

Rumination: Reflection Can Amplify the Depressogenic Effects of Brooding

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Despite their co-occurrence, little work has examined how the tendencies to brood and reflect can covary within individuals and interact to confer risk for depression. To address this gap in the literature, we conducted two prospective studies (study 1, $n = 154$; study 2, $n = 205$) to examine the interactive effect of reflection and brooding on future depressive symptoms in undergraduates. We hypothesized that when both are present in high levels, brooding and reflection will lead to greater levels of depressive symptoms than brooding alone. Consistent with the hypotheses, participants who reported both high levels of brooding and high levels of reflection tended to experience the greatest levels of future depressive symptoms after experiencing stress. The findings support the theoretical distinction between these constructs and may help to explain the inconsistent findings for the association between reflection and depression. However, the clinical implications of the amplifying effects of reflection are limited due to the small effect size of the findings.

Keywords: brooding, depression, reflection, rumination

As defined by the response styles theory (Nolen-Hoeksema, 1991), rumination is a response to stress “that involves repetitively and passively focusing on symptoms of negative mood as well as the possible causes and consequences of these symptoms” (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008, p. 400). According to the theory, rumination confers risk for depression because it serves as a catalyst for negative moods and, in turn, the activation of negative cognitions and negative memories. It also is associated with deficits in cognitive flexibility, task-switching, concentration, attention, and memory (e.g., Lyubomirsky, Tucker, Caldwell, & Berg, 1999; Nolen-Hoeksema et al., 2008; Ray et al., 2005; Watkins & Brown, 2002). Because of these deficits, ruminators tend to have difficulty with problem solving, which leads to problems resolving negative moods and interpretations of

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life circumstances as unchangeable. The link between high levels of rumination and depression is well established in the literature (Nolen-Hoeksema et al., 2008).

Rumination is typically measured using the Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Factor analytic studies of the RRS show that rumination can be broken down into two components: brooding and reflection (Treynor et al., 2003). Brooding is characterized by negative self-focus, which includes a passive comparison of one's current situation with some unachieved standard as well as a focus on obstacles rather than possible solutions to problems (Treynor et al., 2003). In contrast, reflection (also called pondering) is characterized by a purposeful looking inward to engage in active problem solving. Of these two components, brooding has demonstrated the most consistent and robust association with depression (Burwell & Shirk, 2007; Crane, Barnhofer, & Williams, 2007). Research shows that people who brood have greater severity of depressive symptoms and have longer episodes of depression (Nolen-Hoeksema, Larson, & Grayson, 1999; Nolen-Hoeksema, Morrow, & Fredrickson, 1993). Importantly, individual differences in the propensity to brood can also predict risk for future depression. Prospective studies show that people who brood are more likely than those who do not to experience increases in depressive symptoms and the onset of depressive episodes (Just & Alloy, 1997; Nolen-Hoeksema, 2000; Sarin, Abela, & Auerbach, 2005).

The results of research examining the association between reflection and depression are mixed. Some studies suggest that reflection poses little risk for depression longitudinally and might even have a buffering effect (Grossman & Kross, 2010; Treynor et al., 2003). For example, Burwell and Shirk (2007) found that reflection was related to adaptive primary and secondary coping strategies such as problem solving and goal clarification. However, the results of other studies show that reflection has the potential to be depressogenic. For example, Joorman, Dkane, and Gotlib (2006) found that reflection was associated with greater depression and negative memory bias. And yet other studies (Cox, Funasaki, Smith, & Mezulis, 2012; Hasegawa, Koda, Hattori, Kondo, & Kawaguchi, 2013; Mezulis, Simonson, McCauley, & Vander Stoep, 2011; Siegle, Moore, & Thase, 2004) have found no association (neither positive nor negative) between reflection and future depression.

