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# RUMINATION AND PROSPECTIVE CHANGES IN DEPRESSIVE SYMPTOMS

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According to the response styles theory (Nolen-Hoeksema, 1991), rumination contributes to both the development and maintenance of depressive symptoms. In this study, we examined the vulnerability and maintenance hypotheses in a multi-wave prospective study of young adults with levels of negative events and depressive symptoms assessed every week for 7 weeks. We found no support for the vulnerability hypothesis. Specifically, levels of rumination (brooding or reflective rumination) did not moderate the link between weekly negative events and weekly changes in depressive symptoms. In contrast, we did find support for the maintenance hypothesis. Specifically, levels of brooding and reflective rumination were related to elevated depressive symptom levels across the follow-up. Consistent with previous research, the magnitude of the effect for brooding was stronger than that for reflective rumination.

According to the response styles theory (Nolen-Hoeksema, 1991), a tendency to ruminate in response to a depressed mood (i.e., a ruminative response style) is hypothesized to increase both the duration and severity of depressive reactions to negative events. Rumination has been defined as repetitively focusing on the fact that one is depressed, one's symptoms of depression, and the causes, meanings, and consequences of one's depressive symptoms. A ruminative response to depressive affect is hypothesized to contribute to the de-

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velopment and maintenance of depression, by escalating the effects of initial negative mood on thinking (making negative cognitions more accessible) and by reducing functional behaviours such as active problem solving or behaviours that allow for positive reinforcement.

There is increasing support for the hypotheses of the response styles theory (for reviews, see Nolen-Hoeksema, 2002, 2004). In a number of these studies, however, it is unclear whether rumination contributed to the development of depressive symptoms, the maintenance of those symptoms, or both (e.g., Broderick & Korteland, 2004; Burwell & Shirk, 2007; Nolen-Hoeksema & Morrow, 1991; Schwartz & Koenig, 1996). Findings from studies that have directly compared the development and maintenance hypotheses have yielded mixed results. For example, whereas some studies have found stronger support for rumination in the development than in the maintenance of depression (e.g., Just & Alloy, 1997; Nolen-Hoeksema, Stice, Wade, & Bohon, 2007), others have found that rumination is more strongly linked to maintenance than development (e.g., Nolan, Roberts, & Gotlib, 1998; Nolen-Hoeksema, Morrow, & Fredrickson, 1993; Singer & Dobson, 2007), and a few studies have found support for both (Nolen-Hoeksema, 1991; Nolen-Hoeksema, 2000; Nolen-Hoeksema, Parker, & Larson, 1994; Roberts, Gilboa, & Gotlib, 1998).

One potential reason for these mixed findings is that most previous prospective studies have included only two assessment points (e.g., Burwell & Shirk, 2007; Nolan et al., 1998; Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 1994; Schwartz & Koenig, 1996), which allows a relatively poor examination of change (see Willett, 1989). In addition, these studies have focused on whether rumination assessed at the initial time point predicts residual change in depressive symptoms over the follow-up without explicitly examining whether rumination predicts equally well for participants exhibiting high versus low depressive symptoms at the initial assessment (for notable exceptions, see Nolan et al., 1998; Nolen-Hoeksema et al., 1994). Using this approach, one cannot determine whether rumination is associated with residual change in depressive symptoms among those experiencing low levels of depressive symptoms at the initial assessment (development) versus those initially experiencing high depressive symptom levels (maintenance; cf. Joiner, 1994). Another limitation of the two time point design in studies testing

the vulnerability-stress hypothesis is that this approach focuses exclusively on between-subject differences in negative life events and assumes that the relation between negative events and changes in depressive symptoms is the same for each participant. However, a negative life event score of 10, for example, may represent a significant increase for one participant, but a significant decrease for another participant. In this example, only the first participant would be expected to have an increase in depressive symptoms, but the typical method of analysis would treat both participants equivalently. In the current study, therefore, negative events and depressive symptoms were assessed repeatedly over time and hierarchical linear modeling (HLM) was used to analyze the data. This approach allows one to examine within-subject variations in the link between weekly negative events and changes in depressive symptoms, as well as between-subject differences in the role of rumination moderating this link (Raudenbush & Byrk, 2002; Raudenbush, Bryk, Cheong, & Congdon, 2004).

