

considered in the context of “maladaptive” strategy use (e.g., rumination; Aldao & Nolen-Hoeksema, 2012). These findings highlight the need to consider different cognitive styles as simultaneous predictors of SAD or MDD status. The extent to which brooding, reflection, worry, and reappraisal are uniquely associated with the presence or absence of SAD, MDD, and comorbid SAD/MDD diagnoses has yet to be examined. Building on the findings of Aldao and Nolen-Hoeksema (2012), it is also critical to examine how reappraisal interacts with rumination or worry to predict clinical diagnoses.

The current study sought to systematically examine the similarities and differences in brooding, reflection, worry, and reappraisal among individuals with SAD, MDD, comorbid SAD/MDD, and no history of psychiatric disorder (i.e., healthy controls). Diagnostic differences in cognitive styles were examined using a MANOVA with follow-up ANOVAs and Bayes factors that examined each cognitive factor in isolation, and with regression analyses which adjusted for the use of all other cognitive styles. Across analyses, it was expected that the three clinical groups would report greater use of brooding, reflection, and worry, and less use of reappraisal as compared to healthy controls. Based on previous research (D’Avanzato et al., 2013), it was also expected that individuals with MDD would endorse greater use of brooding and less use of reappraisal than individuals with SAD. No study, to date, has compared rumination, worry, and reappraisal in individuals with SAD or MDD vs. comorbid SAD/MDD. Given that comorbid SAD/MDD is often associated with a more severe illness presentation (Adams et al., 2016; Wittchen et al., 2000), we expected individuals with comorbid SAD/MDD to report the greatest use of brooding, reflection, and worry, and the least use of reappraisal. We also explored whether these associations were independent of current symptom severity. Finally, we examined whether reappraisal interacted with brooding, reflection, or worry to predict diagnostic status. Given Aldao and Nolen-Hoeksema’s (2012) results, we expected that reappraisal would be negatively associated with psychopathology in the context of high levels of rumination or worry.

Method

Participants

A sample of $N = 351$ individuals was recruited from the community through advertisements posted in local newspapers and online bulletin boards. Participants with missing data on one or more measures ($n = 21$) were excluded from the study¹, leaving a final sample of 330 participants.

Potential participants were screened by phone for initial inclusion/exclusion criteria. To qualify for the study individuals were required to be between 18 and 65 years of age and fluent in English. Individuals were excluded if they met criteria for (1) a current or past manic episode, (2) current or past psychotic symptoms, (3) DSM-IV-TR substance abuse or dependence occurring within the past 6 months, (4) a learning disorder or diagnosis of attention deficit/hyperactivity disorder that would prevent them from reading or paying attention during study procedures, or (5) a brain injury resulting in loss of consciousness >10 min or lasting cognitive impairment.

Eligible individuals were invited to the laboratory to participate in a more extensive diagnostic interview. During this appointment, trained, doctoral-level, graduate students administered the Structured Clinical Interview for the DSM-IV-TR (SCID; First et al., 2002). Diagnostic inter-rater reliability was strong ($K = .88$). Participants were included in the study if they currently met criteria for SAD ($n = 54$), MDD ($n = 61$), or comorbid SAD/MDD ($n = 69$), or if they did not meet criteria for any current or past DSM-IV-TR Axis I disorder (i.e., Healthy Controls; $n = 146$). Aside from stated exclusionary diagnoses, individuals with SAD, MDD, or comorbid SAD/MDD endorsing other current DSM-IV-TR diagnoses were included in the study. Rates of comorbid diagnoses were as follows: 24.6% specific phobia, 18.1% generalized anxiety disorder, 17.1% panic disorder with agoraphobia, 12.6% posttraumatic stress disorder, 9.0% dysthymic disorder, 5.0% obsessive compulsive disorder, 3.0% panic disorder without agoraphobia, 2.0% agoraphobia without panic disorder, 0.5% anorexia nervosa, 0.5% bulimia nervosa. X^2 tests were used to ensure that individuals with SAD, MDD, and comorbid SAD/MDD did not differ in the frequency with which they met criteria for other diagnoses. None of these tests were significant ($ps > .10$), with the exception of specific phobia, $X^2 (df = 2) = 10.86, p = .004$. Participants with comorbid SAD/MDD endorsed specific phobia at a higher rate (37.3%) than participants with SAD (19.1%) or MDD (14.2%).

