

Adaptive and Maladaptive Components of Rumination? Diagnostic Specificity and Relation to Depressive Biases

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The present study investigated the validity of the two-factor solution of items selected from the Rumination Scale of the Response Style Questionnaire proposed by Treynor, Gonzalez, and Nolen-Hoeksema (2003). In the first part of this study we used samples of currently depressed (MDD), formerly depressed (FD), socially anxious (SP), and healthy control participants to examine whether the brooding and reflective pondering components differentiate participants with an anxiety disorder from participants with depression. In the second part of this study we examined whether these components of rumination were differentially related to cognitive biases in depression. Overall, the MDD group exhibited higher brooding scores than did all other groups; SP and FD groups did not differ from each other but obtained higher brooding scores than did the control participants. Only the MDD and the control groups differed on the reflective pondering factor. Importantly, brooding and reflective pondering were differentially related to cognitive biases. Specifically, the correlation between brooding/reflective pondering and memory bias was not significant when depressive symptoms were partialled out. The correlation between brooding and attentional bias for sad faces, however, remained significant even when current depressive symptoms were taken into account. In sum, our results support the formulation that rumination is composed of an adaptive reflective pondering factor and a maladaptive brooding factor.

RUMINATION HAS BEEN CONCEPTUALIZED as a traitlike response style that perpetuates depressive symptomatology (Nolen-Hoeksema, 1991). Rumination consists of persistent and recurring thoughts that unintentionally enter consciousness (Nolen-Hoeksema, 1987), and has been defined as “behaviors and thoughts that focus one’s attention on one’s depressive symptoms and on the implications of those symptoms” (Nolen-Hoeksema, 1991, p. 569). Cognitive models of depression suggest that a ruminative response style, that is, a stable tendency to respond to negative life events and negative mood states with ruminative thinking and negative automatic thoughts, results in a heightened vulnerability to experience episodes of major depression (Nolen-Hoeksema, Morrow, & Fredrickson, 1993). Recent research indicates that rumination enhances cognitive biases in information-processing tasks and impairs mood regulation, resulting in sustained negative mood states (Lyubomirsky & Nolen-Hoeksema, 1993, 1995). Thus, dysphoric participants who were induced to ruminate endorsed more negative interpretations of hypothetical situations, generated less effective problem-solving strategies (Lyubomirsky & Nolen-Hoeksema, 1995), and showed increased recall of negative autobiographical memories (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998). Although numerous studies suggest a close relation between ruminative thinking and emotional disorders (Nolen-Hoeksema, 1991; Roberts, Gilboa, & Gotlib, 1998), there is debate about whether rumination is an adaptive coping mechanism that might be part of the problem-solving process, or whether it is maladaptive and increases the risk for depression. Thus, in research on problem solving and goal attainment, rumination has been conceptualized as an attempt at problem solving and as a self-regulatory strategy used to resolve unattained

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goals, initiated by an intrusive concern that indicates a discrepancy between current state and ideal outcome (Martin & Tesser, 1996).

The issue concerning the adaptive or maladaptive nature of rumination may be informed by determining whether rumination is a unitary process. If rumination is a multidimensional construct, some of these components may be adaptive while others are maladaptive, and this complexity may help to explain contradictory findings regarding the role of rumination in problem solving and in emotional disorders. For example, Trapnell and Campbell (1999) differentiate between ruminative and reflective subtypes of self-attentiveness, while Watkins and Teasdale (2004) proposed that self-focused cognitions typically associated with rumination can be divided into two categories: analytical and experiential. According to their model, whereas analytical rumination is characterized by intellectual overprocessing and perpetuates depressive symptomatology, experiential cognitions are adaptive processes characterized by unfiltered responses to experiences in the present moment. By instructing participants to engage in either analytical or experiential cognitions, Watkins and Teasdale found evidence that analytical and experiential rumination have differential effects on aspects of cognition associated with depression, such as recall of overgeneral autobiographical memories (Watkins & Teasdale, 2001, 2004) and social problem solving (Watkins & Moulds, 2005).

Most studies examining rumination and response style theory (RST; Nolen-Hoeksema, 1987) have used self-report measures of rumination, in particular, the 71-item Response Style Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991) or the 22-item Ruminative Responses Scale (RRS; Nolen-Hoeksema, Larson, & Grayson, 1999), a subset of the RSQ items. Recently, Treynor, Gonzalez, and Nolen-Hoeksema (2003) removed 12 items from the RRS that had manifest depressive content and thus might confound rumination with depressive affect and conducted an exploratory factor analysis on the remaining 10 RRS items. This analysis supported a two-factor model describing ruminative response styles: "reflective pondering" (the R subscale) and "brooding" (the B subscale). Treynor et al. interpret the reflective pondering factor as "a purposeful turning inward to engage in cognitive problem solving to alleviate one's depressive symptoms," and the brooding factor as "a passive comparison of one's current situation with some unachieved standard" (p. 256). These results are consistent with those obtained in other studies describing factors similar to the R and B subscales (e.g., Bagby & Parker, 2001; Roberts et al., 1998).

