

Rumination Reconsidered: A Psychometric Analysis

Wendy Treynor,^{1,2} Richard Gonzalez,¹ and Susan Nolen-Hoeksema¹

In an attempt to eliminate similar item content as an alternative explanation for the relation between depression and rumination, a secondary analysis was conducted using the data from S. Nolen-Hoeksema, J. Larson, and C. Grayson (1999). After constructing a measure of rumination unconfounded with depression content, support for a two factor model of rumination was found. These analyses indicate that the 2 components, reflective pondering and brooding, differentially relate to depression in terms of predictive ability and gender difference mediation. The results presented here support the general premise of Nolen-Hoeksema's Response Styles Theory (S. Nolen-Hoeksema 1987) that rumination can contribute to more depressive symptoms and to the gender difference in depression, but suggest important refinements of the theory. Such refinements include the need to differentiate between the reflective pondering component of rumination and the brooding component in rumination research.

KEY WORDS: depression; rumination; psychometrics.

She sat by the window, looking inward rather than looking out. Her thoughts were consumed with her sadness. She viewed her life as a broken one, and yet she could not place her finger on the exact moment it fell apart. “How did I get to feel this way?” she repeatedly asked herself. By asking, she hoped to transcend her depressed state; through understanding, she hoped to repair it. Instead, her questions led her deeper and deeper inside herself—further away from the path that would lead to her recovery.

Rumination is a method of coping with negative mood that involves self-focused attention (Lyubomirsky & Nolen-Hoeksema, 1993). According to Response Styles Theory (RST; Nolen-Hoeksema, 1987), it is characterized by self-reflection (Morrow & Nolen-Hoeksema, 1990) as well as a repetitive and passive focus on one's negative emotions (Nolen-Hoeksema, 1991, 2000; Nolen-Hoeksema, Larson, & Grayson, 1999; Nolen-Hoeksema, Parker, & Larson, 1994). Siegle, Steinhauer, Carter,

¹University of Michigan, Ann Arbor, Michigan.

²Correspondence should be directed to Wendy Treynor, Department of Psychology, University of Michigan, 525 East University Avenue, Ann Arbor, Michigan 48109; e-mail: wtreyndor@umich.edu.

and Thase (2003) found that rumination is associated with some physiological measures of elaboration of negative information. Numerous experimental and correlational studies have shown that rumination predicts greater depressive symptoms, predicts the onset of major depressive episodes, and mediates the gender difference in depressive symptoms (Just & Alloy, 1997; Kuehner & Weber, 1999; Nolan, Roberts, & Gotlib, 1998; Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 1994, 1999; Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema, Morrow, & Fredrickson, 1993; Roberts, Gilboa, & Gotlib, 1998; Wood, Saltzberg, Neale, Stone, & Rachmiel, 1990).

Studies of the RST have typically measured ruminative coping using the Ruminative Responses Scale (RRS), a self-report measure of rumination (see Table I). Some of the items on the scale appear to overlap with items on measures of depressive symptomatology. When measures of any two constructs contain overlapping items there exists an alternative explanation for the observed correlation between the two measures. Namely, the observed correlation may not be due to a fundamental relation between the two constructs but might be due to the shared items. For example, an item on the rumination scale that asks “think about how sad you feel” may be related in content to an item on the depression scale “I feel sad.” Granted, the former deals with cognitions about feeling sad and the latter deals with the existence, or presence, of sadness. In Table II we point out additional similarities in item content between the RRS and a commonly used self-report measure of depression (Beck Depression Inventory, BDI). This overlap in item content raises the question, Does a correlation

Table I. 22 Item Ruminative Responses Scale

Number	RRS item	Item type
1	Think about how alone you feel	D
2	Think “I won’t be able to do my job if I don’t snap out of this.”	D
3	Think about your feelings of fatigue and achiness	D
4	Think about how hard it is to concentrate	D
5	Think “What am I doing to deserve this?”	B
6	Think about how passive and unmotivated you feel	D
7	Analyze recent events to try to understand why you are depressed	R
8	Think about how you don’t seem to feel anything anymore	D
9	Think “Why can’t I get going?”	D
10	Think “Why do I always react this way?”	B
11	Go away by yourself and think about why you feel this way	R
12	Write down what you are thinking and analyze it	R
13	Think about a recent situation, wishing it had gone better	B
14	Think “I won’t be able to concentrate if I keep feeling this way.”	D
15	Think “Why do I have problems other people don’t have?”	B
16	Think “Why can’t I handle things better?”	B
17	Think about how sad you feel	D
18	Think about all your shortcomings, failings, faults, mistakes	D
19	Think about how you don’t feel up to doing anything	D
20	Analyze your personality to try to understand why you are depressed	R
21	Go someplace alone to think about your feelings	R
22	Think about how angry you are with yourself	D

Note. R = Reflection; B = Brooding; D = Depression-Related.