Average age was 36.52 ($SD = 12.23$) years, and 52% identified as female. Participants were racially and ethnically diverse with 34.7% identifying as Hispanic or Latino, 36.9% identifying as Caucasian, 32.0% identifying as African American, 3.6% identifying as American Indian, 2.7% identifying as Asian, 0.6% identifying as Native Hawaiian, and 2.7% identifying as “Other” (categories not mutually exclusive).

Self-Report Measures

Liebowitz Social Anxiety Scale (LSAS; Fresco et al., 2001).—The LSAS is a 24-item measure that asks about anxiety experienced in social performance situations in the past week. Items are given two separate scores, one for the intensity of the anxiety or fear evoked by a particular situation (anchors 1 – *none* to 4 – *severe*) and a second for the degree to which the individual avoids the situation (anchors 1 – *never* to 4 – *usually*). The current study utilized the LSAS total score, which summed responses across the fear and avoidance subscales. The self-report version of the LSAS demonstrates sound psychometric properties, and scores obtained via self-report are highly correlated with scores obtained from the clinician-administered version of the LSAS (Fresco et al., 2001). Internal consistency in the current study was excellent ($\alpha = .96$).

Beck Depression Inventory-II (BDI-II; Beck et al., 1996).—The BDI-II is a 21-item measure of depression symptom severity in the past two weeks. Items map on to the core features of MDD and are rated on a 4-point Likert scale, ranging from 0–3. The BDI-II is one of the most commonly used measures of depression and it has strong psychometric properties (Beck et al., 1996). Internal consistency in the current study was excellent ($\alpha = .92$).

Ruminative Responses Scale (RRS; Treynor et al., 2003).—The RRS is a measure of habitual rumination in response to sad mood. Items are rated on a 4-point scale, with anchors 1 (*Almost Never*) to 4 (*Almost Always*). Factor analysis has identified discrete reflection (e.g., “Go away by yourself and think about why you feel this way”) and brooding (e.g., “Think ‘why do I always react this way?’”) subscales with strong psychometric properties (Treynor et al., 2003). The current study utilized the 4-item reflection and 3-item brooding subscales utilized by McEvoy and Brans (2013). The current study found internal consistency to be acceptable ($\alpha = .77$ and $\alpha = .92$ for reflection and brooding subscales, respectively).

Thought Control Questionnaire (TCQ; Wells & Davies, 1994).—The TCQ is a 36-item measure that assesses strategies used to control unpleasant or unwanted thoughts. Items are rated on a 4-point scale, with anchors 1 (*Never*) to 4 (*Almost Always*). The current study utilized two subscales of the TCQ: Worry (e.g., “I replace the thought with a more trivial bad thought”) and Reappraisal (e.g., “I analyze the thought rationally”). The other subscales (i.e., Punishment, Distraction, and Social Control) were excluded due to their emphasis on behavioral and social, as opposed to cognitive, control of negative thoughts. Consistent with previous research (Wells & Davies, 1994), the current study found the subscales to have acceptable internal consistency ($\alpha = .83$, and $\alpha = .72$ for worry and reappraisal subscales, respectively).

Procedures

Procedures were approved by the local Institutional Review Board. Data were collected during an initial eligibility session required before individuals could participate in one or more of several experimental studies within our laboratory (e.g., Arditte Hall, De Raedt, Timpano, & Joormann, 2018; LeMoult & Joormann, 2012). During this session participants first completed the SCID before completing a brief battery of questionnaires, including the LSAS, BDI-II, RRS and TCQ. Participants were compensated \$15/hour.

Results

Self-report measure means are presented in Table 1. Healthy controls reported less severe social anxiety (d s 1.43 to 2.78) and depression (d s 2.06 to 3.50) symptoms than the three diagnostic groups. Individuals with MDD reported less severe social anxiety than those with SAD ($d = .91$) or comorbid SAD/MDD ($d = .99$), whereas individuals with SAD and comorbid SAD/MDD did not differ from each other ($d = .21$). Individuals with SAD reported less severe depression than individuals with MDD ($d = .78$), and individuals with MDD reported less severe depression than individuals with comorbid SAD/MDD ($d = .41$).