Given the conceptual and empirical differences between brooding and reflection, the implicit assumption seems to be that people fall into one of two categories: "brooders" or "reflectors." However, the modest positive correlation between these two factors indicates that people are capable of expressing any possible combination of both brooding and reflective tendencies (high levels of both, low levels of both, or a mixture). Despite their possible co-occurrence, brooding and reflection have been examined separately by research looking at the main effects of each construct on depression. Little work has examined how both brooding and reflective tendencies can vary within an individual and interact to confer risk for depression. It is important to address this gap in the literature because different brooding and reflection "profiles" might confer different risk for future depressive symptoms. A better understanding of the ruminative construct and

how these additional factors interact might also help to reconcile prior research on reflection. It is possible that the inconsistencies in the literature on the association between reflection and depression are due to the failure to consider concomitant levels of brooding within individuals.

The purpose of the current research was to address this gap in the literature and examine how brooding and reflection covary within individuals and how this affects risk for future depressive symptoms. We hypothesized that individuals who were high in both reflection and brooding would be at greatest risk for future depressive symptoms. Although the results from prior work on reflection are mixed, we theorize that reflection, in combination with high levels of brooding, will be representative of highly introspective individuals who have a great motivation to think about themselves and their mood. This intensity of focus on self and emotion will amplify brooding tendencies and risk for depression. Consistent with this reasoning, Whitmer and Gotlib (2011) found that the two-factor (brooding-reflection) structure for the RRS scale was supported only in currently non-depressed samples. Those who were currently depressed had high scores on both brooding and reflection, hence supporting a single-factor structure. Whitmer and Gotlib suggested that this combined effect resulted from a state of depression. However, we believe that this combination might have represented an a priori rumination profile that preceded and predicted the depression.

To test our hypothesis, we conducted two prospective longitudinal studies. The first study used a 4-week time frame, and the second study used a 6-month time frame. In both studies, we first examined the degree to which reflection and brooding covary within individuals (i.e., the frequency of different “profile” combinations of these two ruminative components). Next, we tested the interactive effects of brooding, reflection, and stress on risk for future depressive symptoms. We included stress in our study because response styles theory is a diathesis stress model in which ruminative styles are most likely to be activated during times of stress. We hypothesized that those with high levels of both brooding and reflection would show the greatest levels of future depressive symptoms when faced with stress, even after controlling for baseline depression. We also hypothesized that, consistent with prior research, brooding alone in combination with stress would confer risk for depression, whereas reflection and stress would not.

STUDY 1: METHOD

PARTICIPANTS

Participants were 160 college students (mean age: 19.33 years; 57 men, 103 women; 73% Caucasian, 3% African American, 10% Hispanic, 8% Asian, 6% Native American, Alaskan, or Hawaiian) from a mid-sized private university in the Midwestern United States. Participants were recruited by the psychology department’s online extra credit system. Six participants dropped out after the baseline assessment. Thus, a total of 154 participants (53 men, 101 women) were included in the analyses.

MEASURES

Brooding and Reflection. The Ruminative Response Scale (RRS; Nolen-Hoeksema & Morrow, 1991) is a 22-item self-report measure that assesses the constructs of brooding and reflection. Each item is rated from 1 to 4, with 1 corresponding to “Almost Never” and 4 to “Almost Always.” Higher scores represent frequent ruminative tendencies. The Brooding subscale and the Reflection subscale are each composed of 5 items. Example items from the Brooding subscale include “What am I doing to deserve this?” and “Why do I always react this way?” Example items from the Reflection subscale include “Write down what you are thinking about and analyze it” and “Go away by yourself and think about why you feel this way.” The RRS has demonstrated good internal consistency (alphas typically greater than .80; Nolen-Hoeksema & Morrow, 1991) and predictive validity (Nolen-Hoeksema, Parker, & Larson, 1994; Treynor et al., 2003). Internal consistency for the Brooding and Reflection subscales in the current sample were good, with alphas equal to .87 and .86, respectively.

Depressive Symptoms. The Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979) is a widely used 21-item self-report inventory that assesses depressive symptoms. Participants rate symptoms of depression (e.g., negative mood, pessimism, sleep disturbance, etc.) on scales of 0 to 3. Total scores on the BDI can range from 0 to 63, with higher scores indicating greater levels of depressive symptoms. The BDI has high internal consistency (coefficient alpha is typically greater than .8), good test-retest reliability ($r = .60-.83$ for non-psychiatric samples), and validity with both college and psychiatric samples (see Beck, Steer, & Garbin, 1988, for a review). Internal consistency in the current sample was good, with alpha = .84 at baseline and alpha = .90 at time 2.