Another limitation of previous studies is that the majority used an older measure of rumination (Ruminative Response Scale; Nolen-Hoeksema & Morrow, 1991), which has been criticized for containing items that overlapped with measures of depressive symptoms (Conway, Csank, Holm, & Blake, 2000; Segerstrom, Tsao, Aldon, & Craske, 2000). It is unclear, therefore, whether the relations between rumination and depression observed in previous studies were truly due to an association between the two constructs or whether they were merely a function of item-overlap. Given this criticism, the Ruminative Response Scale was recently revised, with those items that may be confounded with depressive symptoms removed (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). In addition, the rumination scale was shown to load on two distinct factors: brooding and reflection. The brooding subscale is defined as a kind of maladaptive moody pondering and is therefore hypothesized to be more indicative of depression. Reflection is defined as being less suggestive of depressive symptoms and more a function of contemplation and even coping, making it perhaps less maladaptive. In a re-analyses of previous data, Treynor and colleagues found that brooding rumination, and not reflection, predicted changes in depressive symptoms over time. This revised measure, therefore, may provide a stronger test of the response styles theory, while minimizing the confound with depressive symptoms and providing a more focused examina-

tion of the role of maladaptive rumination (i.e., brooding). The current study focused on this new measure of rumination, specifically the brooding and reflection subscales.

The primary goal of the current project, therefore, was to provide a prospective test of development and maintenance hypotheses derived from the response styles theory of depression. In terms of the development hypotheses, research has suggested that all individuals, regardless of level of cognitive vulnerability, tend to exhibit depressive symptom increases on days with concurrent increases in negative events (see Hilsman & Garber, 1995; Metalsky, Halberstadt, & Abramson, 1987; Metalsky, Joiner, Hardin, & Abramson, 1993). These studies have also shown that the severity and duration of these depressive symptom elevations are greater for individuals exhibiting a cognitive vulnerability to depression. Therefore, because the response styles theory focuses on rumination in response to dysphoric mood, we hypothesized that individuals with elevated levels of rumination, particularly brooding, would show stronger depressive reactions following negative events than would low ruminators. In terms of our analysis plan, this would be demonstrated by a significant cross-level interaction of rumination on the relation between weekly negative events and weekly changes in depressive symptoms.

In testing the maintenance hypothesis, we predicted that elevated levels of rumination, specifically brooding, at the initial assessment point would be associated with higher depressive symptom levels across the follow-up. Specifically, we predicted that levels of rumination would moderate the depressive symptom intercept, but not the linear slope in our hierarchical linear models. Finally, given that the response styles theory was originally developed to explain the elevated prevalence of depression among women, we tested for sex differences in each of the variables as well as whether participant sex moderated any of the relations examined.

## METHOD

### PARTICIPANTS

Participants in this study ($n$ = 83) were a subset of undergraduates participating in a larger study of cognition and depression ($n$ = 108).

The 83 participants included in the current study were those who completed at least 4 of the 7 assessments. Participants included in this study did not differ from those excluded because of missing data on any study variables. Of the 83 participants in this study, 58 were women and 25 were men. Participants' mean age was 19.41 years (*SD* = 4.21). Of these, 60.2% were Caucasian, 21.7% were Asian, 7.2% were African American, 4.8% were Hispanic and 6.0% were either from another ethnic group or did not report their ethnicity. The racial distribution of the sample is representative of the broader university population.

