Negative Cognitive Styles and Stress-Reactive Rumination Interact to Predict Depression: A Prospective Study[1]

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Research on cognitive theories of depression has identified negative cognitive styles and rumination in response to depressed mood as risk factors for depressive episodes. In addition, a general self-focusing style has been suggested to increase vulnerability to depression. The present study used a behavioral high-risk paradigm to test whether the interaction of negative cognitive styles and rumination predicted the prospective onset, number, and duration of depressive episodes in a sample of 148 initially non-depressed undergraduates over a 2.5-year follow-up. In addition, rumination was assessed specifically as the tendency to focus on maladaptive self-referential thoughts following stressful events (stress-reactive rumination; SRR). The principal hypotheses tested were (1) the interaction of negative cognitive styles and SRR increases risk for developing depressive episodes as well as longer duration depressive episodes; and (2) this interaction would not be obtained when a trait measure of general self-focus or a measure of rumination in response to depressed mood is used instead of the measure of SRR. After controlling for subsyndromal depressive symptoms and the main effects of negative cognitive styles and SRR, the interaction of negative cognitive styles and SRR was found to predict the prospective onset, number, and duration of major depressive and hopelessness depressive episodes. These interactions were not obtained when other measures of trait self-focus and depressive rumination were used instead of SRR.

KEY WORDS: negative cognitive style; stress-reactive rumination; depression.

The identification of cognitive patterns of response to both naturally occurring and laboratory induced stressors has been a major focus of research on the etiology of depression. Cognitive theories that describe the etiology of depression can be

classified into two broad groups. The first group includes the hopelessness theory of depression (Abramson, Metalsky, & Alloy, 1989) and Beck's (1967) theory of depression, among other theories. Both of these theories are cognitive vulnerability–stress models that emphasize the specific content of cognitions that arise in response to negative life events in the etiology of depression. Specifically, according to the hopelessness theory, some people characteristically attribute negative life events to stable and global causes, infer that further negative consequences will follow from a current negative event, and infer that the occurrence of a negative event in their lives means that they are deficient or unworthy. These individuals are hypothesized to be more likely to become hopeless when they confront negative life events than people who don't exhibit this negative inferential style. Hopelessness, in turn, is hypothesized to be a proximal sufficient cause of the symptoms of a subtype of depression, "hopelessness depression" (HD). Although the proposed content of the stress-reactive thoughts that contribute to the onset and maintenance of a depressed episode are somewhat different in Beck's theory of depression, the emphasis on negative content is consistent with hopelessness theory. In Beck's (1967) theory, people who possess negative self-schemata that contain dysfunctional attitudes, for example the belief that their worth or happiness depends on being perfect or on others' approval, are hypothesized to be vulnerable to depressive episodes when they encounter stressors that impinge on these beliefs.

Recently, Alloy et al. (1999, 2000, 2002) reported findings supporting the role of negative inferential styles and dysfunctional attitudes in predicting retrospective lifetime and prospective episodes of depression. They found that nondepressed freshmen with these negative cognitive styles, compared to those with positive cognitive styles, had higher lifetime prevalence and prospective incidence of major depressive disorder and the subtype of HD. In addition, Alloy et al. (2000) found that the interaction of negative cognitive styles and the tendency to ruminate on negative inferences following stressful life events (stress-reactive rumination; SRR) predicted the retrospective lifetime rate of Diagnostic and Statistical Manual of Mental Disorders—Third Edition revised (*DSM-III-R*; American Psychiatric Association [APA], 1987) major depressive (MD) episodes and HD episodes.