Table II. Examples of Similar RRS and BDI Items

Sadness
RRS 17-Think about how sad you feel
<i>BDI 1-I feel sad</i>
Fatigue
RRS 3-Think about your feelings of fatigue and achiness
<i>BDI 12-I get tired more easily than usual</i>
Great effort required to perform simple tasks
RRS 4-Think about how hard it is to concentrate
RRS 6-Think about how passive and unmotivated you feel
RRS 9-Think "Why can't I get going?"
<i>BDI 11-It takes extra effort to get started at doing something</i>

between rumination and depression suggest an association between cognitive style and affect, or is the correlation artifactual because the two scales tap the identical phenomenological experience?

Conway, Csank, Holm, and Blake (2000), Cox, Enns, and Taylor (2001), Segerstrom, Tsao, Alden and Craske (2000), and Roberts et al. (1998) also raised the question of whether the observed relation between rumination and depression was due to similar item content. Conway et al. (2000) dealt with item overlap by creating a new rumination scale. However, it appears that their new scale may have depression-confounding problems because more than half their items contain the word "sad" (or "sadness").

Segerstrom et al. (2000) dealt with item overlap by removing items from the RRS that they deemed similar to depression items. In three different samples, they found that this short version of the RRS was still significantly correlated with the BDI, although less so than the full scale RRS.

Roberts et al. (1998) concluded there was no confound in the RRS. They found three rumination subfactors—one they deemed as being depression-related and the other two were deemed depression-unrelated. "Factor 1 was composed of exactly those types of items that we believed could be highly confounded with the severity of previous depressive symptoms" (Roberts et al., 1998, p. 411). However, because they found significant depression differences on all three rumination subfactors, they rejected their "confounding hypothesis." In our view, if a subset of a whole is confounded, one cannot claim the whole is unconfounded.

In an attempt to eliminate similar item content as an alternative explanation for the relation between depression and rumination, we performed a secondary analysis using the data from Nolen-Hoeksema et al. (1999). We removed depression-related items from the RRS and then assessed whether relations often found between rumination and depression would still hold. Finding a relation after removing the contaminated items would suggest that depression and rumination are related constructs, whereas no relation would suggest that the finding reported in the literature could be attributed to the similarity in item content. We also examine whether one of the major findings in the rumination literature—that the gender difference in depression is mediated by rumination—still holds when depression-related items are removed from the rumination scale.

METHOD

Participants

Analyses were conducted on a randomly selected, community sample of adults from the Oakland, San Francisco, and San Jose, California, areas who were interviewed two times over 1 year (see Nolen-Hoeksema et al., 1999, for details). There were 1,328 participants for Time 1 (697 women and 631 men) and 1,131 for Time 2 (605 women and 526 men). One participant had missing data at Time 2, so some analyses involving Time 2 data are based on an N of 1,130. In the present paper we limit our analyses to those participants who provided data at both times. See Nolen-Hoeksema et al. (1999) for additional details on how the participants who dropped out at Time 2 differed from those who were present at both times. The gender split was roughly equal among the subsample that dropped out (53% men and 47% women).

Measures

All measures, including self-report measures, were administered in an interview context. The items and instructions were identical in this interview format as in the original self-report formats of the measures, except that participants were read the items (in order to overcome individual differences in reading skills), given an 8×10 card with the response options printed, and asked to indicate their response to the interviewer verbally. Two years after the study reported here was conducted, Nolen-Hoeksema and Jackson (2001) administered a self-report version of the RRS to a subset of 740 of the participants in the original sample. The correlation between participants' mean scores on the self-report version of the RRS and the interview version they completed as part of the original study was $r = .90$, and the group means for the two administrations were nearly identical ($M = 1.80$ for the self-report and $M = 1.86$ for the interview).

Rumination

Interviewers administered the RRS, which includes 22 items "... describing responses to depressed mood that are self-focused ... symptom focused ... and focused on the possible consequences and causes of the mood ..." (Nolen-Hoeksema et al., p. 1064, 1999). Respondents rated each questionnaire item on a scale from 1 (*almost never*) to 4 (*almost always*). Interviewers read the following instructions to participants:

People think and do many different things when they feel sad, blue, or depressed. I'm going to read a list of possibilities. Turn to the next scale in your book and please tell me if you never, sometimes, often, or always think or do each one when you feel down, sad, or depressed. Please indicate what you generally do, not what you think you should do. (Nolen-Hoeksema et al., p.1064, 1999)

For this scale, the alpha coefficient at Time 1 was .90 and the test-retest correlation was .67.