Group differences in the four cognitive styles were first examined using a MANOVA. Results indicated significant differences between the groups, Wilk's $\Lambda = .39$, $F(12, 854.87) = 30.45$, $p < .001$, $\eta_p^2 = .27$. Because unequal group sizes can violate the assumption of homogeneity of variance, we examined Levene's Test before running further analyses. This test was significant at $p < .05$ for brooding, reflection, and worry, but not reappraisal. Significant effects were driven by participants in the control condition; excluding control participants, Levene's Test effects were no longer significant. Given this and based on

recommendations by Allen & Bennett (2008), we opted to use a stricter α level ($p < .001$) when interpreting omnibus brooding, reflection, and worry ANOVA results, as well as when comparing participants in the control group to participants in each of the clinical groups on these three cognitive styles.

In follow-up ANOVAs and post-hoc Bonferroni comparisons, significant differences emerged for all cognitive strategies, except reappraisal (Table 1). Healthy controls reported less use of reflection, brooding, and worry than each of the three clinical groups (d s 1.23 to 2.62). Individuals with SAD or MDD reported less use of reflection and brooding than individuals with comorbid SAD/MDD (d s .53 to .63). However, individuals with SAD did not differ from individuals with MDD on the use of these cognitive styles (d = .01 and .04 for reflection and brooding, respectively).² Of note, even after adjusting for group differences in depression and social anxiety symptom severity, individuals with SAD or MDD reported less use of reflection, $F(2, 151) = 5.04$, $p = .008$, and brooding, $F(2, 151) = 4.13$, $p = .02$, than individuals with comorbid SAD/MDD. No differences in worry were found between the three clinical groups (d s .08 to .28).

ANOVAs and post-hoc Bonferroni comparisons were supplemented with an examination of scaled JZS Bayes factors, calculated using a web applet (<http://pcl.missouri.edu/bayesfactor>) produced by (Rouder and colleagues 2009). This web applet allowed us to further examine differences in cognitive strategies between specific diagnostic groups (e.g., SAD vs. MDD) using data from independent samples t -tests. In general, examining Bayes factors is superior to traditional null hypothesis significance testing in situations in which a researcher is interested in determining if evidence favors the alternative or the null hypothesis. The scaled JZS Bayes factor is interpreted as favoring the null or favoring the alternative based on t -values and sample size. For example, with a sample of 100 participants, scaled JZS Bayes factor values associated with a t -value less than 1.72 favor the null hypothesis, those associated with a t -value between 1.72 and 2.76 provide inconclusive evidence, and those associated with a t -value greater than 2.76 favor the alternative hypothesis (see Rouder et al., 2009). Scaled JZS Bayes factors also allow for a more nuanced interpretation as they are an odds ratios, and can be interpreted as the odds of the alternative compared to the null. Because differences between healthy control and clinical participants were expected to be relatively large, scale r was set to 1.0 for these analyses. Differences between the three clinical groups were expected to be relatively small; thus, scale r was set to 0.5 for these analyses (Rouder et al., 2009). Table 2 presents t -values, scaled JZS Bayes factors (reported using scientific notation as necessary), and the interpretation of these data provided by the web applet. Results were consistent with those produced by ANOVAs.

Next, we used multinomial logistic regression to examine the unique association between each cognitive style and diagnostic status, adjusting for the other cognitive styles (Table 3). Diagnostic status was included as the dependent variable, and healthy control status was initially selected as the referent group. Brooding, reflection, worry, and reappraisal were then simultaneously entered as predictors. When compared with healthy controls, greater use of brooding, reflection, and worry were uniquely associated with SAD, MDD, and comorbid SAD/MDD status. Additionally, when considered simultaneously with the other cognitive styles, reappraisal was negatively associated with the probability of having an SAD, MDD,

or comorbid SAD/MDD diagnosis. To compare individuals with SAD to individuals with MDD or comorbid SAD/MDD, a second multinomial regression model with SAD status used as the referent group was then run. None of the cognitive styles were associated with MDD or comorbid SAD/MDD status, and these associations continued to be non-significant when the model was tested adjusting for social anxiety and depression symptoms (all p s > .05). A third multinomial regression, including MDD status as the referent group, was then run. This model allowed us to compare individuals with MDD to individuals with comorbid SAD/MDD. Only one significant finding emerged; brooding was positively associated with the probability of having a comorbid SAD/MDD diagnosis ($B = .26$, $SE = .11$, $\chi^2 [df = 1] = 6.01$, $p = .01$, OR = 1.29, 95% CI [1.05, 1.59]). This effect continued to be significant even after adjusting for social anxiety and depression symptoms ($B = .23$, $SE = .12$, $\chi^2 [df = 1] = 3.86$, $p = .049$, OR = 1.26, 95% CI [1.001, 1.58]).