A second group of cognitive models, including Pyszczynski and Greenberg's (1987), Carver and Scheier's (1981), and Duval and Wicklund's (1972) theories, propose a central role for self-focused attention in determining a variety of functional and dysfunctional responses. Regarding depression more specifically, they each hypothesize that when stress reactive cognitions are self-referential, this may contribute to the onset of a depressive episode. These theories suggest a self-regulatory function for self-focused attention. Duval and Wicklund (1972), Carver and Scheier (1981), and Pyszczynski and Greenberg (1987) have all proposed that self-focus can function as a coping mechanism by which a person attempts to reconcile "real self"—"ideal self" discrepancies brought about by the occurrence of negative life events. According to Pyszczynski and Greenberg, a stressful event that leads to a perceived decrease in a self-relevant dimension (e.g., physical attractiveness, problem-solving ability), in turn, causes a negative discrepancy between the individual's ideal state and his or her resulting state on that self-relevant dimension. Once the discrepancy exists, the

individual then becomes focused on the self-relevant dimension. Self-focus is theorized to be a coping strategy by which a person attempts to resolve the discrepancy between the ideal state and the perceived state based on the negative life event. When self-focus fails to provide a solution for how to eliminate the discrepancy and the individual is unable to disengage from the self-regulatory cycle, a depressive episode may occur. Carver and Scheier have proposed a similar process whereby failure to either reduce the discrepancy or disengage from the self-regulating self-focus can lead to depression. In addition, Ingram (1990) has proposed a theory of psychopathology in which maladaptive self-focus plays a prominent role in the etiology of numerous forms of psychopathology, including depression. In this theory, self-focus is more generally conceptualized as maladaptive. This is in contrast to the other theories discussed in which self-focus can serve as an adaptive self-regulating cognitive strategy. Therefore, in these relatively separate lines of theoretical and empirical investigation, specific negative cognitive responses to negative life events and the degree to which a person becomes stuck on focusing on his or her negative cognitive responses have been suggested to be risk factors for depression.

Nolen-Hoeksema (1991) proposed a theory of depression that integrated negative content and a specific type of self-focus (referred to as rumination in her theory). In her theory, individuals who exhibit a ruminative response style when they become depressed, focusing on their symptoms of depression and the causes and consequences of those symptoms, are more likely to exacerbate transient negative mood states leading to longer duration, full-blown depressive episodes. The theory does not detail the specific cause of a depressed state, but focuses instead on factors that maintain and prolong depressive symptoms. Several studies have supported Nolen-Hoeksema's prediction of longer duration and more severe depressive symptoms among people with ruminative response styles (e.g., Just & Alloy, 1997; Nolen-Hoeksema, McBride, & Larson, 1997; Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema, Morrow, & Frederickson, 1993; Nolen-Hoeksema, Parker, & Larson, 1994). In addition, a ruminative response style has been found to predict new onsets of depressive episodes among nondepressed individuals once baseline depressive symptoms are controlled (Just & Alloy, 1997; Nolen-Hoeksema, 2000; Spasojevic & Alloy, 2001).

The results of a study by Needles and Abramson (1992) suggest that it is not just cognitive content that contributes to depressed mood, but also the degree to which this content is activated and recursively rehearsed. This study provided empirical support for the role of rumination in activating the critical cognitive component featured in the hopelessness theory: hopelessness. They experimentally manipulated degree of self-focus among dysphoric undergraduates with tasks designed to induce rumination or distraction. They found that participants induced to ruminate demonstrated significantly greater activation of hopelessness and subsequently greater depressive affect than those induced to distract. In addition, whereas the activation of hopelessness was greater among ruminators, the underlying belief in a hopeless future did not differ between ruminators and distractors. Thus, the results of the Needles and Abramson (1992) study suggest that both negative cognitive content and the

degree to which this content is activated and rehearsed are important in contributing to depression.

Therefore, we propose a conceptual extension of Nolen-Hoeksema's (1991) response styles theory of depression (see also Zullow & Seligman, 1990 for a similar extension). We hypothesize that individuals who both exhibit the negative cognitive styles (negative inferential styles and dysfunctional attitudes) featured as vulnerabilities in hopelessness (Abramson et al., 1989) and Beck's (1967) theories and who exhibit a tendency to ruminate on these negative cognitions in response to stressful life events should be more likely to experience onsets of depression in the first place (perhaps HD, in particular) and longer duration depression. That is, negative cognitive styles provide negative inferences for stressful events, but such inferences will be more likely to be depressogenic when they are recursively activated through rumination.