Depression

Participants completed the 13 item BDI (Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961), a widely-used measure of current depressive symptoms. The Time 1 alpha coefficient was .82 and the test-retest correlation was .60. The major content differences between the 13 item BDI and the full 21 item BDI are that the 13 item version includes fewer redundant items and does not include as many items that do not reflect core symptoms of depression (e.g., I feel I'm being punished) or that can have multiple causes (e.g., sleep problems, weight loss).

RESULTS AND DISCUSSION

Construction of a New Rumination Scale

We performed a frequency analysis on the RRS. Using cutoffs 0.05 and 0.95, no items were unable to discriminate across participants. Next, we removed 12 items from the RRS that we deemed similar to BDI items (see Table I), leaving 10 candidate rumination items (Items 5, 7, 10, 11, 12, 13, 15, 16, 20, and 21; see Segerstrom et al., 2000, for a nearly identical removal of RRS items similar to BDI items).

The remaining 10 items were subjected to a principal components analysis with varimax rotation. Location of the elbow in the scree plot and the magnitude of factor loading revealed bidimensionality. One factor contained RRS Items 7, 11, 12, 20, and 21; the other factor contained Items 5, 10, 13, 15, and 16³ (factor loading cutoff = 0.4). The eigenvalues for these two factors were 1.64 and 3.41, respectively, together accounting for 50.5% of the variance. All items on the latter factor had a negative connotation, whereas all items on the former factor were neutrally valenced. Furthermore, all items on the latter factor began with the word “think,” unlike any of the items in the second factor.

We interpret the factor containing Items 7, 11, 12, 20, and 21 as reflection (R). All these items (a) are neutrally valenced, (b) capture rumination as defined by Webster's *New Collegiate Dictionary*: “. . . to engage in contemplation: [to] REFLECT . . . [to] PONDER” (Woolf, p. 1004, 1981), and (c) capture the definition of coping: “to deal with and attempt to overcome problems and difficulties” (Woolf, p. 248, 1981). We interpret the other factor as brooding (B). Brooding is defined by Webster's as moody pondering: “. . . to think anxiously or gloomily about . . .” (Woolf, p. 140, 1981). This definition aptly captures important features of this construct. First, it reflects that people are reporting what they do when they are sad, blue, or depressed—when they are moody. Second, although other authors have given factors similar to this factor labels such as “self-criticism,” the factor captures a broader range of thoughts than self-criticism. Three of the 5 items on this factor are “think ‘What am I doing to deserve this?’,” “think about a recent situation, wishing it had gone better,” and “think, ‘Why do I have problems other people don't have?’” These are not necessarily

³Factor loadings are available from the authors. In addition to principal components analysis with varimax rotation we also analyzed the data with factor analysis as well as with other rotations such as oblimin and promax. In all cases the results were identical with respect to factors and the pattern of item loadings. Throughout the paper we report the results of the principal components analysis with varimax rotation.

self-critical thoughts—indeed the first and third item might be considered criticisms of others or fate. These items seem to index brooding as defined as “moody pondering.”

The R and B RRS subfactors resemble those found by other researchers. For example, the R factor is related to the “RRS Self-focus” factor found by Cox et al. (2001) and the “Introspection/Self-Isolation” factor found by Roberts et al. (1998) when they factor-analyzed the 21 item RRS. Bagby and Parker (2001) found a “Self-Focused Rumination” factor when they analyzed the 32 item RSQ. In addition, the B factor is similar to the “Self-Blame” RRS subfactor Roberts et al. (1998) found; only two B items were included on the 21 item RRS they analyzed (Items 10 and 13) and both these items loaded onto Roberts et al.’s 3 item “Self-Blame” factor.

The coefficient alpha for the R subscale was .72 at Time 1 and the test-retest correlation was $r = .60$. For the B subscale, coefficient alpha at Time 1 was .77 and the test-retest correlation was $r = .62$. These alphas are relatively low but keep in mind that each subscale is based on five items. Standardized coefficient alpha is identical to the average correlation among k items adjusted by the Spearman–Brown formula, so the sensitivity to item number is expected. Under the usual psychometric assumptions, doubling each subscale to 10 items would yield an expected coefficient alpha of .85.