Finally, we examined if reappraisal interacted with brooding, reflection, or worry to predict diagnostic status. Given the similarity of findings across individuals with SAD, MDD, or comorbid SAD/MDD in multinomial regression analyses, these analyses collapsed across clinical diagnoses, such that our dependent variable was coded as 0 = healthy control, 1 = SAD, MDD, or comorbid SAD/MDD. This reduced the number of analyses conducted and, thus, our likelihood of committing a Type I error. Independent variables were centered before creating interaction terms.

The first logistic regression model revealed a significant brooding by reappraisal interaction, $\chi^2 [df = 1] = 9.70$, $p = .002$. This interaction was first probed by examining the association between reappraisal and diagnostic status at high (+1SD) and low (−1SD) levels of brooding. The association between reappraisal and participants' diagnostic status was significant at high ($p < .001$, OR = .68, 95% CI [.57, .81]), but not low ($p = .85$, OR = .99, 95% CI [.87, 1.13]), levels of brooding. The interaction was subsequently probed by examining the association between brooding and diagnostic status at high (+1SD) and low (−1SD) levels of reappraisal. Brooding was positively associated with diagnostic status, with small to medium effects observed at both low ($p < .001$, OR = 3.84, 95% CI [2.72, 5.39]) and high levels of reappraisal ($p < .001$, OR = 2.31, 95% CI [1.88, 2.85]).

The second logistic regression model revealed a significant reflection by reappraisal interaction, $\chi^2 [df = 1] = 21.87$, $p < .001$. As with brooding, the association between reappraisal and diagnostic status was significant at high ($p < .001$, OR = .63, 95% CI [.54, .74]), but not low ($p = .95$, OR = 1.00, 95% CI [.89, 1.12]), levels of reflection. At both high and low levels of reappraisal, results revealed that reflection was positively associated with diagnostic status, with small to medium effects at low ($p < .001$, OR = 2.90, 95% CI [2.27, 3.71]) and high levels of reappraisal ($p < .001$, OR = 1.76, 95% CI [1.54, 2.03]).

The last logistic regression model revealed a significant worry by reappraisal interaction, $\chi^2 [df = 1] = 25.59$, $p < .001$. At low levels of worry, reappraisal was not significantly associated with diagnostic group status ($p = .06$, OR = 1.10, 95% CI [1.00, 1.21]), but at high levels of worry it was ($p < .001$, OR = .71, 95% CI [.62, .81]). At high and low levels of reappraisal, worry was positively associated with diagnostic status; again, small to medium

effects were found at both low ($p < .001$, OR = 2.25, 95% CI [1.85, 2.74]) and high levels of reappraisal ($p < .001$, OR = 1.45, 95% CI [1.30, 1.60]).

Discussion

In this study, differences in brooding, reflection, worry, and reappraisal were examined across individuals with SAD, MDD, comorbid SAD/MDD, and no history of psychiatric disorder. Higher levels of brooding, reflection, and worry differentiated the three clinical groups from healthy controls in MANOVA, Bayes factor, and multinomial logistic regression analyses. Fewer differences in these cognitive styles were found across the three clinical groups. The levels of reflection, brooding, and worry reported by individuals with SAD were not significantly different from the levels reported by individuals with MDD. Within ANOVAs, individuals with SAD or MDD endorsed lower levels of reflection and brooding, but not worry, than individuals with comorbid SAD/MDD. However, when the four cognitive styles were considered simultaneously in multinomial regression analyses, only one significant difference emerged; as compared to individuals with comorbid SAD/MDD, individuals with MDD endorsed less brooding. Differences in reappraisal between the three clinical groups and healthy controls only emerged in the context of the regression analyses, and the three clinical groups were not found to differ from each other. Moderation analyses revealed that, as expected, reappraisal was negatively associated with psychopathology, but only when examined in the context of high levels of brooding, reflection, and worry.