The present study utilized a prospective behavioral high-risk paradigm (Alloy & Abramson, 1999; Alloy, Lipman, & Abramson, 1992) to investigate the role of the interaction of negative cognitive styles and stress-reactive rumination (SRR) on negative inferences in the onset of major depression (MD) and the subtype of HD. Using the behavioral high-risk design, nondepressed freshmen were selected and classified as at high risk (HR) or low risk (LR) for depression based on the presence versus absence of negative cognitive styles (negative inferential styles and dysfunctional attitudes). Onsets of depressive episodes were then assessed prospectively every 6 weeks for 2.5 years. We used a prospective high-risk design in order to adequately test hypotheses regarding vulnerability to new onsets of depression. This research design minimizes the probability that significant differences in onsets of depression between the hypothesized HR and LR groups would result from covariation between the vulnerability factors (negative cognitive styles and SRR) and the predicted variable (depression) at the time of assessment of the vulnerabilities. As an additional control, we included each participant's Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979) score at Time 1 as a covariate in all of our analyses. The risk group differences in prospective onsets of depressive episodes based on negative cognitive styles have been reported previously and provided strong support for negative cognitive styles as a vulnerability factor for clinically significant depression (Alloy et al., 1999, 2002). This study focused on the potential moderating role of the additional hypothesized risk factor of SRR in predicting prospective onset, number, and duration of depressive episodes.

We tested the following specific hypotheses in this study: (1) The interaction between negative cognitive styles (cognitive risk status) and SRR will predict prospective onsets of MD and HD. Specifically, cognitively HR individuals who also tend to ruminate about negative inferences in response to stressful events (high SRR) will have greater prospective incidence, number of episodes, and duration of depressive episodes than HR individuals with low SRR or LR individuals regardless of their levels of SRR ; and (2) The above interaction between negative cognitive styles and SRR in predicting depression will not be obtained when a trait measure of general self-focus or a measure of rumination in response to depressed mood is used instead of the measure of SRR.

METHOD

Participants

The sample for this study was derived from undergraduates participating at the Temple site of the Temple–Wisconsin Cognitive Vulnerability to Depression (CVD) Project (Alloy & Abramson, 1999). College freshmen were recruited for the CVD Project because they comprise an excellent study sample for testing etiological theories of depression. Freshmen are at an "age of risk" for developing onsets of clinical depression and are exposed to high numbers of stressful life events (see Alloy & Abramson, 1999). However, results from this study may not necessarily generalize to community populations.

The current study drew from an initial sample of 170 freshmen participating at the Temple site of the CVD Project. They were selected from a screening pool of 2,438 based on their inferential styles as assessed by the Cognitive Style Questionnaire (CSQ; Alloy et al., 2000) and their dysfunctional beliefs as measured by the Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978). Freshmen scoring in the highest (most negative) and lowest (most positive) quartiles of the large screening sample on both the CSQ composite (stability, globality, consequences, and self dimensions) for negative events and the DAS were considered at high risk (HR) and low risk (LR) for depression, respectively, and were invited to participate in the second phase of screening. In Phase II, these HR and LR participants were then screened for current psychopathology based on the *DSM-III-R* (APA, 1987) and the Research Diagnostic Criteria (RDC; Spitzer, Endicott, & Robins, 1978). Those meeting either *DSM-III-R* or RDC criteria for any current Axis I disorder were excluded from the study. Of the remaining 224 participants, 23 refused participation in the longitudinal, prospective phase of the CVD project and another 31 were dropped prior to the prospective phase due to either an inability to locate them, an excessive number of missed appointments (five or more), or an inability to communicate in English with their interviewer. This left 170 (83 HR, 87 LR) participants in the final CVD Project sample at the Temple site. Nine additional participants failed to fill out the measure of SRR and 13 participants withdrew from the study prior to the end of the 2.5-year follow-up period. Thus, all analyses in this article are based on a subsample of 148 (74 HR, 74 LR) participants.