To test whether the two subscales are redundant with the BDI we conducted various principal component analyses (with varimax rotation and a factor loading cutoff of .4). First, a principal components analysis on the 13 BDI items and 10 RRS items resulted in one depression factor (containing all BDI items except for BDI 5; eigenvalue = 5.32), one brooding factor (containing RRS items 5, 10, 13, 15, and 16—which includes all five B items; eigenvalue = 2.61), and one reflection factor (containing RRS items 7, 11, 12, 20, and 21—all five R items; eigenvalue = 1.44). BDI Item 3 double loads on the BDI factor and the B factor. These three factors together account for 40.7% of the variance.

To check our decision to drop the 12 RRS items we conducted a principal components analysis on Nolen-Hoeksema and Morrow’s 22 item RRS. This yielded a two factor solution with the second factor comprised solely of reflection items (RRS Items 7, 11, 12, 20, and 21; eigenvalue = 1.92). No distinguishable B factor emerged because all of the remaining 17 items loaded on the first factor (eigenvalue = 7.53). The two factor solution accounts for 43% of the variance. Perhaps this two factor solution accounts for the items that begin with the stem “think . . .” versus the five items that do not begin with that stem. Investigation of the three factor solution revealed a third factor comprised solely of R items (eigenvalue = 1.36), a 9-item first factor containing all 5 B items (RRS Items 1, 5, 10, 13, 15, 16, 17, 18, 22; eigenvalue = 7.53), and a second factor containing the items we eliminated because of depression content (Items 1, 2, 3, 4, 6, 8, 9, 14, and 19—with Item 1 double loading; eigenvalue = 1.92). The first factor of this three factor solution contains the 5 brooding scale items along with some highly depression-related items. Since these other items were highly related to depression and failed to consistently emerge in other analyses we ran, we did not regard them as brooding items. Solutions with four and five factors were also examined but the higher order factors were not interpretable and accounted for little variance.

We ran an additional PCA as another check on our decision to eliminate the 12 items from the RRS that overlapped in content with depression. This PCA was

conducted on the 22 RRS and 13 BDI items. Using the scree plot and eigenvalue greater than one criteria, PCA results yielded a five factor solution consisting of a B factor (comprised of all 5 B items, as well as RRS scale deleted Items 8, 17, 18, and 22; eigenvalue = 9.20), an “RRS deleted items factor” (comprised of 9 of the 12 rumination scale deleted items: RRS Items 1, 2, 3, 4, 6, 8, 9, 14, 19; eigenvalue = 2.87), a depression factor (containing BDI Items 1 through 7; eigenvalue = 1.74), an R factor (containing all five R items; eigenvalue = 1.62), and another depression factor (containing BDI Items 4, 9, 11, 12, 13; eigenvalue = 1.12), together accounting for 47.27% of the variance. BDI Items 8 and 10 failed to load onto any factor.

In short, the subfactors of the 10 item rumination scale are similar to those obtained using other methods and they are reliable. The 10 item scale is nonredundant in content with depression scale items and it captures two aspects of rumination: reflection and brooding. Another result adds further robustness to the factor structure: The PCA analyses conducted on the Time 1 data of the subset of participants who eventually dropped out from the study yielded almost identical factor structures as the subsample with data at both time points. We next examine whether R rumination and B rumination predict depression.

Descriptive Statistics

Descriptive statistics for the BDI, R, and B are presented in Table III for the sample as a whole as well as by gender. The BDI score for each participant was the sum over the 13 items; the R and B scores were the sums over the respective five items. Correlations between the three variables are presented in Table IV.

Prediction

We investigated whether R and B would predict concurrent and future depression, as previous studies have shown (Just & Alloy, 1997; Kuehner & Weber, 1999; Nolan et al., 1998; Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 1994, 1999; Nolen-Hoeksema & Morrow, 1991; Segerstrom et al., 2000), even after controlling

Table III. Means and Standard Deviations for Depression (BDI), Reflection (R), and Brooding (B)

Variable	Time 1			Time 2		
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
BDI	4.43	4.13	1130	3.94	4.06	1130
R	9.83	3.11	1130	9.30	2.99	1130
B	9.40	2.96	1130	8.96	2.81	1130
<i>Men</i>						
BDI	3.94	3.85	526	3.48	3.80	526
R	9.64	3.01	526	9.02	3.01	526
B	9.11	2.78	526	8.63	2.57	526
<i>Women</i>						
BDI	4.86	4.32	604	4.34	4.24	604
R	10.00	3.19	604	9.55	2.96	604
B	9.66	3.09	604	9.25	2.97	604

Table IV. Correlations Among Depression (BDI), Reflection (R), and Brooding (B) Over Time (T1 and T2)