Results provide support for rumination, including both brooding and reflection subtypes, and worry as *transdiagnostic* rather than disorder-specific cognitive styles. Whereas all three cognitive styles differentiated psychiatric illness from wellness, none differentiated SAD from MDD. This is consistent with conceptualizations of rumination and worry as manifestations of a tendency to engage in repetitive negative thinking (Klemanski et al., 2017; McEvoy & Brans, 2013). However, results also indicated that brooding, reflection, and worry were each uniquely associated with clinical vs. healthy control status, which suggests utility to examining these cognitive styles as distinct, albeit related, constructs. This latter finding is consistent with previous research indicating that ruminative and worried thoughts are likely to differ in their chronicity, unpleasantness, time-orientation, and perceived basis in reality (Watkins et al., 2005). Similarly, we may expect the focus of ruminative or worried thoughts to differ across individuals with SAD (e.g., concern about social judgment in specific interpersonal situations) and MDD (e.g., concern about experiences of personal failure and worthlessness). In-depth assessments of the content of ruminative and worried thoughts may help to explain associations between these cognitive styles and specific anxiety or depression symptoms. Based on study findings, we also recommend that clinicians continue to assess for and target specific ruminative and worried thoughts in individuals with SAD or MDD who present for treatment.

The study also built upon previous research by comparing individuals with SAD or MDD to individuals with comorbid SAD/MDD. Individuals with comorbid SAD/MDD endorsed more severe rumination, particularly the brooding subtype, than individuals with either SAD or MDD alone, and these effects remained significant after adjusting for social anxiety and

depression symptoms. One interpretation of these findings is that comorbid SAD/MDD is categorically distinct from SAD or MDD, and not simply an indication of more severe symptomatology (e.g., SAD and MDD vulnerabilities or symptoms may interact in a non-additive fashion). Research indicates that in the majority of cases (65.6%), SAD develops at least two years before the onset of MDD (Ohayon & Schatzberg, 2010). Perhaps individuals with SAD who are predisposed to ruminate, and particularly to brood, about social interactions (i.e., post-event processing; Rachman et al., 2000) are at greatest risk for developing secondary depression. This hypothesis is supported by a recent study of undergraduates, which found that brooding mediated the relationship between social anxiety symptom severity at baseline and depression symptom severity two months later (Grant et al., 2014). Of note, the cross-sectional nature of our results precludes us from drawing causal conclusions about the role of rumination in the development of MDD among participants with SAD. Future research should prospectively examine rumination as a moderator of the association between SAD and the development of MDD. Support for this hypothesis may mean that targeting rumination in treatment for SAD may prevent the onset of depression in this at-risk population.

Interestingly, diagnostic group differences in reappraisal only emerged in the context of multinomial regression analyses, which accounted for participants' use of the other three cognitive styles. This finding indicates that when considered separately from other cognitive factors, use of reappraisal may be unrelated to vulnerability for SAD or MDD. This is consistent with the finding that pre-treatment levels of reappraisal were not significantly associated with CBT outcomes among individuals with SAD (Brozovich et al., 2015). The importance of considering reappraisal in conjunction with other cognitive styles was further highlighted by our moderation analyses. In line with Aldao and Nolen-Hoeksema (2012), reappraisal was associated with the presence vs. absence of SAD, MDD, or comorbid SAD/MDD only when used by individuals with high levels of brooding, reflection, and worry. In contrast, the associations between brooding, reflection, worry and diagnostic status were significant at both low and high levels of reappraisal. Clinically, these findings suggest that reappraisal responses are, in part, helpful because they substitute maladaptive cognitive responding with adaptive responses. That is, use of reappraisal among individuals with elevated worry and rumination may function to both increase the use of adaptive responding and decrease the use of maladaptive responding. The notion that reappraisal reduces the frequency of maladaptive strategy use is an important direction for future research. In addition, because this study examined habitual use of reappraisal in a community sample, an important next step is to investigate the ways in which habitual use of reappraisal is similar to or different from the skill of reappraisal taught within the context of CBT. It will be important to understand the benefits and limitations of reappraisal as a CBT skill for reducing ruminative and worried thoughts among individuals with SAD and/or MDD.