Table I presents the demographic characteristics of this subsample used in the present analyses. The subsample of 148 participants did not differ from the larger Temple sample of 170 participants on age, gender, ethnicity, socioeconomic status, or proportion of HR and LR participants. Like the larger Temple sample of 170,

Table I. Demographic Characteristics of the Sample

Temple Site	High risk ($N = 74$)	Low risk ($N = 74$)	t/χ^2	p
Age (years)	18.80 (1.47)	20.09 (3.01)	0.55	ns
Average parental education (years)	13.67 (2.31)	13.64 (2.44)	0.00	ns
Parental income	$46,297 ($32,242)	$40,152 ($25,710)	0.21	ns
Sex	62.1% Women	64.3% Women	4.15	ns
Ethnic group	69.2% Caucasian	56.5% Caucasian	0.62	ns

this subsample of 148 also did not differ from the original Phase I screening sample of 2,438 on any demographic characteristics, except gender. Both the final Temple sample and the present subsample had a larger proportion of women (63.2% in our subsample) than did the original screening sample (56.8% women). Finally, HR and LR participants in our subsample did not differ from each other on demographic characteristics.

Measures

Cognitive Risk Status

The Cognitive Style Questionnaire (CSQ; Alloy et al., 2000) and Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978) were both used jointly to select HR and LR participants in the CVD Project.

The CSQ is an expanded and modified version of the Attributional Style Questionnaire (ASQ; Seligman, Abramson, Semmel, & von Baeyer, 1979), which assesses the internality, stability, and globality of individuals' attributions for positive and negative events. The ASQ was modified in two major ways to create the CSQ. First, the number of hypothetical events was increased to include 12 positive and 12 negative events (six achievement and six interpersonal of each) relevant to college students. Second, inferences about consequences and self-worth implications of the events were also assessed in addition to attributions. A composite score was computed by summing scores on four inference dimensions (stability, globality, consequences, and self-worth implications) generated in response to the negative events. Findings from the CVD Project (Alloy et al., 2000) indicate that the CSQ composite for negative events has good internal consistency ($\alpha = .88$) and 1-year retest reliability ($r = .80$).

The DAS (Weissman & Beck, 1978) contains 40 items that assess dysfunctional attitudes regarding concern with approval by others and perfectionism. For the CVD Project, the original DAS was expanded by adding an extra 24 items that measured dysfunctional beliefs in achievement and interpersonal domains specifically. The coefficient α for the expanded DAS was .90 and retest reliability over 1 year was .78. In the CVD Project, cognitive risk based on both the CSQ negative event composite and the DAS predicted lifetime history of major depression and HD (Alloy et al., 2000) and prospective onsets and recurrences of major depression, minor depression, and HD over the 2.5-year follow-up period (Alloy et al., 1999, 2002), as well as suicidal ideation (Abramson et al., 1989). The CSQ and DAS were given at the initial Phase I screening.

Private Self-Consciousness

The private self-consciousness subscale of the Self-Consciousness Scale (SCS; Fenigstein, Scheier, & Buss, 1975) was used to measure the dispositional tendency to self-focus. This subscale was factor analytically derived from the SCS and has been used extensively in research on self-focus and depression (e.g., Ingram, 1990; Musson & Alloy, 1988). Private self-consciousness refers to the dispositional tendency to be aware of one's own private thoughts and feelings. The private subscale of the SCS (PSCS) contains 10 items, such as "I reflect about myself a lot," and "I'm

generally attentive to my inner feelings," that are self-rated on a 5-point Likert scale. The PSCS has shown adequate internal consistency ($\alpha = .89$ in the CVD Project sample) and retest reliability ($r = .79$; Fenigstein et al., 1975).