	BDI T2	R T1	R T2	B T1	B T2
BDI T1	.60**	.12**	.18**	.44**	.37**
BDI T2		.08*	.15**	.37**	.44**
R T1			.60**	.37**	.25**
R T2				.31**	.42**
B T1					.62**

* $p < .01$. ** $p < .001$.

for Time 1 depression levels. Table IV shows that the zero-order correlations between B and BDI are higher than those between R and BDI. Using the modified test for dependent correlations presented in Steiger (1980; we denote this test by Z_{dep}), the correlation between R and BDI at Time 1 is significantly less than the correlation between B and BDI, $Z_{\text{dep}} = 10.08$, $p < .0001$. Similarly, the correlation between Time 1 R and Time 2 BDI is significantly less than the correlation between Time 1 B and Time 2 BDI, $Z_{\text{dep}} = 9.01$, $p < .0001$.

The correlations between B and BDI are similar to the size of the correlations obtained for the entire 22 item rumination scale. Compare the concurrent correlation for the 5 item B scale, $r = .44$, with that for the 22 item scale, $r = .48$ (these two correlations are significantly different, $Z_{\text{dep}} = 2.97$, $p < .01$) and the 5 item B scale correlation with future depression, $r = .37$, with that for the 22 item scale, $r = .38$ ($Z_{\text{dep}} = 0.29$, ns). The similarities in the magnitude of the correlations are remarkable given that the B scale consists of only 5 items.

To deal with the reliability issue that is created by having five item scales we tested a cross-lag model in the context of maximum likelihood structural equations modeling. The model had a total of six latent variables, that is, BDI, R, and B for each of the two times. The BDI latent variable had 13 indicators, and the R and B variables each had 5 indicators. Autocorrelation was modeled by allowing correlated error over time between indicators (e.g., the error for Item 1 BDI at Time 1 was allowed to correlate with the error for Item 1 BDI at Time 2). We also allowed correlated disturbance terms at Time 2 (i.e., the model allowed the full 3×3 correlation matrix of disturbance terms for the three endogenous latent variables). The critical aspects of this model for our purposes are the paths between the Time 1 and Time 2 latent variables. Each of the three Time 2 latent variables had three paths pointing to it. Table V presents the beta coefficients for each of the nine paths; statistical testing was done through likelihood ratio tests (Gonzalez & Griffin, 2001). The model has the following overall fit characteristics: $\chi^2(951) = 2875.5$, $p < .001$, GFI = .89, RMSEA = .042. Despite the model's significant misfit to the data, indicated by the Chi-square test, the high GFI and low RMSEA suggest the model may provide useful intuitions about relationships between the measured variables.

The first observation made in Table V is that a variable is best predicted by itself, even after controlling for the other two Time 1 variables. That is, the best predictor of, say, B at Time 2 is B at Time 1. The second observation is that the two rumination subscales do not predict each other at Time 2, but the BDI at Time 1 predicts both subscales. This is an interesting observation because it suggests that depression at

Table V. Structural Equations Model of Predicting Time 2 Variables From Time 1. Depression (BDI), Reflection (R), and Brooding (B)

Time 1	Time 2		
	R	B	BDI
R			
β	0.7142	− 0.0199	−0.0594
Z	16.4770***	−0.5826	−2.3995*
B			
β	0.0043	0.6396	0.1583
Z	0.0927	14.0971***	5.1606***
BDI			
β	0.1811	0.1126	0.5118
Z	3.2192***	2.2421*	12.8799***

Note. Z tests are likelihood ratio tests.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Time 1 leads to more reflection and more brooding at Time 2. The third observation is that the BDI at Time 2 is predicted by both R and B, but note that the coefficient for R is negative. The pattern between the zero-order correlations suggests that R may be acting as a suppressor variable (Darlington, 1990).

A similar pattern of coefficients was obtained using regression on the observed scale scores directly (rather than using latent variables). In the context of these regressions we also tested for 2-way interactions between Time 1 brooding, reflection, and depression, as well as the 3-way interaction. That is, each of the three Time 2 dependent variables was regressed on B, R, and BDI main effects, 2-way interactions and the 3-way interaction (predictor variables were centered; main effects and interactions were entered sequentially). Only two interaction tests were statistically significant (out of 12 different tests involving interactions)—for Time 2, the interaction of BDI and R (Beta = .042, $t = 2.45$, $p = .014$) as well as the interaction of R and B (Beta = −.044, $t = −3.3$, $p < .001$) were significant predictors. We hesitate to place much emphasis on these two statistically significant interactions because of the possible capitalization on chance.