## MEASURES

Rumination was measured using the Ruminative Response Scale (RRS; Nolen-Hoeksema & Morrow, 1991; Treynor et al., 2003). The RRS is a self-report questionnaire that asks participants to rate the frequency with which they think or do certain things when they feel sad, down, or depressed (e.g., Go some place alone to think about your feelings). The statements are rated on a 4-point Likert-type scale from *almost always* to *almost never*. The brooding and reflection subscales are both composed of 5 items. Both subscales have exhibited adequate internal consistency ($\alpha$s = .77 and .72 for brooding and reflection, respectively) and retest reliability over one-year ($r$ = .62 and .60 for brooding and reflection, respectively). In the current study, the internal consistencies ($\alpha$) for the brooding and reflection subscales were .80 and .83, respectively.

Negative life events were assessed using the Hassles Scale from the Hassles and Uplifts questionnaire (DeLongis, Folkman, & Lazarus, 1988). A measure of hassles rather than major life events was used because few subjects were expected to have major negative life events occur from week to week. The hassles scale consists of 53 items and participants were asked to answer whether each event had happened in the past week, and if so, how negative each item was for them in the past week. Examples of items include family obligations, your supervisor, clients and customers, and having enough

1. We should note that the pattern of significant results obtained using the subjective impact ratings from the hassles scale was identical to that obtained using frequency counts

money for things. The number of events endorsed each week, rather than the sum of the subjective impact ratings, were used for all analyses to minimize the potential confound with depressive symptoms.[1] In the current study, the internal consistency of the hassles scale ranged from $\alpha = .88$ to .93 across the 7 time points.

Depressive symptoms were measured with the Beck Depression Inventory-Second Edition (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report questionnaire and each item is rated on a 4-point Likert-type scale. Total scores on the BDI-II range from 0 to 63, with higher scores indicating more severe depressive symptoms. Scores less than 19 are considered mild, scores between 20 and 28 are considered moderate, and scores of 29 and above are considered to reflect severe depressive symptoms. The reliability and validity of the BDI-II have been supported in both clinical and nonclinical samples (Beck et al. 1996). In the current study, the BDI-II exhibited excellent reliability across each of the assessments ($\alpha$ ranged from .91 to .96).

### PROCEDURE

Participants were recruited from undergraduate psychology classes. They received course credit for the initial assessment and $10 for their participation in the six follow-up assessments. At Time 1, participants completed the Rumination Response Scale, Hassles Scale, and BDI-II in the laboratory. Participants then completed the Hassles Scale and BDI-II via a secure website once per week for six weeks. The secure website allowed the participants flexibility in completing the measures while still providing researchers with the exact time and date of their completion. Questionnaires completed more than one day after they were due were omitted from analyses.

## RESULTS

Means and standard deviations of study variables can be found in Table 1 and correlations among study variables are presented in Table 2. The percentage of participants reporting at least moderate de-

**TABLE 1. Means (and Standard Deviations) for Study Variables**

| Variable | T1 | T2 | T3 | T4 | T5 | T6 | T7 |
|---|---|---|---|---|---|---|---|
| RRS-Brooding | 3.15 (.54) | —- | —- | —- | —- | —- | —- |
| RRS-Refection | 3.05 (.55) | —- | —- | —- | —- | —- | —- |
| BDI-II | 12.96 (10.04) | 9.66 (8.04) | 8.91 (8.86) | 9.66 (10. 60) | 9.91 (10.11) | 9.63 (10.78) | 7.94 (8.96) |
| Hassles | 19.53 (7.64) | 19.05 (8.84) | 17.64 (8.84) | 15.90 (8.92) | 14.54 (7.99) | 13.61 (8.27) | 13.20 (9.39) |
| *n* | 83 | 78 | 80 | 81 | 76 | 71 | 75 |

*Note*. RRS-Brooding = Rumination Response Scale-Brooding Subscale. RRS – Reflection = Rumination Response Scale-Reflection Subscale. BDI-II = Beck Depression Inventory-II.