Depressive Rumination

The Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991) was used to measure the degree to which a person ruminates on his or her depressive mood. The RSQ uses 4-point Likert scales and asks respondents to indicate what they "generally do when feeling down, sad, or depressed." The Ruminative Responses subscale of the RSQ consists of 21 items assessing responses to depressed mood that are self-focused (e.g., "Think about all your shortcomings, failings, faults, mistakes"), symptom focused (e.g., "Think about how hard it is to concentrate"), or focused on possible causes and consequences of the depressive mood ("Think I won't be able to do my job/work because I feel so badly"). Previous research has shown that the Ruminative Responses subscale of the RSQ has good internal consistency ($\alpha = .89$; Nolen-Hoeksema & Morrow, 1991), 5-month retest reliability ($r = .80$; Nolen-Hoeksema et al., 1994), and validity for predicting depression (Just & Alloy, 1997; Nolen-Hoeksema, 2000; Spasojevic & Alloy, 2001). In the present sample, internal consistency of the Ruminative Responses subscale was similar to prior studies ($\alpha = .92$).

Stress-Reactive Rumination

The Stress-Reactive Rumination Scale (SRRS; Alloy et al., 2000; Robinson, 1997) was adapted from the RSQ for the present study. The SRRS was developed by constructing items that were believed to assess three cognitive tendencies in response to major life stressors: the tendency to focus on the negative attributions and inferences that comprise the negative inferential style; the tendency to focus on hopeless cognitions; and the tendency to focus on active coping strategies and problem-solving solutions. The instructions used for the questionnaire were similar to those on the RSQ with appropriate modifications given that the constructs assessed were in response to life stresses as opposed to depressed affect and that the participants studied were college students. The content of the items were reviewed by one of the developers of Hopelessness Theory and the concept of negative inferential style, who authenticated that the items had face validity in assessing stress reactive focus on negative attributions and inferences as well as hopelessness.

Having developed an instrument that had face validity, we proceeded to assess the temporal reliability, convergent and discriminant validity, predictive validity, and internal consistency of the instrument. The questionnaire was given to 68 college freshmen and sophomores and then readministered 1 month later. The retest reliabilities for the hopelessness and active coping subscales were low and these scales were dropped from further study. However, the focus on negative attributions and inferences subscale was considered adequate to proceed with additional study ($r = .71$, $p < .001$). Example items from the SRRS negative inferences subscale include, "Think about how the stressful event was all your fault," "Think about what the occurrence of the stressor means about you," and "Think about how things like this always happen to you."

The SRRS was then given to participants at the Temple University site as part of the CVD Project. Internal consistency for the focus on negative attributions and inferences subscale was found to be acceptable (Chronbach's $\alpha = .89$). Convergent and divergent validity of the SRRS negative inferences subscale were assessed by examining its overlap with negative inferential style, depressive rumination, and private self-consciousness. The correlation between the SRRS subscale and the CSQ composite for negative events was $r = .36$ ($p < .05$), indicating that these two constructs are related but not redundant, with only 13% of variance in common. The overlap between the SRRS subscale and private self-consciousness was even less pronounced, with $r = .09$ (*ns*). Finally, the correlation between the SRRS subscale and the RSQ Rumination subscale was $r = .69$ ($p < .001$). The two scales' shared variance was slightly less than 48%. This would suggest that individuals who report ruminating in response to stressful life events also tend to report ruminating in response to their depressed moods. One of the purposes of this study was to determine whether these constructs are redundant or whether SRR has greater predictive validity than the RSQ Rumination scale regarding onsets and duration of depressive episodes (Hypothesis 2).

Depressive Episodes

Expanded and modified versions of the Schedule for Affective Disorders and Schizophrenia—Lifetime (SADS-L; Endicott & Spitzer, 1978) and—Change (SADS-C; Spitzer & Endicott, 1978) interviews were used to make lifetime and prospective diagnoses, respectively, of *DSM-III-R* Major Depression (MD) and CVD Project criteria HD episodes. The Mod-SADS-L was given at the Phase II screening to assess lifetime history of psychopathology and to exclude participants with current Axis I disorders from the study. The Mod-SADS-C was given approximately every 6 weeks throughout the 2.5-year prospective follow-up to assess new onsets and remissions of depressive and other disorders. The original SADS-L and SADS-C interviews were modified for the CVD Project to allow for *DSM-III-R* and project HD diagnoses as well as RDC diagnoses. In addition, the Mod-SADS-L and Mod-SADS-C interviews grouped together all of the questions relevant to each diagnosis and presented the assessment of past episodes of a given disorder immediately following the assessment of a current episode of that disorder.