Interestingly, Treynor et al. found that scores on the R and B subscales not only differentially predicted concurrent and future depression scores, but further, differentially mediated gender differences in depressive symptomatology. Specifically, although scores on the reflective pondering factor were positively correlated with concurrent depressive symptoms, they were associated with lower levels of depressive symptoms at follow-up. In contrast, scores on the brooding subscale were associated with both high concurrent and high follow-up depression scores. These results suggest that different components of rumination may indeed be differentially related to depressive symptoms and, therefore, may reflect adaptive and maladaptive components of this cognitive style.

The aim of the present study was to further investigate the validity of the separation of the subset of RRS items into two subcomponents. Treynor et al. (2003) obtained their data from a community sample in which "depression" was assessed using the Beck Depression Inventory. Therefore, the important question of whether brooding and reflective pondering differentiate clinical from nonclinical samples remains unanswered. Moreover, it is unclear whether elevated brooding and reflective pondering scores are simply symptoms of depressive episodes or whether they remain stable after recovery. Importantly, there is no information about the diagnostic specificity of elevated brooding and reflective pondering scores. Are elevated brooding and reflective pondering scores specifically related to depression or are they related to other forms of psychopathology as well?

Finally, the present study provides a closer analysis of the proposed maladaptive nature of brooding versus reflective pondering. A core hypothesis of RST is that rumination is associated with cognitive biases in depression. Importantly, RST suggests that rumination increases biased cognitive processing (e.g., biased interpretation of ambiguous situations and memory biases; Lyubomirsky et al., 1998) and thus sustains negative mood states. Indeed, the close relation between rumination and cognitive biases is posited to explain why rumination is maladaptive and impairs problem solving (Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Lyubomirsky, Tucker, Caldwell, & Berg, 1999). This raises the question of whether it is the brooding or the reflective pondering subcomponent that is associated with cognitive biases. If brooding is the maladaptive component of rumination and reflective pondering is the adaptive component, only brooding should be associated with cognitive biases. In the present study we used a dot-probe task with emotional faces and a self-

referent encoding task (SRET; Derry & Kuiper, 1981) to examine this formulation. The dot-probe task is frequently used to assess attentional biases in depression and anxiety. The emotion-face version of this task was developed to provide greater ecological validity than is the case with verbal stimuli (Bradley, Mogg, Falla, & Hamilton, 1998). Indeed, previous research has documented that attentional biases for sad faces can be found reliably in depression by using this task (Gotlib, Kasch, et al., 2004; Gotlib, Krasnoperova, Yue, & Joormann, 2004). Biases in memory were assessed using the SRET, a task that has been shown to reliably produce increased recall of negative words in depression (Bradley & Mathews, 1983; Dozois & Dobson, 2001). Gotlib, Kasch, et al. (2004) showed that attentional biases in depression assessed with the emotion-face dot probe and memory biases assessed with the SRET are specific to depression.

In sum, we had three major goals in conducting the present study. First, in order to examine the diagnostic specificity of the brooding and reflective pondering subcomponents of the RRS, we compared the scores on these subscales of participants diagnosed with MDD, participants diagnosed with social phobia, and nonpsychiatric control participants. We hypothesized that if brooding and reflective pondering are maladaptive and adaptive components of rumination, respectively, depressed (but not social phobic) participants should show elevated scores on the brooding but not on the reflective pondering component of rumination. Second, as an initial step in examining brooding and reflective pondering as state versus trait markers of depression, we compared the scores of currently and formerly depressed participants. Working from a "trait" or "vulnerability" perspective, we hypothesized that elevated brooding scores should be evident both in currently and in formerly depressed participants. The final goal of our study was to investigate the adaptive versus maladaptive nature of reflective pondering and brooding by examining whether reflective pondering and brooding scores are correlated with information-processing biases in a diagnosed sample of depressed participants. We hypothesized that the brooding, but not the reflective pondering, component of rumination would be associated with biases in attention and memory in depression.

Method

PARTICIPANTS

Four groups of participants took part in the study: participants with a current major depressive disorder (MDD); participants who had experienced at

least one depressive episode in their lives but were currently remitted (formerly depressed; FD); participants with social phobia (SP) and never-disordered controls (NC). Participants were recruited from two outpatient psychiatry clinics in a university teaching hospital, as well as through advertisements posted in numerous locations within the local community (e.g., Internet bulletin boards, university kiosks, supermarkets). A telephone interview was used to select potential participants. Participants were required to be fluent in English and between 18 and 60 years of age. In addition, participants were excluded if they reported severe head trauma, learning disabilities, or if they indicated a history of bipolar disorder, current panic disorder, psychotic symptoms, or alcohol or substance abuse within the past 6 months. This initial interview was also used to identify individuals who were likely to meet criteria for inclusion in one of the four groups. Those individuals were invited to come to the laboratory for a more extensive interview.