Stressful Life Events. The Acute Life Events Questionnaire (ALEQ; Haeffel et al., 2007) was used to assess 30 naturally occurring acute stressful life events important to college students. Items assessed a broad range of life events from achievement to interpersonal. Participants were instructed to indicate which of the stressful life events had occurred to them over the previous 5 weeks. Scores can range from 0 to 30, with higher scores indicating the occurrence of more negative events. Prior research indicates that the ALEQ has good reliability (test-retest correlations typically range from .60 to .80; Haeffel, 2010; Haeffel, Rozek, Hames, & Technow, 2012) and predictive validity (Doom & Haeffel, 2013; Haeffel & Vargas, 2011). Internal consistency in the current sample was acceptable, with alpha = .79.

PROCEDURE

Participants completed two assessments separated by 1 month. At time 1, participants completed a measure of brooding and reflection (RRS) and depressive symptoms (BDI). Participants completed the same depression measure as well as a measure of stressful life events (ALEQ) at the 1-month prospective time point.

TABLE 1. Means, Standard Deviations, and Correlations for Study 1

	1	2	3	4	5
1 BDI	—				
2 BROOD	.55	—			
3 REFLECT	.27	.62	—		
4 STRESS	.38	.24	.13	—	
5 BDI T2	.70	.45	.22	.49	—
Mean	5.47	9.67	9.22	1.41	4.93
SD	5.11	3.75	3.40	1.89	5.86

Note. $N = 154$. BDI = Beck Depression Inventory; BROOD = Ruminative Response Survey Brooding subscale at baseline; REFLECT = Ruminative Response Survey Reflection subscale at baseline; STRESS = Acute Life Events Questionnaire at time 2; BDI T2 = Beck Depression Inventory at time 2. Higher scores on BDI, BROOD, REFLECT, and STRESS indicate greater levels of the construct being measured. Correlations in bold are significant at the .05 level.

Participants were given extra credit toward their psychology courses for completing two sessions.

DATA ANALYTIC OVERVIEW

We used hierarchical multiple regression (Cohen, Cohen, West, & Aiken, 2003) to test the hypothesis that the three-way interaction of brooding, reflection, and stress would predict prospective changes in depressive symptoms (BDI score at T2). The baseline depression measure (BDI score at time 1) was entered in the first step of the regression equation to control for initial levels of depression. In the second step, the main effects of brooding, reflection, and stress (RRS Brooding subscale, RRS Reflection subscale, and ALEQ score, respectively) were entered. Next, the two-way interaction terms were entered (brooding \times reflection, brooding \times stress, and reflection \times stress). In the final step, the hypothesized three-way interaction (brooding \times reflection \times stress) was entered. Consistent with the recommendations of Cohen et al. (2003), all continuous independent variables were centered and individual variables within a given set were not interpreted unless the set as a whole was significant, thereby reducing Type I errors. To determine the pattern of a significant three-way interaction, we computed time 2 depressive symptoms scores by inserting specific values for the predictor variable (i.e., 1 SD above and below the mean) into the regression equation. Tests of simple slopes were conducted using the Dawson and Richter (2006) method.

STUDY 1: RESULTS

Descriptive statistics and correlations for the measures are listed in Table 1. The correlation between brooding and reflection was .62, indicating moderate overlap (38% shared variance). To further examine the degree to which the two constructs covary within individuals, we examined quartile rankings of brooding and reflection variables. This resulted in 16 possible brooding-reflection profiles. As shown