In consultation with Jean Endicott's group at the New York State Psychiatric Institute (the developers of the SADS), we specified the degree of persistence of depressed mood or pervasive loss of interest and the minimum number of days of overlapping symptoms required more explicitly than did the *DSM-III-R* and RDC. Thus, our diagnoses may be somewhat stricter than the *DSM-III-R* and RDC for depressive disorders. We also established explicit project criteria for diagnosing the hypothesized subtype of HD: (a) Hopelessness for 2 weeks or more (definite) or 1 week or more (probable) for 6 of 7 days of each week; (b) Five or more (definite) or four or more (probable) criterial symptoms present, overlapping 6 of 7 days of each week for 2 weeks or more (definite) or 1 week or more (probable); and (c) Onset of hopelessness must precede the onset of criterial symptoms by at least 1 day and no more than 1 week. The criterial symptoms of HD (Abramson et al., 1989) are sadness,

retarded initiation of voluntary responses, suicidality, initial insomnia, low energy, self-blame, difficulty in concentration, psychomotor retardation, brooding-worrying, lowered self-esteem, and dependency.

The Mod-SADS-L and Mod-SADS-C interviewers were blind to participants' risk group status and scores on all other vulnerability measures (e.g., SRRS, RSQ, SCS). Interrater reliability for all depression diagnoses on the Mod-SADS-L and Mod-SADS-C interviews was good, with $\kappa > .90$. Details regarding diagnostic interviewer training and calibration may be found in Alloy and Abramson (1999) and Alloy et al. (2000). The incidence (likelihood of occurrence), number, and total duration (in days) of *DSM-III-R* MD and project HD were used as dependent variables in the present study.

Depressive Symptomatology

The Beck Depression Inventory (BDI; Beck et al., 1979) was used to assess participants' level of subsyndromal depressive symptoms at Time 1, when they completed the vulnerability measures (CSQ, DAS, SRRS, RSQ, SCS). Numerous studies have established the reliability and validity of the BDI (Beck, Steer, & Garbin, 1988). We used Time 1 BDI scores as a covariate in all analyses testing Hypotheses 1–2.

Procedure

Approximately 1 month following the two-phase screening procedure, participants in the final sample completed a Time 1 assessment. At Time 1, participants were administered the SCS, RSQ, SRRS, and BDI as well as other measures and tasks not relevant to the present study (see Alloy & Abramson, 1999). Regular prospective assessments (RPAs) then took place approximately every 6 weeks and consisted of the Mod-SADS-C interview, among other instruments not relevant here. Participants were reimbursed for all sessions.

RESULTS

Data Analytic Approach

To test Hypotheses 1–2, we used hierarchical regression analyses to predict the dependent variables: onset, number, and total duration of *DSM-III-R* MD and HD. The Time 1 BDI score was entered as a covariate on Step 1 of each regression equation in order to insure that any significant results in predicting episodes of depression could not be accounted for by group differences in level of depression at the time of the assessment of the cognitive risk factors. Cognitive risk status was also entered on Step 1 in order to replicate previous findings (Alloy et al., 1999, 2002) of cognitive risk differences in prospective onsets of depression in this subsample. The remaining main effects (e.g., of SRR or PSCS or RSQ) and interactions were entered hierarchically on subsequent steps of the regression analyses. All sums of squares shown in the tables summarizing the results are Type 3 sums of squares and, therefore, represent only the variance accounted for by each factor independent of all other predictors.

As a follow-up to the hierarchical regression analyses, group means for each of the appropriate risk groups were calculated to determine the direction of any statistically significant interactions, as well as to detect the presence of any nonstatistically significant trends. For the 2-way interactions (e.g., Cognitive Risk × SRR), the SRR negative inferences subscale scores were dichotomized by assigning each participant a score of either 0 or 1 based on whether he or she fell below or above the median split, respectively. This allowed participants to be divided into four groups for the 2-way interaction of Risk × SRR. The mean scores on each dependent variable were then calculated and compared for each group.