Trained interviewers administered the Structured Clinical Interview for the *DSM-IV* (SCID; First, Spitzer, Gibbon, & Williams, 1995). This interview schedule assesses *DSM-IV* (American Psychiatric Association, 1994) current and lifetime diagnoses for anxiety, mood, psychotic, alcohol and substance use, somatoform, and eating disorders. The SCID has demonstrated good reliability (Skre, Onstad, Torgersen, & Kringlen, 1991; Williams et al., 1992). SCID interviewers had previous experience with administering structured clinical interviews and were trained specifically to administer the SCID. Our team of interviewers achieved excellent interrater reliability ($\kappa = .92$; Gotlib, Kasch, et al., 2004; Gotlib, Krasnoperova, et al., 2004).

Participants were included in the depressed group if they met the criteria for MDD. Participants were included in the FD group if they met criteria for a past major depressive episode. In addition, a slightly modified version of the SCID was used to determine whether participants met criteria for full recovery from depression, using guidelines recommended by the NIMH Collaborative Program on the Psychobiology of Depression (e.g., Keller et al., 1992): 8 consecutive weeks with no more than 2 symptoms of no more than a mild degree (i.e., ratings of 1 [no symptoms] or 2 [minimal symptoms, no impairment]). Importantly, participants in the current MDD and FB groups were recruited only if they had no additional diagnosis of current or lifetime social phobia. Participants were included in the SP group if they met *DSM-IV* criteria for SP but did not meet criteria for current or lifetime MDD. The NC group consisted of individuals with

no current diagnosis and no history of any Axis I disorder. A total of 211 individuals (64 MDD, 36 FD, 20 SP, and 91 NC) participated in this study.

QUESTIONNAIRES

Rumination scales. In the present study we used the 22-item RRS of the RSQ (Nolen-Hoeksema & Morrow, 1991) to assess how participants tended to respond to sad feelings and symptoms of dysphoria. The RRS assesses responses to dysphoric mood that are focused on the self (*think about all your shortcomings, failings, faults, mistakes*), on symptoms (*think about how hard it is to concentrate*), or on possible consequences and causes of moods (*analyze recent events to try to understand why you are depressed*) using a 4-point scale (*almost never to almost always*). In addition, behavioral responses to sad moods (*go someplace alone to think about your feelings*) are assessed. Previous studies have shown good test-retest reliability and acceptable convergent and predictive validity (Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema, Parker, & Larsen, 1994). The separation into brooding and reflective pondering subscales was modeled after Treynor et al. (2003). Thus, although we administered the complete 22-item version of the RRS, we used only the subset of 10 items that compose the brooding and reflective pondering factors in the subsequent analyses. Both subscales have been found to have acceptable internal consistencies and retest-reliabilities (Treynor et al., 2003).

Depressive symptoms. Participants also completed the second edition of the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996), a 21-item, self-report measure of the severity of depressive symptoms. The reliability and validity of the BDI-II have been well documented (Beck et al., 1996).

DOT PROBE TASK

Stimuli. A set of over 1600 photographs of faces of people portraying different emotions was assembled from a number of sources, including photograph collections of other researchers, standardized sets of emotional faces (Ekman & Friesen, 1976; Matsumoto & Ekman, 1988), and sets of photographs developed by Lang and his colleagues (e.g., Lang, Bradley, & Cuthbert, 1997). All of the images were digitized and edited to be monochromatic and of approximately the same size (260 × 300 pixels, or approximately 9 × 10 cm) and were rated by graduate and undergraduate students on 7-point scales of expressed intensity of sad, angry, happy, and neutral emotions. Based on these ratings, 60 pairs of images were chosen. Each pair depicted a

unique poser with two different facial expressions: 20 pairs had angry and neutral facial expressions, 20 pairs had sad and neutral expressions, and 20 pairs had happy and neutral expressions. The pictures were matched across these three categories with respect to the gender of the poser and the intensity of the dominant emotion displayed in the picture. An additional 12 neutral-neutral face pairs (i.e., two identical neutral faces) were used for practice trials.

Procedure. Participants were seated in front of the computer, with the index finger of their left hand on the “z” key, which was labeled “L” for left, and the index finger of their right hand on the “m” key, which was labeled “R” for right. Participants were told that their goal in this task was to respond as quickly and as accurately as possible when they detected a small dot by pressing the key labeled “L” if the dot appeared on the left side of the screen and the key labeled “R” if the dot appeared on the right side. Participants first completed 12 practice trials. When the participants felt comfortable with the procedure, the experimenter left the room and the participants completed 240 test trials of the task on their own. When projected on the screen, the size of each picture was approximately 9 × 10 cm. The pictures in each pair were approximately 13 cm apart (measured from their centers) with 3 cm space between the pictures. Each of the 60 picture pairs was presented in each of four blocks, for a total of 240 trials, with a brief rest period between each block. The four presentations of each picture pair counterbalanced the side on which the emotion face was presented, and the side on which the dot was presented, such that, for each pair, one of each of the four possible iterations was presented in each block. The 60 trials within each block were presented in a new, randomized order for each participant.