**TABLE 2. Correlations Among Time 1 Variables**

| Variable | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1. Sex | - | | | |
| 2. RRS-Brooding | .12 | - | | |
| 3. RRS-Reflection | -.06 | .51** | - | |
| 4. BDI-II | .07 | .64** | .23* | - |
| 5. Hassles | -.07 | .15 | .06 | .27* |

*Note*. Sex was coded as 0 = men, 1 = women. RRS-Brooding = Rumination Response Scale, Brooding subscale. RRS-Reflection = Rumination Response Scale, Reflection subscale. BDI-II = Beck Depression Inventory-II. Hassles = Hassles Scale. *$p < .05$. **$p < .01$.

pressive symptoms (BDI-II score ≥20) at each time point was 17.3%, 10.7%, 8.3%, 12.8%, 15.1%, 12.2%, and 10.5% for weeks 1-7, respectively. Preliminary analyses were conducted to examine whether there were any sex differences in the study variables (brooding, reflection, BDI-II, and hassles) and none of these analyses were significant (lowest $p = .21$).

Of the 581 assessments completed for this project (83 participants x 7 assessments points), 565 were completed on time (i.e., completed within 1 day of date due). Of the 12 participants with at least one missing data point, 8 participants missed 1 assessment, 3 participants missed 2 assessments, and 1 participant missed 3 assessments. Given the presence of some missing data, we next examined whether data were missing at random, thereby justifying the use of data imputation methods for estimating missing values (cf. Shafer & Graham, 2002). First, we examined whether participants with missing data differed significantly from those with complete data on any of the Time 1 variables and none of these analyses was significant (lowest $p = .35$). Second, Little's missing completely at random (MCAR) test, for which the null hypothesis is that the data are MCAR (Little & Rubin, 1987) was nonsignificant, $\chi^2(420) = 437.21$, $p = .27$, supporting the imputation of missing values. Given this, maximum likelihood estimates of missing data were created as part of the HLM program and used in all subsequent analyses (see Shafer & Graham, 2002).

We next tested the vulnerability-stress (development) hypothesis that initial levels of rumination would moderate the relation between weekly experiences of negative events and changes in depressive symptoms from week to week. The Level 1 (within subject) model focused on the relation between negative life events and de-

pressive symptom change for each participant individually, and the Level 2 (between subjects) model allowed us to examine whether rumination moderated any of the relations in Level 1.

The Level 1 model used to test the vulnerability-stress hypothesis was:

$$\text{BDI-II}_{tij} = \pi_{0j} + \pi_{1j}(\text{BDI-II}_{t\text{-}1ij}) + \pi_{2j}(\text{Hassles}_{tij}) + e_{ij}$$

where $\text{BDI-II}_{tij}$ represents the BDI-II score at time $t$ for week $i$ for participant $j$, $\pi_{0j}$ is the BDI-II intercept at time $t$ for participant $j$, and $\pi_{1j}$ is the slope of the relation between BDI-II scores at time $t - 1$ and BDI-II scores at time $t$ for participant $j$. We included BDI-II scores at time $t$ -1 as a covariate in the level 1 model to examine residual change in each participant's depressive symptom levels from week to week. $\pi_{2j}$ is the slope for the relation between hassles at time $t$ and changes in BDI-II scores from time $t - 1$ to time $t$ for participant $j$, and $e_{ij}$ represents the error term for participant $j$ at week $i$.

The Level 2 (between-subject) model used to test the vulnerability-stress hypothesis was:

$$\pi_{0j} = \beta_{00} + \beta_{01}(\text{Rumination}) + r_{0j}$$

$$\pi_{1j} = \beta_{10} + \beta_{11}(\text{Rumination}) + r_{1j}$$

$$\pi_{2j} = \beta_{20} + \beta_{21}(\text{Rumination}) + r_{2j}$$

where $\beta_{01}$ is the cross level interaction term representing the effect of rumination on the BDI-II intercept at time $t$ and $\beta_{11}$ is the cross level interaction term representing the effect of rumination on the slope of the relation between BDI-II scores at time $t - 1$ and BDI-II scores at time $t$ from week to week. The primary statistic of interest in this study is $\beta_{21}$, the cross-level interaction term representing the effect of rumination on the slope of the relation between hassles during week $t$ and changes in BDI-II scores from week $t - 1$ to week t. Finally, $\beta_{00}$, $\beta_{10}$, and $\beta_{20}$ represent the intercepts of their respective equations and $r_{0j}$, $r_{1j}$, and $r_{2j}$ represent the error terms.