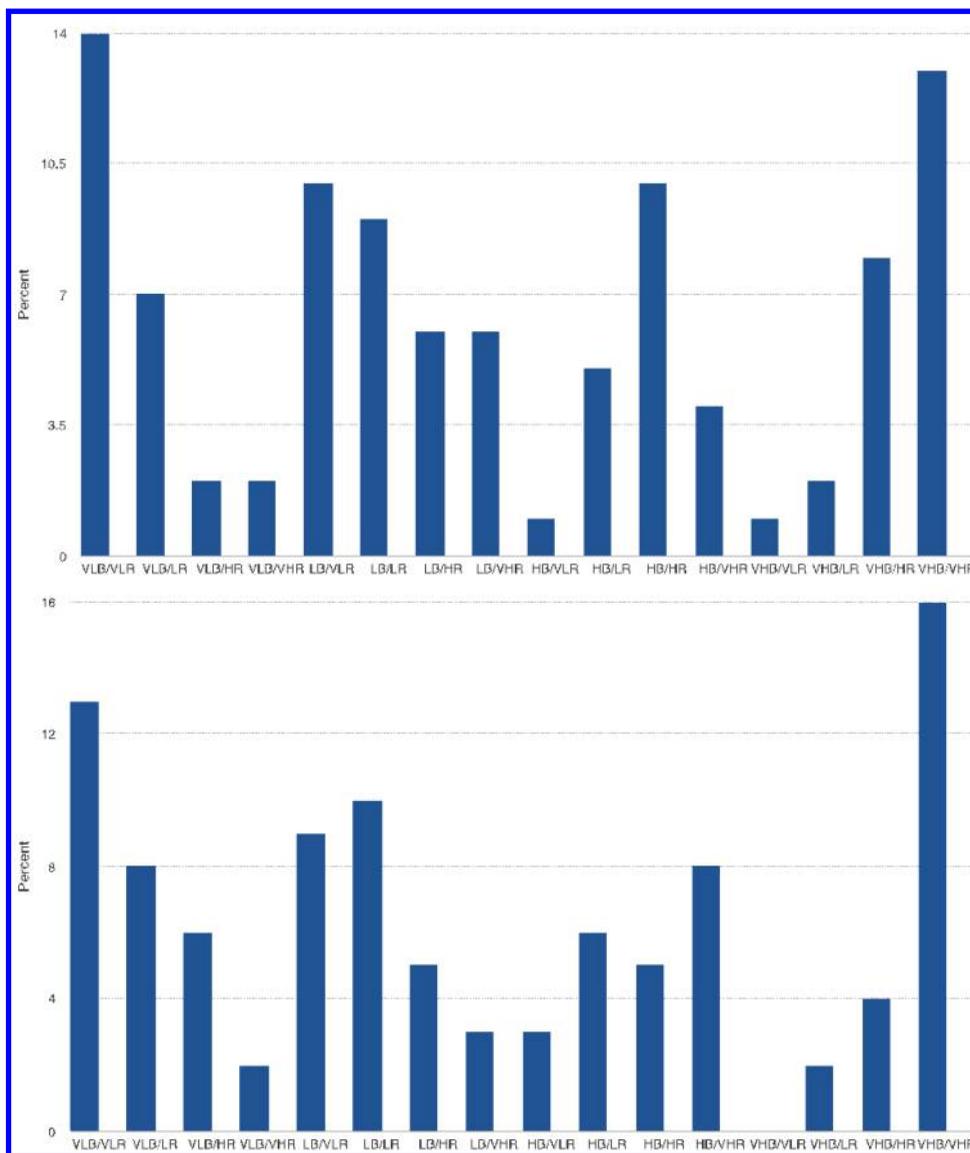


FIGURE 1. Proportion of Participants Exhibiting Each of 16 Brooding/Reflection Profiles. VLB = very low brooding, LB = low brooding, HB = high brooding, VHB = very high brooding, VLR = very low reflection, LR = low reflection, HR = high reflection, VHR = very high reflection. Top panel: study 1; bottom panel: study 2.

in Figure 1, 27% of participants exhibited a match on extreme levels of brooding and reflection (approximately 15% of participants scored in the highest quartile [very high] on both brooding and reflection, and approximately 15% of participants scored in the lowest quartile [very low] on both brooding and reflection). Three quarters of participants exhibited a match on brooding and reflection when moderate levels of brooding and reflection were also considered (35% of participants reported high or very high levels of both brooding and reflection; 40% of