Mediation

The gender difference in rumination is a well-established finding (e.g., Nolen-Hoeksema et al., 1993, 1994,1999) as is the gender difference in depression (Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993; Nolen-Hoeksema, 1987). Not only are women depressed more often than men but they also ruminate more than men. Nolen-Hoeksema has posited that the gender difference in rumination contributes to the gender difference in depression (Nolen-Hoeksema, 1987). Evidence supporting this proposition comes from studies demonstrating that rumination mediates the gender difference in depression (Nolen-Hoeksema et al., 1994, 1999; Roberts et al., 1998).

Before proceeding with the mediation analysis, we first examined whether a significant gender difference emerged across the three variables: depression, reflection, and brooding. We performed an ANOVA on each variable separately with gender

as the between-subjects factor and time as the within-subjects factor. The means and standard deviations are presented in Table III. Significant gender differences emerged in all three variables such that women had higher means than men: depression, $F(1, 1128) = 17.00$, $p < .001$, $d = .24$; reflection, $F(1, 1128) = 7.51$, $p < .01$, $d = .16$, and brooding, $F(1, 1128) = 14.29$, $p < 0.001$, $d = .22$ (effect sizes reported on the metric of Cohen's d). All three variables also had significant main effects for Time, showing that Time 2 scores were lower than Time 1 scores: depression, $F(1, 1128) = 20.01$, $p < .001$; reflection, $F(1, 1128) = 43.86$, $p < .001$ and brooding, $F(1, 1128) = 34.46$, $p < .001$. There were no significant interactions (all three F 's < 1.21).

We sought to examine whether the two new rumination subscales mediated the gender difference in depression. Mediation requires a strong relation between mediator and dependent variable (Baron & Kenny, 1986), but there was a weak, though statistically significant, relationship between the mediating variable R and depression, $r = .12$, $t(1128) = 4.05$, $p < .0001$. Hence, by the logic of the mediation analysis in Baron and Kenny, reflection cannot mediate the gender difference in depression. However, there is a suggestion that the B subscale mediates the gender difference. Following the procedure outlined in Baron and Kenny (1986), the Goodman test (1960) for brooding at Time 1 mediating the BDI gender difference at Time 1 was statistically significant, $z = 2.678$, $p = .0074$. Similarly, brooding at Time 1 appears to mediate the BDI gender difference at Time 2, $z = 2.65$, $p = .008$. An interpretation of this finding is that the standard result that rumination mediates the relation between gender and depression may be due to the brooding component of rumination rather than reflection. A similar pattern of results was observed when the mediation tests were conducted in the context of structural equations modeling with latent variables.

CONCLUSION

After constructing a measure of rumination unconfounded with depression content, we found support for a two factor model of rumination. We call the first component reflection and the second component brooding. The items on the reflection factor suggest a purposeful turning inward to engage in cognitive problem solving to alleviate one's depressive symptoms. In contrast, the items on the brooding factor reflect a passive comparison of one's current situation with some unachieved standard.

These two aspects of rumination captured in the RRS of the Response Styles Questionnaire reflect an ongoing debate about whether rumination is adaptive or maladaptive (see Wyer, 1996, for a series of essays on this debate; and Trapnell & Campbell, 1999, for similar factor analytic results using a measure of private self-consciousness). Martin and Tesser (1996) argue that rumination is instrumental, and is generally adaptive in assisting a person toward solving a problem. Carver and Scheier (1981; see also Pyszcynski & Greenberg, 1987) noted that rumination can become maladaptive when an individual cannot resolve the discrepancy between current and desired states and cannot relinquish goals. Nolen-Hoeksema (1996) has focused

almost exclusively on the maladaptive consequences of rumination, suggesting that even self-reflection intended to be problem solving can draw one into negative cycles of thinking and thus impair mood.

Our analyses suggest that support for any of these viewpoints depends on how you operationalize rumination. The reflection factor of rumination was associated with *less* depression over time in our longitudinal analyses, although it was correlated with *more* depression concurrently. This suggests that reflection may be instigated by negative affect, or lead to negative affect in the short-term, but may eventually be adaptive in reducing negative affect, perhaps because it leads to effective problem solving. In contrast, the brooding factor of rumination was associated with more depression both concurrently and in the longitudinal analyses, suggesting it is not adaptive.

In addition, although women scored higher than men on both the reflection and brooding factors, only the brooding factor mediated the gender difference in depressive symptoms. This suggests that women are generally more contemplative than men, but it is only when this contemplation takes the form of brooding is it associated with greater levels of depression in women compared to men.