These analyses yielded no support for the vulnerability-stress hypothesis. Specifically, neither brooding rumination nor reflective rumination moderated the relation between hassles at time $t$ and changes in BDI-II scores from time $t - 1$ to time $t$ (see Tables 3 and 4).

**TABLE 3. Summary of Vulnerability-Stress Analysis with Brooding Rumination**

| Fixed Effect | Coefficient | SE | t | $r_{effect\ size}$ |
|---|---|---|---|---|
| BDITime T Intercept ($\pi_0$) | | | | |
| Intercept ($\beta_{00}$) | 1.30 | 0.75 | 1.72 | .19 |
| RRS-Brooding ($\beta_{01}$) | 1.52 | 1.40 | 1.09 | .12 |
| BDITime T-1 ($\pi_1$) | | | | |
| Intercept ($\beta_{10}$) | 0.47 | 0.07 | 7.16*** | .62 |
| RRS-Brooding ($\beta_{11}$) | -0.04 | 0.11 | -0.41 | -.04 |
| HasslesTime T ($\pi_2$) | | | | |
| Intercept ($\beta_{20}$) | 0.17 | 0.05 | 3.56*** | .37 |
| RRS-Brooding ($\beta_{21}$) | 0.13 | 0.11 | 1.26 | .14 |

*Note*. BDI-II = Beck Depression Inventory-II. RRS-Brooding = Rumination Response Scale-Brooding Subscale. *** $p < .001$

Although we also examined whether participants' sex moderated either of the vulnerability-stress relations tested, neither of these effects was significant (lowest $p = .56$).

We then examined the maintenance hypothesis by examining the potential main effect of rumination on participants' depressive symptom trajectories across the follow-up. The Level 1 model for these analyses was:

$$\text{BDI-II}_{ij} = \pi_{0j} + \pi_{1j}(\text{Time}) + e_{ij}$$

where $\text{BDI-II}_{ij}$ represents the BDI-II score on week i for participant j, $\pi_{0j}$ is the BDI-II intercept (BDI-II score at the initial assessment point), $\pi_{1j}$ is the slope of the linear relation between Time (in weeks) and BDI-II scores across the follow up for participant *j*, and $e_{ij}$ represents the error term.

The Level 2 was:

$$\pi_{0j} = \beta_{00} + \beta_{01}(\text{Rumination}) + r_{0j}$$

$$\pi_{1j} = \beta_{10} + \beta_{11}(\text{Rumination}) + r_{1j}$$

where $\beta_{01}$ is the cross-level interaction term representing the effect of brooding rumination on the BDI-II intercept and $\beta_{11}$ is the cross level

**TABLE 4. Summary of Vulnerability-Stress Analysis with Reflective Rumination**

| Fixed Effect | Coefficient | SE | t | $r_{\text{effect size}}$ |
|---|---|---|---|---|
| BDITime T Intercept ($\pi_0$) | | | | |
| Intercept ($\beta_{00}$) | 0.61 | 0.62 | 1.00 | .11 |
| RRS-Reflection ($\beta_{01}$) | 0.74 | 0.93 | 0.79 | .09 |
| BDITime T-1 ($\pi_1$) | | | | |
| Intercept ($\beta_{10}$) | 0.54 | 0.06 | 9.66*** | .73 |
| RRS-Reflection ($\beta_{11}$) | -0.01 | 0.10 | -0.07 | -.01 |
| HasslesTime T ($\pi_2$) | | | | |
| Intercept ($\beta_{20}$) | 0.18 | 0.05 | 3.78*** | .39 |
| RRS-Reflection ($\beta_{21}$) | -0.02 | 0.09 | -0.26 | -.03 |