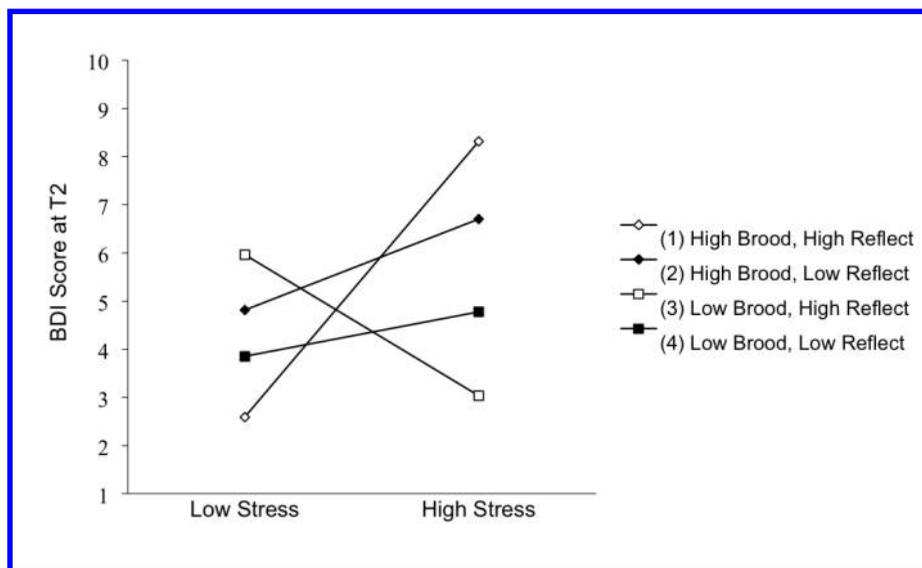


FIGURE 2. Depression Scores at Time 2 (Controlling for Depression Scores at Time 1) as a Function of Brooding, Reflection, and Stress.

participants reported low or very low levels of brooding and reflection). Twenty-five percent of participants exhibited a mismatch on brooding and reflection: approximately 10% of participants reported high/very high levels of brooding and low/very low levels of reflection, and 15% of participants reported high/very high levels of reflection and low/very low levels of brooding. However, it was rare for participants to exhibit an extreme mismatch. Only 3% of participants scored in the highest quartile on one factor and in the lowest quartile on the other factor.

We used hierarchical multiple regression to test the hypothesis that the interaction of brooding, reflection, and stress would predict prospective changes in depressive symptoms when controlling for initial levels of depression. Significant predictors were baseline level of depression ($t = 7.76, p < .001, pr = .54$), level of stress ($t = 4.32, p < .001, pr = .34$), and the two-way interaction of brooding and stress ($t = 3.44, p = .001, pr = .23$). None of the other main effects or two-way interactions was a significant predictor of future depressive symptoms. As predicted, the three-way interaction of brooding, reflection, and stress was significant ($t = 2.07, p = .04, pr = .17$). As can be seen in Figure 2, participants who had high levels of brooding, high levels of reflection, and high levels of stress exhibited the greatest levels of depressive symptoms. Tests of simple slopes showed that, depending on level of stress, those with high levels of brooding and high levels of reflection were significantly different than those with (a) low levels of brooding and high levels of reflection ($t = 4.23, p < .001$), (b) low levels of brooding and low levels of reflection ($t = 3.05, p < .01$), and (c) high levels of brooding and low levels of reflection at the level of a trend ($t = 1.95, p = .05$).

STUDY 2: METHOD

PARTICIPANTS

Participants were 216 college freshmen (mean age = 18) from a private midsized university in the Midwestern United States (see Haeffel & Hames, 2014, for further details about sample and study design). Eighty percent of the sample reported their ethnicity as Caucasian, 9% Hispanic, 6% Asian, 3% African American, and 2% endorsed an “other” category. Eleven participants dropped out after the baseline assessment. Thus, the final sample consisted of 205 participants (124 women, 81 men).

MEASURES

The same measures that were used in study 1 (RRS, BDI, and ALEQ) were also used in study 2. Internal consistency for the Brooding and Reflection subscales in study 2 were good, with alphas equal to .90 and .81, respectively. Internal consistency for the BDI in study 2 was good, with $\alpha = .87$ at both baseline and time 2. Internal consistency for the ALEQ in study 2 was acceptable, with $\alpha = .77$.