Each trial began with the display of a white fixation cross in the middle of the screen for 500 ms, followed by the presentation of a face pair on the screen for 1000 ms. Following the offset of the pictures, a small gray dot appeared in the center of the screen location where one of the pictures had been and remained on the screen until the participant pressed a key on the keyboard. The intertrial interval was 1000 ms.

SELF-REFERENT ENCODING TASK (SRET)

Stimuli. We developed a set of 116 adjectives from 4 different categories for use as stimuli in the incidental recall task: 22 depressotypic, 22 socially threatening, 22 physically threatening, and 50 positive adjectives. Compared to each of the other categories, more positive words were presented in

order to reduce the extent to which the full set of words was primarily negative. Some words were selected from previous studies of cognitive biases in depression (e.g., Gotlib & Cane, 1987; Gotlib & McCann, 1984; McCabe & Gotlib, 1993). Additional anxiety- and depression-relevant words were drawn from those used by Mogg, Bradley, Williams, and Mathews (1993), who had judges rate each word with respect to relevance to depression and anxiety. All stimulus words were rated by five senior psychology graduate students with respect to their relevance to depression, social threat, and positive emotions on a scale of 0 (*not at all relevant*) to 4 (*extremely relevant*). The relevance of each word in the final set of 116 words had been rated as 3 or more for the appropriate emotion category and less than 3 for other categories. The categories were equivalent in terms of average emotionality, range of emotionality, number of letters, and frequency of words.

Procedure. Participants were tested individually. They were seated in front of the computer, with the index finger of their right hand on a key labeled “yes” and the third finger of their right hand on a key labeled “no.” Participants were instructed to focus on the cross in the middle of the screen and then to indicate whether the word that followed on the screen described them or not. For each trial, the words “Describes me?” appeared in the center of the screen for 500 ms, followed by a 250 ms pause. Then, one of the stimulus words was presented in uppercase letters. Participants indicated whether the displayed word described them by pressing the appropriate key. Following the participant’s response, the word disappeared. The computer recorded the latency and response for each trial. The intertrial interval was 1000 ms. The words were presented in random order. Once the practice trials were completed, the experimenter waited outside the room until the participant was finished. The participants were then asked to work on the digit-symbol copying task of the Wechsler Adult Intelligence Scale–Revised (WAIS-R; Wechsler, 1981) for 3 min as a distractor task. The experimenter left the room during this time and then returned with a sheet asking the participants to recall words from the previous self-referential encoding task, regardless of whether or not they endorsed the words as self-descriptive. Participants were given 3 min to remember the words. The SRET and the dot-probe task were implemented with E-prime software.

OVERALL PROCEDURE

All participants took part in the clinical interview session and completed the questionnaires at

the end of this session. After this initial assessment, participants were assigned to different projects that were conducted in the Stanford Mood and Anxiety Disorders Lab. Thirty-four of the participants with MDD and had completed the RRS subsequently took part in a second study, in which the dot-probe and SRET tasks were presented. The rest of the sample (FD, SP, and NC) did not participate in this second study, and we did not assess attention or memory biases in those groups. Results of the second study involving comparisons of the dot probe and SRET findings with other samples were described by Gotlib, Krasnoperova, et al. (2004); however, those samples did not complete the RRS. Therefore, the data from the subset of 34 MDD participants permitted the investigation of the relationships between cognitive biases and the measures of brooding and reflective pondering. Participants were tested individually within 2 weeks after their initial diagnostic interview. They were told that the experiment was designed to assess how they processed emotional stimuli. Participants first completed the dot-probe task followed by the SRET. The experimental session lasted 60 min, and participants were each paid \$25 per hour.

Results

PARTICIPANT CHARACTERISTICS

The four groups of participants did not differ significantly in age, $F(3, 175) = 2.01$; race, $\chi^2(3, N = 210) = 6.7$; marital status, $\chi^2(3, N = 210) = 2.96$; or college education, $\chi^2(3, N = 210) = 4.38$, all $ps > .05$ (see Table 1). As expected, the groups did differ on the BDI-II, $F(3, 171) = 129.35$, or the RRS, $F(3, 171) = 68.98$; both $ps < .01$. Follow-up t -tests indicated that MDD participants had significantly higher scores on the BDI-II and the RRS than did participants in the other three groups. In addition, FD and SP participants had significantly higher scores on the BDI-II and on the RRS than did the control participants, but did not differ from each other on either measure (see Table 1).