*Note*. BDI-II = Beck Depression Inventory-II. RRS-Reflection = Rumination Response Scale-Reflection Subscale. ***$p < .01$

interaction term representing the effect of brooding rumination on the slope of the relation between Time and BDI-II scores. Finally, $\beta_{00}$ and $\beta_{10}$ represent the intercepts of their respective equations and $r_{0j}$ and $r_{1j}$ represent the error terms.

Support for the maintenance hypothesis was obtained for both brooding rumination and reflective rumination. Specifically, as can be seen in Table 5, brooding rumination was significantly related to the BDI-II intercept, $t(81) = 6.20$, $p < .001$, $r_{effect\ size} = .57$, indicating that higher levels of brooding rumination were associated with higher depressive symptoms at the initial assessment. In addition, although there was an overall decrease in depressive symptoms across the follow-up, $t(81) = -4.18$, $p < .001$, $r_{effect\ size} = .42$, which is a common pattern in multi-wave longitudinal studies (c.f. Kwon & Laurenceau, 2002) brooding rumination did not moderate the time slope, $t(81) = -1.42$, $p = .16$, $r_{effect\ size} = .16$. This suggests that the magnitude of the brooding effects did not significantly change over the course of the follow-up (see Figure 1). Similarly, reflective rumination was related to the BDI-II intercept, $t(81) = 2.12$, $p = .04$, $r_{effect\ size} = .23$, but not the time slope, $t(81) = -0.58$, $p = .57$, $r_{effect\ size} = .06$ (see Table 6 and Figure 2), suggesting that reflective rumination was also associated with the maintenance of depressive symptoms across the follow-up. We should note that although both brooding and reflective rumination were associated with the maintenance of depressive symptoms, consistent with previous studies (e.g., Treynor et al., 2003), the effect was stronger for brooding rumination than for

**TABLE 5. Summary of Analysis Examining Maintenance Effects of Brooding Rumination**

| Fixed Effect | Coefficient | SE | t | $r_{\text{effect size}}$ |
|---|---|---|---|---|
| BDITime T Intercept ($\pi_0$) | | | | |
| Intercept ($\beta_{00}$) | 11.03 | 0.78 | 14.06*** | .84 |
| RRS-Brooding ($\beta_{01}$) | 9.41 | 1.52 | 6.20*** | .57 |
| Time ($\pi_1$) | | | | |
| Intercept ($\beta_{10}$) | -0.54 | 0.13 | -4.18*** | .42 |
| RRS-Brooding ($\beta_{11}$) | -0.37 | 0.26 | -1.42 | -.16 |

*Note*. BDI-II = Beck Depression Inventory-II. RRS-Brooding = Rumination Response Scale-Brooding Subscale. ***$p < .001$.

reflective rumination. Specifically, whereas reflective rumination was associated with a small to medium-sized effect upon depressive symptom maintenance (BDI-II intercept; $r_{effect\ size} = .23$), brooding rumination was associated with a large effect ($r_{effect\ size} = .57$). To further examine the relative predictive validity of brooding versus reflective rumination, we entered both forms of rumination together in the same HLM model. In this analysis, brooding, $t(80) = 6.18$, $p < 0.001$, $r_{effect\ size} = .57$, but not reflection $t(80) = -1.68$, $p = .10$, $r_{effect\ size} = -.19$, was significantly related to the depressive symptom intercept and neither was related to the time slope (lowest $p = .20$). However, the pattern of these results suggests the presence of a suppressor effect (see Cohen & Cohen, 1983) in that the sign of the relation between reflective rumination and the BDI-II intercept reversed from positive to negative once brooding was included in the model. Given this, the results of this analysis should be interpreted with caution. Finally, although we also examined whether participant sex would moderate the maintenance effects of brooding or reflective rumination, these analyses were not significant (lowest $p = .07$) suggesting that the maintenance effects of brooding and reflective rumination did not differ significant for women versus men.