Several limitations to the study are noted. First, the study relied on self-report measures of cognitive styles, and the internal consistency for our measure of reappraisal was relatively low, though still within the acceptable range. In addition, the measures used in this study only assessed the frequency with which individuals engage in rumination, worry, or reappraisal. This prevents us from drawing conclusions about a) how these cognitive styles are used in specific situations (e.g., in response to stress), b) the function of each cognitive

style, and c) whether each cognitive style is used more or less effectively by individuals with differing diagnoses. Experimental investigations, in which individuals with and without SAD, MDD, or comorbid SAD/MDD are trained to use rumination, worry, and/or reappraisal and in which the effects of each style are assessed with multiple subjective and objective (e.g., psychophysiological) indices, will be necessary to more fully understand the implications of the current study's findings. It should also be noted that this study did not include all cognitive styles relevant to SAD and MDD. Future research should examine other potentially relevant constructs (e.g., suppression or acceptance) in individuals with SAD, MDD, and comorbid SAD/MDD. Finally, individuals were diagnosed using DSM-IV-TR criteria. Though neither SAD nor MDD underwent substantial revision in DSM-5, replication in a DSM-5 diagnosed sample may increase generalizability of findings to current treatment settings.

Despite limitations, results offer important insights into the use of rumination, worry, and reappraisal in individuals diagnosed with SAD, MDD, or both disorders. Individuals with these disorders engage in similar levels of rumination and worry and at substantially higher levels as compared to healthy controls. This supports transdiagnostic conceptualizations of these cognitive styles. However, individuals with comorbid SAD/MDD may be more likely to ruminate than individuals with SAD or MDD alone, and this effect does not seem to be due to the higher levels of social anxiety and depression symptoms reported by this population. Results also indicated that reappraisal may only be associated with SAD or MDD when considered alongside rumination and worry. In particular, reappraisal was negatively associated with SAD and/or MDD diagnoses only when individuals also endorsed high levels of rumination or worry. Given that reappraisal is such a large component of existing CBT interventions, therapists may consider evaluating the extent to which reappraisal is used to address ruminative or worried thought processes among individuals with SAD and/or MDD, as well as how reappraisal may be used most effectively.

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Practitioner Points

- Individuals with SAD or MDD report more rumination and worry than healthy controls, but do not differ from each other in their reliance on these cognitive styles.
- Individuals with comorbid SAD/MDD endorse more rumination than individuals with SAD or MDD alone, even after adjusting for differences in symptom severity.
- Reappraisal may only predict diagnostic group status when considered alongside other cognitive styles.
- In particular, high reappraisal may be associated with reduced risk of psychiatric disorder, but only when rumination and worry are also high.

Limitations

- The study was limited by its cross-sectional design and reliance on self-report measures.
- Participants were diagnosed using DSM-IV-TR criteria for SAD and MDD.

Omnibus Test of Group Differences and Means (Standard Deviations) for Clinical Symptoms and Cognitive Strategies as a Function of Diagnostic Group.

Table 1.

	<i>F</i>	<i>df</i>	Healthy Control	SAD	MDD	Comorbid
BDI-II	235.50 [*]	3, 326	4.19 (6.04) ^{bcd}	21.28 (10.06) ^{acd}	29.57 (10.72) ^{abd}	33.84 (10.35) ^{abc}
LSAS	138.06 [*]	3, 326	22.12 (24.42) ^{bcd}	87.42 (19.73) ^{ac}	63.13 (32.24) ^{abd}	92.27 (26.11) ^{ac}
Reflection	84.63 [*]	3, 326	5.82 (2.55) ^{bcd}	9.80 (3.10) ^{ad}	9.84 (2.41) ^{ad}	11.30 (2.53) ^{abc}
Brooding	128.72 [*]	3, 326	4.84 (1.79) ^{bcd}	8.52 (2.06) ^{ad}	8.43 (2.11) ^{ad}	9.72 (1.93) ^{abc}
Worry	46.78 [*]	3, 326	8.19 (2.57) ^{bcd}	11.61 (2.94) ^a	12.35 (3.91) ^a	12.77 (3.71) ^a
Reappraisal	1.30	3, 326	13.44 (4.21)	13.74 (3.49)	14.10 (3.67)	14.48 (3.27)

^{*} *Note.* $p < .001$; BDI-II = Beck Depression Inventory-II; LSAS = Liebowitz Social Anxiety Scale; Superscript connotes significant group differences using Bonferroni method to correct for multiple comparisons and all comparisons between healthy controls and clinical participants were significant at $p < .001$;

^a = differs from healthy control group,

^b = differs from social anxiety disorder (SAD) group,

^c = differs from major depressive disorder (MDD) group,

^d = differs from comorbid SAD/MDD group.