The correlations between the rumination scales and the cognitive bias measures (reported below) are based on the subset of 34 depressed participants who had taken part in the initial testing session and in the follow-up test session that included the SRET and dot probe tasks. This subsample consisted of 6 male and 28 female participants. Mean age was 34 ($SD = 11.89$), mean BDI-II score was 26.75 ($SD = 12.55$). The

Table 1
Characteristics of participants

	Group			
	NC	MDD	FD	SP
<i>N</i> (<i>N</i> female)	91 (56)	64 (50)	36 (26)	20 (13)
Percent Caucasian	64.77	73.23	78.38	69.57
Percent college educated	73.86	70.42	78.13	56.52
Percent married	25.00	19.72	34.38	18.18
Age	35.46 (11.42) _b	35.78 (10.08) _b	35.54 (8.48) _b	30.77 (7.62) _a
RRS score	31.01 (7.64) _a	53.09 (11.07) _c	41.11 (10.58) _b	44.51 (9.68) _b
BDI-II	1.94 (3.77) _a	28.09 (11.17) _c	5.81 (7.49) _b	9.25 (9.06) _b

Note. NC = never-disordered control participants; MDD = participants with major depressive disorder; FD = formerly depressed participants; SP = participants diagnosed with social phobia; RRS = Ruminative Responses Scale; BDI-II = Beck Depression Inventory-II. Standard deviations are shown in parentheses. Means in the same row having the same subscript are not significantly different at $p < .05$.

mean RRS score in this sample was 52.35 ($SD = 15.42$). Brooding ($M = 12.23$, $SD = 4.25$) and reflective pondering scores ($M = 10.41$, $SD = 2.68$) were comparable to those obtained by the complete sample.

DIAGNOSTIC SPECIFICITY

The internal consistency of the brooding subscale in our sample was $\alpha = .78$, and the internal consistency of the reflective pondering subscale was $\alpha = .65$. Mean scores on the brooding and reflective pondering subscales for the four groups are presented in Figure 1. The diagnostic specificity and “rumination trait” hypotheses predict a significant interaction of group and scale, such that the MDD and FD groups should

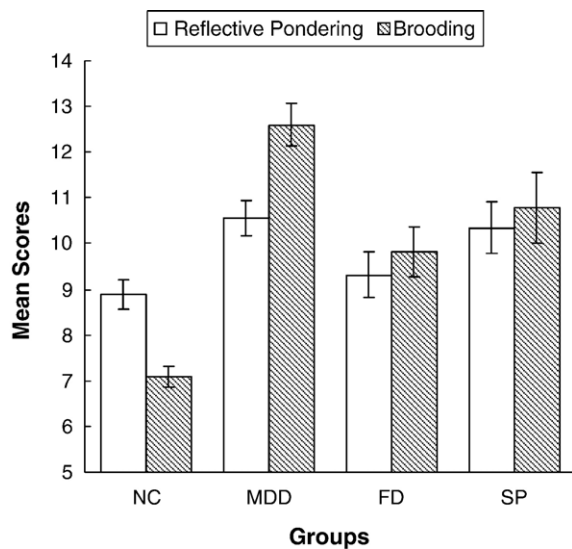


FIGURE 1 Means and standard errors of the reflective pondering and brooding subscales in the different diagnostic groups (NC = control participants; MDD = participants with major depressive disorder; FD = formerly depressed participants; SP = participants diagnosed with social phobia).

differ from the SP and control groups in their brooding but not in their reflective pondering scores. Indeed, the two-way (group [MDD, FD, SP, control] by scale [brooding, reflective pondering]) mixed design analysis of variance (ANOVA) yielded a significant main effect for group, $F(3, 207) = 27.22$, $p < .01$, which was qualified by a significant interaction of group and scale, $F(3, 207) = 15.29$, $p < .01$. In follow-up tests, we investigated whether elevated scores on the brooding and/or reflective pondering subscales were specific to one of our diagnostic groups or a more general feature of psychopathology. Univariate ANOVAs showed significant group differences on both the reflective pondering and the brooding subscales, respectively, $F(3, 207) = 4.28$, $p < .01$, and $F(3, 207) = 41.54$, $p < .01$. Follow-up t -tests conducted on the brooding subscale indicated that the MDD group differed significantly from all other groups, including the FD group, all $ps < .05$. Moreover, SP and FD participants had higher brooding scores than did the control participants, both $ps < .05$, but did not differ significantly from each other, $p > .05$. For the reflective pondering scale, only the MDD and control participants differed significantly, $t(153) = 11.27$, $p < .01$, all other $ps > .05$.