PROCEDURE

Freshmen were randomly selected from the university’s freshmen directory and contacted by e-mail, asking if they would like to participate in the study. Freshmen indicated interest in the study by responding affirmatively to the e-mail. Within 1 month of arriving on campus, freshmen completed the first of two online questionnaire sessions (i.e., the baseline assessment). Participants completed a measure of brooding and reflection (RRS) and depressive symptoms (BDI). Participants completed the BDI again 6 months later; they also completed a measure of stressful life events (ALEQ). We paid participants \$10 for completing the two sessions.

DATA ANALYTIC OVERVIEW

In study 2, we used the same statistical approach used in study 1. Hierarchical multiple regression (Cohen et al., 2003) was used to test the hypothesis that the interaction of brooding, reflection, and stress would predict prospective changes in depressive symptoms (BDI score at T2). The baseline depression measure (BDI score at time 1) was entered in the first step of the regression equation to control for initial levels of depression. In the second step, the main effects of brooding, reflection, and stress (RRS Brooding subscale, RRS Reflection subscale, and ALEQ score, respectively) were entered. Next, the two-way interaction terms were entered (brooding \times reflection, brooding \times stress, and reflection \times stress). In the

TABLE 2. Means, Standard Deviations, and Correlations for Study 2

	1	2	3	4	5
1 BDI	—				
2 BROOD	.62	—			
3 REFLECT	.42	.62	—		
4 STRESS	.37	.31	.16	—	
5 BDI T2	.57	.43	.23	.52	—
Mean	5.29	9.09	8.23	2.81	5.34
SD	5.72	3.42	3.26	2.87	5.43

Note. $N = 205$. BDI = Beck Depression Inventory; BROOD = Ruminative Response Survey Brooding subscale at baseline; REFLECT = Ruminative Response Survey Reflection subscale at baseline; STRESS = Acute Life Events Questionnaire at time 2; BDI T2 = Beck Depression Inventory at time 2. Higher scores on BDI, BROOD, REFLECT, and STRESS indicate greater levels of the construct being measured. Correlations in bold are significant at the .05 level.

final step, the hypothesized three-way interaction (brooding \times reflection \times stress) was entered. Consistent with the recommendations of Cohen et al. (2003), all continuous independent variables were centered and individual variables within a given set were not interpreted unless the set as a whole was significant, thereby reducing Type I errors.

STUDY 2: RESULTS

Descriptive statistics and correlations for the measures are listed in Table 2. The correlation between brooding and reflection was .62, indicating moderate overlap (38% shared variance). To further examine the degree to which the two constructs covary within individuals, we examined quartile rankings of brooding and reflection variables. This resulted in 16 possible brooding-reflection profiles. Results confirmed the pattern of profiles found in study 1. As shown in Figure 1, 28% of participants exhibited a match on extreme levels of brooding and reflection (approximately 15% of participants scored in the highest quartile [very high] on both brooding and reflection; approximately 15% of participants scored in the lowest quartile [very low] on both brooding and reflection). Approximately 75% of participants exhibited a match on brooding and reflection when moderate levels of brooding and reflection were also considered (33% of participants reported high or very high levels of both brooding and reflection; 40% of participants reported low or very low levels of brooding and reflection). Twenty-seven percent of participants exhibited a mismatch on brooding and reflection (11% of participants reported high/very high levels of brooding and low/very low levels of reflection; 16% of participants reported high/very high levels of reflection and low/very low levels of brooding). However, it was rare for participants to exhibit an extreme mismatch. Only 2% of participants scored in the highest quartile on one factor and in the lowest quartile on the other factor.

We used hierarchical multiple regression to test the hypothesis that the interaction of brooding, reflection, and stress would predict prospective changes in

depressive symptoms when controlling for initial levels of depression. Significant predictors were baseline level of depression ($t = 5.02, p < .001, pr = .40$), level of stress ($t = 4.73, p < .001, pr = .38$), and the two-way interaction of brooding and stress ($t = -2.14, p = .04, pr = -.18$). None of the other main effects or two-way interactions was a significant predictor of future depressive symptoms. The three-way interaction of brooding, reflection, and stress was significant at the level of a trend, $t = 1.79, p = .07, pr = .16$. Although not significant, the pattern and effect size of the interaction were similar to those found in study 1; participants who had high levels of brooding, high levels of reflection, and high levels of stress exhibited the greatest levels of depressive symptoms.