## DISCUSSION

The primary goal of the current study was to test development and maintenance hypotheses derived from the response style theory of depression (Nolen-Hoeksema, 1991). Contrary to the development hypothesis, there was no evidence that levels of rumination (brood-

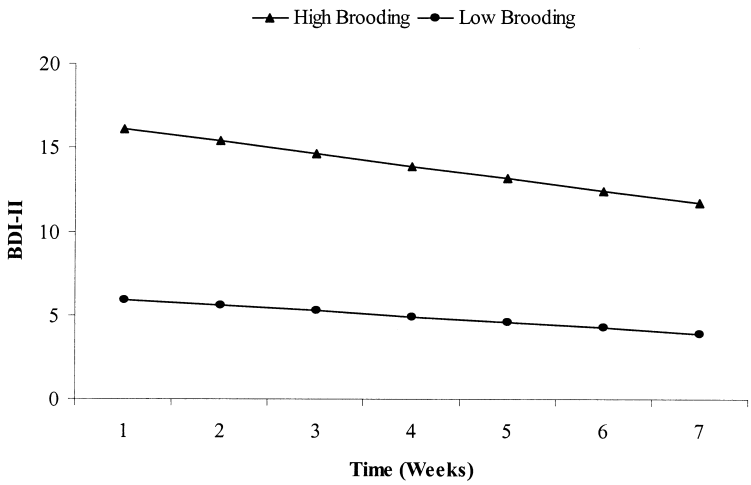


FIGURE 1. Maintenance effect of brooding rumination on depressive symptoms . BDI-II = Beck Depression Inventory-II.

ing or reflective rumination) moderated the link between weekly negative events and prospective changes in depressive symptoms. We did, however, find support for the maintenance hypothesis. Specifically, elevated levels of brooding and reflective rumination at the initial assessment point were associated with higher depressive symptoms across the follow-up, though the maintenance effects were stronger for brooding than for reflective rumination.

The current lack of support for the development hypothesis is in contrast to the results of several previous studies (e.g., Just & Alloy, 1997; Nolen-Hoeksema, 1991; Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 1994; Nolen-Hoeksema et al., 2007; Roberts et al., 1998; however, see also Sarin, Abela, & Auerbach, 2005). Although the reason for this discrepancy is unclear, it is interesting to note that studies examining the development of both symptoms and diagnoses of depression have found stronger support for rumination contributing to the development of diagnoses (Nolen-Hoekema, 2000; Nolen-Hoeksema et al., 2007). Another potential reason for our lack of support for the development hypothesis is that the 1-week lag between assessments used in the current study may not have allowed enough time for the occurrence of a major stressor or an accumula-

**TABLE 6. Summary of Analysis Examining Maintenance Effects of Reflection Rumination**

| Fixed Effect | Coefficient | SE | t | $r_{effect\ size}$ |
|---|---|---|---|---|
| BDITime T Intercept ($\pi_0$) | | | | |
| Intercept ($\beta_{00}$) | 11.03 | 0.95 | 11.63*** | .79 |
| RRS-Reflection ($\beta_{01}$) | 3.03 | 1.43 | 2.12* | .23 |
| Time ($\pi_1$) | | | | |
| Intercept ($\beta_{10}$) | -0.54 | 0.13 | -4.15*** | .42 |
| RRS-Reflection ($\beta_{11}$) | -0.14 | 0.24 | -0.58 | -.06 |

*Note*. BDI-II = Beck Depression Inventory-II. RRS-Reflection = Rumination Response Scale- Reflection Subscale. *$p < .05$. ***$p < .001$.

tion of smaller negative events. Future studies testing the development hypothesis may, therefore, wish to focus on longer follow-up intervals.