To investigate whether brooding and reflective pondering represent different components of rumination, we examined the relation of brooding and reflective pondering scores within the diagnostic groups. It is possible that brooding and reflective pondering are independent (e.g., adaptive and maladaptive) components of rumination in the control participants but are highly intercorrelated and highly correlated with depressive symptoms in the MDD group. Within the group of MDD participants, brooding and reflective pondering were highly correlated, $r(62) = .51$, $p < .05$. Brooding and reflective

Table 2
Correlations of rumination and reflective pondering scores with cognitive biases in the MDD subsample

Bias measures	Scales			
	Reflective pondering	Brooding	RRS	BDI-II
<i>Dot probe (DP)</i>				
DP-bias: sad	.25	.36*	.35*	.01
DP-bias: angry	-.05	.13	.08	-.01
DP-bias: happy	.01	-.16	-.01	-.19
<i>SRET</i>				
% endorsed sad	.56*	.73*	.75*	.70*
% endorsed social-threat	.37	.62*	.63*	.52*
% endorsed happy	-.48*	-.70*	-.69*	-.58*
Recalled sad	.47*	.66*	.66*	.43*
Recalled social-threat	.33	.43*	.49*	.12
Recalled happy	-.37	-.39*	-.43*	-.51*

Note. $N = 34$. MDD = major depressive disorder; DP = dot probe task; SRET = self-referent encoding task; RRS = Ruminative Responses Scale; BDI-II = Beck Depression Inventory.

* $p < .05$.

pondering were also significantly correlated with BDI-II scores within the MDD group (brooding: $r[62] = .38$; reflective pondering: $r[62] = .25$; both $ps < .05$). Within the control group, brooding and reflective pondering were also significantly intercorrelated, $r(89) = .30$, $p < .05$. Still, whereas brooding was correlated significantly with BDI-II scores within the control group, $r(89) = .44$, $p < .05$, reflective pondering was not, $r(89) = .12$, $p > .05$.

RELATION TO COGNITIVE BIASES

To examine the relation of scores on the brooding and reflective pondering subscales with information-processing biases, we analyzed the data from the 34 depressed participants who had both completed the RRS and taken part in the second testing session in which the dot-probe task and SRET were presented. Bias on the dot-probe task was calculated as the response latency to detect the dot probe when it appeared on the same side of the screen as the emotional face (happy, sad, or angry), subtracted from the latency to detect the dot probe when it appeared on the opposite side of the screen as the emotional face (i.e., behind the neutral face). Greater bias on this task, as indexed by a stronger tendency to look at the emotional than at the neutral faces, is reflected by a positive bias score.

On the SRET, two ratios were calculated to assess endorsement and incidental recall. Endorsement was calculated as the number of words endorsed in a content category (e.g., sad, social threat, positive) divided by the total number of words endorsed (Dozois & Dobson, 2001). Incidental recall scores were calculated as the number of the endorsed and

subsequently recalled words from each content category, divided by the total number of words that were endorsed and recalled.¹

Given that brooding but not reflective pondering should reflect the maladaptive nature of rumination, we hypothesized that brooding scores would be related to biases within the subsample of depressed participants. The correlations of the brooding and reflective pondering scales with the dot-probe and SRET bias scores are presented in Table 2, as are correlations with BDI-II scores and with the full RRS rumination scale. Brooding and RRS scores, but not reflective pondering or BDI-II scores, were significantly correlated with attentional bias scores for sad faces on the dot-probe task. No significant correlations were found between bias scores for angry or happy faces and the self-report measures. SRET endorsements and recall for happy, sad, and social-threat words were correlated with both reflective pondering and brooding. Most of these bias scores, however, were also highly correlated with BDI-II scores. To examine whether the correlations of brooding and reflective pondering with bias scores are explained through the correlation of rumination and depressive symptoms, we conducted hierarchical regression analyses entering BDI-II scores in Step 1 and adding reflective pondering and brooding scores in Step 2 (see Table 3). Although brooding explained unique variance in the dot-probe bias scores, correlations between brooding/reflective pondering and bias

¹ We used the number of words that were endorsed and recalled by each participant in the denominator of percentage recalled, instead of the number of words per category, because the numbers of words per category were very different and therefore their numbers of endorsements could likewise vary.

Table 3
Hierarchical Regression Analyses Predicting Bias Scores From Depressive Symptoms, Reflective Pondering, and Rumination in the MDD Subsample

Dependent variable	Predictors			
	Step 1: β	Step 1: R^2	Step 2: β	Step 2: ΔR^2
DP-bias: sad	BDI-II: .09	.01	BDI-II: -.32 Reflection: -.53 Brooding: .88*	.22*
SRET: % endorsed sad	BDI-II: .89	.79*	BDI-II: .75* Reflection: -.07 Brooding: .28	.04
SRET: % endorsed happy	BDI-II: -.75	.53*	BDI-II: .55* Reflection: .25 Brooding: -.41	.01
SRET: Recalled sad	BDI-II: .74	.55*	BDI-II: .54* Reflection: .03 Brooding: .36	.10
SRET: Recalled happy	BDI-II: -.77	.57*	BDI-II: -.89* Reflection: -.16 Brooding: .25	.04*

Note. $N = 34$. MDD = major depressive disorder; DP = dot probe task; SRET = self-referent encoding task; BDI-II = Beck Depression Inventory-II.