A key question then is why some people, when they contemplate their problems and feelings of distress, are able to engage in adaptive reflection whereas others fall into brooding. The original study upon which the current study was based (Nolen-Hoeksema et al., 1999) showed that people who had a lesser sense of mastery over important events in their lives, and who were more beset by chronic stress and strain, were more likely to ruminate (as defined by whole scale scores on the Rumination Scale). Nolen-Hoeksema et al. (1999) argued that low mastery and chronic strain lead individuals to feel there is little they can do to overcome their problems. Yet, the problems still plague them on a daily basis, giving them plenty to ruminate about. We went back to the data from this original study and correlated both the reflection and brooding scales with the measures of mastery and chronic strain. Brooding was more strongly associated with both mastery, $r = -.26$, $p < .0001$, and chronic strain, $r = .20$, $p < .0001$, than was reflection (for mastery, $r = .05$, $p = .13$; for chronic strain, $r = .09$, $p = .002$). The Z tests for dependent correlations were $Z_{\text{dep}} = -9.38$, $p < .0001$, and $Z_{\text{dep}} = 3.34$, $p < .001$, respectively. Note that the relationship between reflection and mastery did not even reach statistical significance. Chronic stressors probably give people much to brood about but for some people instigate problem solving. A low sense of mastery, however, contributes primarily to brooding—that is, to a passive contemplation of what’s wrong in your life and how you wish it were better.

Further exploration of the factors that differentiate people who engage in adaptive reflection and those who engage in maladaptive brooding could provide clues regarding how to assist depressed people to engage in problem solving without falling into brooding. If our post hoc results showing that low mastery contributes to brooding but not reflection can be replicated, this suggests that graded task assignments designed to provide people with evidence of their control over their problems are a critical aspect of cognitive therapy. It may also be useful to assess and explicitly respond to an individual’s tendency to engage in negative social comparisons (e.g., “Why do I have problems other people don’t have?”) because this was a key aspect of

the brooding factor in this study (see Lyubomirsky & Ross, 1997, and Lyubomirsky, Tucker, & Kasri, 2001, for further evidence of the toxicity of social comparison).

In conclusion, the results presented here support the general premise of the RST that rumination can contribute to more depressive symptoms and to the gender difference in depression, but suggest important refinements of the theory. Specifically, it is critical to differentiate between a reflection component of rumination and a brooding component, and to measure them separately, because they have quite different relationships to depression. In addition, the fact that the reflection and brooding factors accounted for only 50% of the variance in the 10 RRS items suggests that there is more to rumination than reflection and brooding. This will be an important focus of future studies.

Investigators using the current version of the RRS may wish to analyze their data separately for the subscales of reflection and brooding. The small number of items on these subscales and their moderate reliabilities indicate that further work is needed to expand these scales so that they have better construct validity and reliability. In addition, more work is needed to understand the factors that lead people to engage in one of these forms of rumination or the other. However, even in light of these qualifications, the distinction between reflection and brooding appears promising, not only in terms of reconciling the adaptive versus maladaptive rumination debate, but also in terms of gaining a finer understanding of the relationship between rumination and depression.

ACKNOWLEDGMENTS

The study was supported by the PHS Grant MH 51817 to Nolen-Hoeksema. Gonzalez was supported by NSF Grant 98-09261.

REFERENCES

- Bagby, R. M., & Parker, J. D. A. (2001). Relation of rumination and distraction with neuroticism and extraversion in a sample of patients with major depression. *Cognitive Therapy and Research*, 25(1), 91–102.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182.
- Beck, A. T., Ward, C. H., Mendelsohn, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4, 561–571.
- Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control-theory approach to human behavior*. New York: Springer.
- Conway, M., Csank, P. A. R., Holm, S. L., & Blake, C. K. (2000). On assessing individual differences in rumination on sadness. *Journal of Personality Assessment*, 75(3), 404–425.
- Cox, B. J., Enns, M. W., & Taylor, S. (2001). The effect of rumination as a mediator of elevated anxiety sensitivity in major depression. *Cognitive Therapy and Research*, 25(5), 525–534.
- Darlington, R. (1990). *Regression and Linear Models*. New York: McGraw-Hill.
- Gonzalez, R., & Griffin, D. (2001). Testing parameters in structural equation modeling: Every “one” matters. *Psychological Methods*, 6, 258–269.
- Goodman, L. A. (1960). On the exact variance of products. *Journal of the American Statistical Association*, 55(292), 708–713.
- Just, N., & Alloy, L. B. (1997). The response styles theory of depression: Tests and an extension of the theory. *Journal of Abnormal Psychology*, 106(2), 221–229.