Table 2.

Scaled JZS Bayes factors for between-group comparisons.

	<i>t</i>	B	Interpretation
<i>HC vs. SAD</i>	–10.58	1.06×10^{18}	Favor Alternative
Reflection	–12.04	2.37×10^{22}	Favor Alternative
Brooding	–8.01	7.50×10^{10}	Favor Alternative
Worry	–1.19	4.26	Favor Null
Reappraisal			
<i>HC vs. MDD</i>	–8.33	4.49×10^{11}	Favor Alternative
Reflection	–12.60	7.11×10^{23}	Favor Alternative
Brooding	–8.23	2.46×10^{11}	Favor Alternative
Worry	–.44	7.34	Favor Null
Reappraisal			
<i>HC vs. Comorbid</i>	–14.68	2.87×10^{38}	Favor Alternative
Reflection	–17.13	6.39×10^{30}	Favor Alternative
Brooding	–9.40	5.46×10^{14}	Favor Alternative
Worry	–1.92	1.50	Favor Null
Reappraisal			
<i>SAD vs. MDD</i>	–.18	3.69	Favor Null
Reflection	.09	3.73	Favor Null
Brooding	–1.31	3.70	Favor Null
Worry	–.66	3.12	Favor Null
Reappraisal			
<i>SAD vs. Comorbid</i>	–2.97	11.44	Favor Alternative
Reflection	–3.01	10.36	Favor Alternative
Brooding	–1.81	1.02	Favor Null
Worry	–1.17	2.16	Favor Null
Reappraisal			
<i>MDD vs. Comorbid</i>	–3.27	22.63	Favor Alternative
Reflection	–3.17	17.32	Favor Alternative
Brooding	–.38	3.70	Favor Null
Worry	–1.17	3.58	Favor Null
Reappraisal			

Note.HC = healthy control, SAD = social anxiety disorder, MDD = major depressive disorder, Comorbid = comorbid SAD and MDD.

Table 3.

Multinomial Logistic Regression Examining All Cognitive Strategies Simultaneously and Predicting Diagnostic Group Outcome with Healthy Controls as the Referent Group.

Model Fit: $-2 \text{ Log Likelihood} = 574.11$, $\chi^2 (15) = 280.05$; $p < .001$							
	B	SE	Wald χ^2	df	p	OR	95% CI
<i>SAD</i>	-6.25	1.05	35.54	1	< .001	-	-
Intercept	.29	.10	21.41	1	.003	1.34	1.11, 1.62
Reflection	.62	.13	9.10	1	< .001	1.85	1.43, 2.40
Brooding	.23	.09	7.06	1	.008	1.26	1.06, 1.49
Worry	-.24	.07	12.25	1	< .001	.79	.69, .90
Reappraisal							
<i>MDD</i>	-6.67	1.04	40.88	1	< .001	-	-
Intercept	.28	.13	17.58	1	.003	1.33	1.10, 1.60
Reflection	.55	.10	8.99	1	< .001	1.73	1.34, 2.23
Brooding	.30	.08	12.43	1	< .001	1.35	1.14, 1.59
Worry	-.21	.07	10.09	1	.001	.81	.71, .92
Reappraisal							
<i>Comorbid</i>	-9.05	1.22	55.08	1	< .001	-	-
Intercept	.41	.10	32.58	1	< .001	1.50	1.23, 1.83
Reflection	.80	.14	16.28	1	< .001	2.23	1.69, 2.94
Brooding	.26	.09	9.36	1	.002	1.30	1.10, 1.54
Worry	-.26	.07	13.19	1	< .001	.77	.67, .89
Reappraisal							

Note. MDD = Major depressive disorder; SAD = Social anxiety disorder; Comorbid = MDD + SAD.