DISCUSSION

The purpose of this study was to examine how brooding and reflection covary within individuals and how these factors combine to confer risk for depression. We theorized that reflection would amplify the depressogenic effects of brooding because having high levels of both types of rumination would be an indicator of extreme levels of self-focus. The results of two studies generally supported this hypothesis. Results showed that approximately 35% of individuals have the tendency to both brood and reflect (about 25% have mixed levels, and about 40% neither brood nor reflect). Consistent with hypotheses, those who had high levels of brooding and reflection tended to report the greatest levels of depressive symptoms after experiencing high levels of stress. Although the significance of study 2 results was only at the level of a trend, the effect size and pattern were the same as the significant interaction effect found in study 1.

The effect size for the interaction of brooding, reflection, and stress was small. This suggests that it may not be useful for clinicians to consider reflection in addition to brooding when treatment planning. However, the findings are still important from a theoretical perspective. Our results are among the first to directly examine within-person variation of brooding and reflection. Approximately 75% of individuals have matching levels of brooding and reflection (i.e., people reported high levels of both brooding and reflection or low levels of both). However, there were a significant number of individuals who exhibited a mismatch between their tendency to brood and their tendency to reflect (although extreme mismatches were rare; see also Valderrama, Miranda, & Jeglic, 2016). These results indicate that brooding and reflection can covary within individuals and it is inaccurate to think of individuals as either mainly brooders or mainly reflectors.

The results also call into question the notion that reflection is an adaptive response to negative moods and stress. Our results suggest that, at best, reflection has no association with future depression and, at worst, it has the potential to increase risk for depression when combined with brooding and stress. The current results may help to explain inconsistencies in research on reflection. Our results suggest that the association of reflection with future depressive outcomes depends

on the level of brooding in the sample. In samples comprised of individuals with high levels of brooding, reflection is likely to be associated with depression. However, in samples, with low levels of brooding, reflection has no association with future depression. Thus, by examining brooding and reflection independently, prior research was not fully capturing the complexity of how ruminative components behave in individuals.

This research had a number of strengths. A significant strength of the present work is the use of two independent studies to test our theory. Using two studies enabled us to provide internal replication of our findings. The current research also included a measure of stress, which allows for a more rigorous test of response style theory's diathesis stress hypotheses (i.e., the depressogenic effects of rumination are most likely to occur under the conditions of stress). Prior research has tended to ignore the stress component of this model by examining only main effects of ruminative components. Our set of studies also provides further evidence for the potency of brooding in predicting future depression. In both studies, the two-way interaction of brooding and stress was significant, with effect sizes in the small to medium range. A final strength of the current study is that the hypotheses were specific, falsifiable, and limited in number. We presented a hypothesis for how brooding and reflection would combine to predict future levels of depressive symptoms that was easy to subject to the "grave danger of refutation" (Meehl, 1978, p. 806). It is critical to construct theories that are falsifiable because many philosophers of science argue that scientific progress occurs through the refutation of theories (Meehl, 1978; Popper, 1959).

There were a number of limitations to this study. First, it would be premature to make conclusions about clinically significant forms of depression because the current studies assessed only depressive symptoms. Second, the studies examined college freshmen. Although freshmen are ideal for testing cognitive theories of depression because they are at the peak age for developing depression (Hankin et al., 1998) and are likely to experience high levels of stress, the results may not generalize to community or clinical samples. Finally, both studies used correlational longitudinal designs. This design allowed us to establish temporal precedence for brooding and reflection as risk factors, but it did not allow us to make causal conclusions. It will be important for future work to manipulate brooding and reflection to determine the causal influence of these factors alone and in combination.

In conclusion, this study examined how brooding and reflection covary within individuals and how they combine to confer risk for depressive symptoms. Results showed that reflection can have a small amplifying effect on brooding under conditions of stress. These results indicate that the associations among brooding, reflection, and depressive symptoms are more complex than originally thought. These results advance theory on how rumination is conceptualized and clarify the context in which reflection can be maladaptive.

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