* $p < .05$.

scores on the SRET were no longer significant when variance in BDI-II scores was taken into account.

Discussion

Since the construct of rumination was introduced into research on psychopathology, it has been debated whether rumination is an adaptive coping mechanism that operates in the service of problem solving or is better conceptualized as a maladaptive, dysfunctional cognitive style that is associated with cognitive biases, sustained negative mood states, increased vulnerability to depression, and impaired problem solving (for an extended discussion of this debate see [Wyer, 1996](#)). More recently, theorists have suggested that rumination might encompass both adaptive and maladaptive components, a formulation that has led research on rumination to focus on differentiating components of rumination and on developing reliable and valid measures of these components. The goal of the present study was to extend [Treyner et al.'s \(2003\)](#) recent differentiation of adaptive (reflective pondering) and maladaptive (brooding) components of rumination. Specifically, we investigated the diagnostic specificity of elevated reflective pondering and brooding scores and the relation of these scores to cognitive biases in depression.

Overall, our results indicate that although MDD participants are indeed characterized by higher brooding scores than are both control and SP participants, SP participants nevertheless had

higher brooding scores than did the control participants. Thus, while brooding does not appear to be a specific feature of depression, depression is characterized by especially high levels of brooding. Importantly, MDD participants also had higher brooding scores than did the FD participants, who in turn had higher scores than did the control participants. Therefore, high levels of brooding appear to be exacerbated by a depressed state, but also appear to be stable beyond the depressive episode. This finding supports results from other studies that show elevated levels of rumination in previously depressed participants and suggest that rumination, and more specifically brooding, is a trait characteristic that increases vulnerability to depression (e.g., [Roberts et al., 1998](#)). Overall, these results extend findings of other studies investigating components of rumination. [Babgy and Parker \(2001\)](#) obtained symptom-focused and self-focused rumination factors in their sample of depressed patients, which resembles the distinction in the present study between brooding and reflective pondering (see also [Cox, Enns, & Taylor, 2001](#); [Roberts et al., 1998](#)). It is important to bear in mind, however, that the MDD participants in the present study also exhibited elevated reflective pondering scores compared to the control participants.

The important question remains, therefore, whether the differentiation of rumination into brooding and reflective pondering components

reflects a distinction between adaptive and maladaptive rumination. To further investigate the possible maladaptive nature of brooding, we examined the relation of cognitive biases to these components of rumination in a sample of depressed participants. Our results, in part, support the notion that brooding is associated with cognitive biases and thus might play a role in maintaining negative mood states. While the relations between reflective pondering/brooding and biases in memory did not remain significant when their common association with depressive symptoms was controlled, brooding, but not reflective pondering, was correlated to attentional bias for sad faces on the dot-probe task, even after controlling for BDI scores. These results support the analysis of [Treyner et al. \(2003\)](#), who found that reflective pondering and brooding were associated differentially with current and subsequent depressive symptoms. [Treyner et al. \(2003\)](#), however, used a community sample and assessed change in BDI scores. Interestingly, [Cox et al. \(2001\)](#) found that neither symptom- nor self-focused rumination predicted clinical variables, including treatment outcome and decrease in depressive symptoms in a clinical sample. Although the present study did not include a follow-up phase and, therefore, cannot be compared directly to these studies, our results nevertheless inform the debate about the adaptive or maladaptive nature of components of rumination.

The present findings indicate that participants diagnosed with MDD are characterized by elevated scores on both the reflective pondering and brooding scales. Moreover, reflective pondering and brooding both were correlated with BDI-II scores. Only brooding, however, was specifically related to cognitive biases (i.e., an attentional bias toward sad facial expressions). Because the face stimuli in the dot probe task were presented for 1 sec, this finding likely reflects an association of the tendency to brood with the tendency to maintain attention to negative stimuli. Although speculative, our results suggest that brooding is related to attentional processing, which may explain why brooding is related to sustained negative mood states. Similar findings of a close relation of subcomponents of rumination and cognitive biases and other mood-stabilizing symptoms of depression have been reported by [Watkins and Teasdale \(2001, 2004\)](#) and [Watkins and Moulds \(2005\)](#). In these studies, abstract, analytic self-focus was associated with increased overgeneral autobiographical memory and impaired problem solving. Combined with the current results, these findings provide convergent evidence that specific forms of rumination

(brooding, analytical self-focus) are implicated in depression-related cognitive biases and are associated with clinically relevant symptoms of depression, such as poor problem solving.