- Kessler, R. C., McGonagle, K. A., Swartz, M., Blazer, D. G., & Nelson, C. B. (1993). Sex and depression in the national comorbidity survey I: Lifetime prevalence, chronicity and recurrence. *Journal of Affective Disorders*, 29, 85–96.
- Kuehner, C., & Weber, I. (1999). Responses to depression in unipolar depressed patients: An investigation of Nolen-Hoeksema's response styles theory. *Psychological Medicine*, 29, 1323–1333.
- Lyubomirsky, S., & Nolen-Hoeksema, S. (1993). Self-perpetuating properties of dysphoric rumination. *Journal of Personality and Social Psychology*, 65(2), 339–349.
- Lyubomirsky, S., & Ross, L. (1997). Hedonic consequences of social comparison: A contrast of happy and unhappy people. *Journal of Personality and Social Psychology*, 73, 1141–1157.
- Lyubomirsky, S., Tucker, K. L., & Kasri, F. (2001). Responses to hedonically conflicting social comparisons: Comparing happy and unhappy people. *European Journal of Social Psychology*, 31, 1–25.
- Martin, L. L., & Tesser, A. (1996). Some ruminative thoughts. In R. S. Wyer Jr. (Ed.), *Advances in social cognition* (pp. 1–47). Hillsdale, NJ: Erlbaum.
- Morrow, J., & Nolen-Hoeksema, S. (1990). Effects of responses to depression on the remediation of depressive affect. *Journal of Personality and Social Psychology*, 58(3), 519–527.
- Nolan, S. A., Roberts, J. E., & Gotlib, I. H. (1998). Neuroticism and ruminative response style as predictors of change in depressive symptomatology. *Cognitive Therapy and Research*, 22(5), 445–455.
- Nolen-Hoeksema, S. (1987). Sex differences in unipolar depression: Evidence and theory. *Psychological Bulletin*, 101(2), 259–282.
- Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, 100(4), 569–582.
- Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology*, 109(3), 504–511.
- Nolen-Hoeksema, S., & Jackson, B. (2001). Mediators of the gender difference in rumination. *Psychology of Women Quarterly*, 25, 37–47.
- Nolen-Hoeksema, S., Larson, J., & Grayson, C. (1999). Explaining the gender difference in depressive symptoms. *Journal of Personality and Social Psychology*, 77(5), 1061–1072.
- Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 loma prieta earthquake. *Journal of Personality and Social Psychology*, 61(1), 115–121.
- Nolen-Hoeksema, S., Morrow, J., & Fredrickson, B. L. (1993). Response styles and the duration of episodes of depressed mood. *Journal of Abnormal Psychology*, 102(1), 20–28.
- Nolen-Hoeksema, S., Parker, L. E., & Larson, J. (1994). Ruminative coping with depressed mood following loss. *Journal of Personality and Social Psychology*, 67(1), 92–104.
- Pyszczynski, T., & Greenberg, J. (1987). Self-regulatory perseveration and the depressive self-focusing style: A self-awareness theory of reactive depression. *Psychological Bulletin*, 101, 122–138.
- Roberts, J. E., Gilboa, E., & Gotlib, I. H. (1998). Ruminative response style and vulnerability to episodes of dysphoria: Gender, neuroticism, and episode duration. *Cognitive Therapy and Research*, 22(4), 1998, 401–423.
- Segerstrom, S. C., Tsao, J. C. I., Alden, L. E., & Craske, M. G. (2000). Worry and rumination: Repetitive thought as a concomitant and predictor of negative mood. *Cognitive Therapy and Research*, 24, 671–688.
- Siegle, G. J., Steinhauer, S. R., Carter, C. S., & Thase, M. E. (2003). Do the seconds turn into hours? Relationships between sustained pupil dilation in response to emotional information and self-reported information. *Cognitive Therapy and Research*, 27(3), 247–259.
- Steiger, J. H. (1980). Tests for comparing elements of a correlation matrix. *Psychological Bulletin*, 87, 245–251.
- Trapnell, P. D., & Campbell, J. D. (1999). Private self-consciousness and the five-factor model of personality: Distinguishing rumination from reflection. *Journal of Personality and Social Psychology*, 76, 284–304.
- Wood, J. V., Saltzberg, J. A., Neale, J. M., Stone, A. A., & Rachmiel, T. A. (1990). Self-focused attention, coping responses, and distressed mood in everyday life. *Journal of Personality and Social Psychology*, 58(6), 1027–1036.
- Woolf, H. B. (Ed.). (1981). *Webster's new collegiate dictionary*. Springfield, MA: G. & C. Merriam Company.
- Wyer, R. S., Jr. (Ed.). (1996). *Advances in social cognition*. Hillsdale, NJ: Erlbaum.