Despite the lack of support for the development (vulnerability-stress) hypothesis, the current results add to a growing body of research supporting the role of rumination in the maintenance of depression (e.g., Nolan et al., 1998; Nolen-Hoeksema, 1991, 2000; Nolen-Hoeksema et al., 1993; Nolen-Hoeksema et al., 1994; Roberts et al., 1998; Singer & Dobson, 2007). The current results are also consistent with previous findings suggesting that brooding rumination may be more maladaptive than reflective rumination (Burwell & Shirk, 2007; Gortner, Rude, & Pennebaker, 2006; Joormann, Dkane, & Gotlib, 2006; Miranda & Nolen-Hoeksema, 2007; Treynor et al., 2003). In combination with these findings from previous research, the current results support the potential utility of treatment interventions that specifically target individuals' levels of rumination (e.g., Watkins et al., 2007) and suggest that these interventions should focus on reducing patients' levels of brooding rumination (cf. Gortner et al., 2006).

Strengths of the current study include its prospective multi-wave design and its focus on both within- and between-subject levels of analysis. The study also exhibited some limitations, which should be noted. One limitation was the reliance upon participants' self-report in assessing rumination, negative life events, and levels of depressive symptoms, which may have inflated the relations among these variables. Future studies should seek to supplement participants' self report with other forms of assessing negative events and

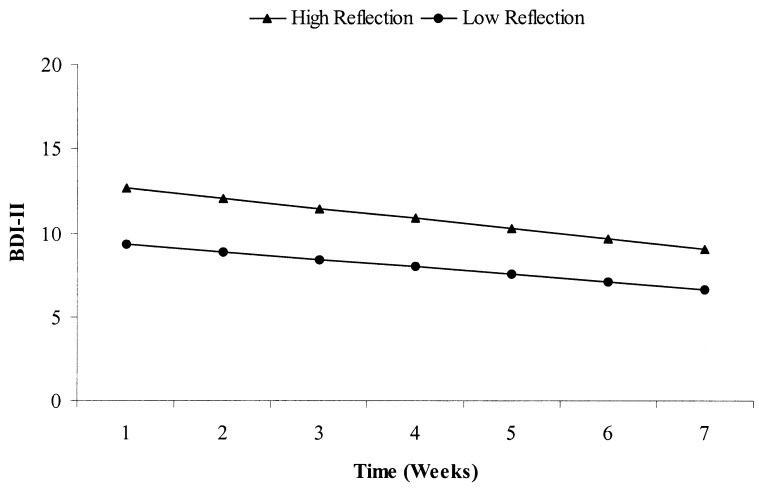


FIGURE 2. Maintenance effect of reflective rumination on depressive symptoms. BDI-II = Beck Depression Inventory-II.

depressive symptoms (e.g., structured interviews). Another potential limitation was the use of an undergraduate sample with relatively low levels of depressive symptoms. Therefore, future studies are needed to determine whether the current results will generalize to samples with more severe symptoms, or to individuals of different ages. This said, previous studies have provided support for the response styles theory in children, adolescents, and adults (for a review, see Nolen-Hoeksema, 2004). Although future research is also needed to determine whether the current results for brooding rumination extend to the maintenance of depressive diagnoses, previous research has supported the role of rumination more broadly in the maintenance of major depression (e.g., Nolan et al., 1998; Nolen-Hoeksema, 1991; Nolen-Hoeksema, 2000).

In summary, the current results provide further support for the maintenance hypothesis of the response styles theory, particularly the role of brooding rumination in maintaining levels of depressive symptoms. The current results also add to a growing body of research suggesting that brooding rumination may be more maladaptive than reflective rumination. As such, they provide further argument for the development of interventions to directly target levels

of rumination in treating depression and suggest that brooding rumination may be a particularly important focus of these interventions.

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