Although these findings generally support the distinction of a more adaptive reflective pondering and a less adaptive brooding factor, our analyses still suggest that it is difficult to separate depressive symptoms, reflective pondering, and brooding in a sample of clinically depressed participants. Thus, whereas brooding and reflective pondering were found to be significantly correlated among the MDD participants, this was not the case among the control participants, highlighting the potential importance of the relation between reflective pondering and brooding. Reflective pondering, in the absence of brooding and depressive symptoms, might indeed be adaptive. In clinically depressed samples, however, reflective pondering and brooding might easily perpetuate each other, thus blurring the distinction between adaptive and maladaptive cognitive styles. Indeed, [Ingram, Miranda, and Segal \(1998\)](#) suggested that although rumination is not necessarily dysfunctional, it may lose its adaptive value in someone with a negative self-schema. Similarly, [Nolen-Hoeksema \(1996\)](#) suggested that even self-reflection used in the context of problem solving might lead to self-perpetuating cycles of negative cognition and negative mood. While brooding appears to be clearly depression-related and maladaptive, our results suggest that reflective pondering is not as easily classified, in particular in the context of clinical disorders.

The current study has a number of limitations. It will be important that our findings regarding the differences between the MDD and the SP groups be replicated with participants who are diagnosed with other anxiety disorders or with other forms of psychopathology. Rumination has been implicated in social phobia, mostly in the form of anticipatory or post-event worry about social situations and experiences (e.g., [Abbott & Rapee, 2004](#); [Mellings & Alden, 2000](#)). Certainly, therefore, some similarities between rumination in depression and social phobia are to be expected. In addition, recent reformulations of the tripartite model posit that both depression and social phobia differ from other anxiety disorders by being characterized by low positive affect ([Brown, Campbell, Lehman, Grisham, & Mancill, 2001](#); [Brown, Chorpita, & Barlow, 1998](#); [Mineka, Watson, & Clark, 1998](#)) and are therefore probably more similar to depression than are other anxiety disorders. While future studies comparing depression to other anxiety disorders would be of great interest, we think that

this close similarity of depression and social phobia makes our finding of differences between the two disorders all the more interesting. Although the SP participants had higher brooding scores than did control participants, MDD participants had even higher brooding scores than did the SP group. It is possible that future studies will find that reflective pondering and brooding characterize social phobia but not other anxiety disorders. A second limitation of the current study is that the relation between brooding/reflective pondering and cognitive biases was assessed only in the MDD group. Thus, it is not clear whether the relation between the subcomponents of rumination and information processing is specific to depression or reflects a general association that would also be found in the other groups. Future studies are needed that address this important question. As a related point, we computed a large number of correlations between the rumination components and the cognitive bias measures using a relatively small sample of 34 depressed participants. Consequently, the results regarding the relation of subcomponents of rumination and cognitive biases should be regarded as preliminary and in need of replication. Finally, the current sample consists mostly of women. Treynor et al. (2003) found that women scored higher on both reflection and brooding, but that only brooding mediated the gender difference in depressive symptoms. Clearly, more studies with both women and men are required to conduct a more thorough examination of these gender differences.

Implications for Clinical Practice

Given the preliminary nature of our findings, implications for clinical practice are necessarily speculative. Nevertheless, we can offer three implications for clinical practice and intervention. First, our results suggest that rumination, in particular maladaptive brooding, characterizes not only depression, but also social phobia. Interventions may do well to focus, therefore, on ways to change brooding in social phobia. Indeed, it is possible that interventions that target rumination in depression would be successful when used in the context of social phobia, and of other anxiety disorders. Harvey, Watkins, Mansell, and Shafran (2004) recently proposed a transdiagnostic approach to clinical research and treatment; rumination might be considered as one of the processes that is common across disorders and might be targeted with similar interventions. Second, our results show that brooding, in particular, remains elevated after recovery from a depressive episode. Thus, brooding might be an important factor in relapse in

depression. If so, it may be useful in the development of relapse prevention strategies to target this process. Finally, our results support the differentiation of rumination into an adaptive reflective pondering and a maladaptive brooding component and suggest that brooding is particularly strongly associated with depressive symptoms, with cognitive biases and, thus, with sustained negative affect in depression. This finding suggests that brooding, more than reflective pondering, should be a focus of clinical interventions. As a caveat, however, our results also suggest that it is difficult to distinguish between reflective pondering and brooding in emotional disorders, which might make it difficult to selectively target these processes in interventions. In particular, it is important to note that depressed participants differed from the control participants in both brooding and reflection; moreover, in the depressed group both rumination factors were correlated significantly with BDI-II scores. Differentiating between reflective pondering and brooding, therefore, might be difficult with individuals currently in a depressive mood state. A more efficacious approach in the initial stages of an intervention may be to teach depressed people both the adverse consequences of rumination and the use of effective distraction strategies to lift their moods.

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