An additional follow-up analysis was conducted to directly test the hypothesis that the SRRS was a better predictor of the dependent variables than either the PSCS or the RSQ. This was done in a two-step process. First, the correlation between the entire model using each measure of rumination (i.e., BDI + Cognitive Risk Status + Measure of self-focus + the Cognitive Risk Status × Measure of self-focus) and each of the dependent variables was calculated. Second, these correlations were used to compare the model including the SRRS with the models using each of the other two measures using a *t*-test to compare the differences in the magnitude of the correlations between dependent samples. The number of participants that could be included in these analyses was reduced due to missing data on the RSQ and the PSCS.

Hypothesis 1

Hypothesis 1 was that the interaction of Risk (negative cognitive styles) and SRR would predict the rate, number, and total duration of MD and HD episodes. Table II displays the results of the series of hierarchical regression analyses used to test Hypothesis 1. First, it should be noted that after controlling for Time 1 BDI scores, Risk significantly predicted the rate and number of MD and HD episodes, replicating Alloy et al. (1999, 2002) with this smaller subsample, as well as predicting the duration of HD episodes. Participants with negative cognitive styles (HR group) were more likely to have an onset and experienced a greater number of MD and HD episodes, as well as experienced longer duration HD episodes, than did participants who exhibited positive cognitive styles (LR group).

As seen in Table II, there was support for Hypothesis 1. The Risk × SRR interaction predicted significantly the rate, number, and duration of MD and HD episodes, accounting for 2–5% of the variance in these dependent measures, even after controlling for Time 1 BDI scores and the main effects of Risk and SRR. Table III provides the means and standard deviations (*SD*s) for the four Risk × SRR groups for each of the dependent measures. As can be seen in Table III, HR participants who were also high in SRR had higher incidence, number, and duration of MD and HD episodes than did HR/low SRR, LR/high SRR, and LR/low SRR groups. For example, 34% of the HR/high SRR group had an onset of MD as compared to 12.5%, 4.3%, and 5.8% of the other three groups, respectively. Similarly, 53.1% of the HR/high SRR group had an onset of an HD episode, compared to 29.2%, 17.4%, and 11.5% of the other three groups, respectively.

Table II. Hierarchical Regressions for Prospective Rate, Number, and Duration of Major Depression (MD) and Hopelessness Depression (HD) Episodes as a Function of Negative Cognitive Styles (Risk) and Stress-Reactive Rumination (SRR)

Step	Predictor	Sum of squares	df	Mean square	F	p	ΔR^2
MD Rate							
1	BDI	0.94	1	0.94	8.05	.009	
	Risk	0.61	1	0.61	5.23	.01	.036
2	SRR	0.26	1	0.26	1.88	ns	
	Risk × SRR	0.90	1	0.90	6.39	.01	.028
	Error	20.07	143	0.14			
MD number							
1	BDI	2.26	1	2.26	4.44	.06	
	Risk	1.61	1	1.61	3.15	.05	.025
2	SRR	3.45	1	3.45	4.89	.03	
	Risk × SRR	3.71	1	3.71	5.26	.02	.022
	Error	100.86	143	0.70			
MD total duration							
1	BDI	2,163.24	1	2,163.24	7.53	.008	
	Risk	758.78	1	758.78	2.64	.08	.018
2	SRR	351.61	1	351.61	1.25	ns	
	Risk × SRR	1,077.56	1	1,077.56	3.83	.05	.024
	Error	40,265.10	143	281.57			
HD rate							
1	BDI	3.10	1	3.10	19.00	.001	
	Risk	1.20	1	1.20	7.38	.007	.040
2	SRR	0.88	1	0.88	5.26	.02	
	Risk × SRR	0.78	1	0.78	4.68	.03	.022
	Error	23.87	143	0.17			
HD number							
1	BDI	108.68	1	108.68	34.15	.001	
	Risk	18.05	1	18.05	5.67	.02	.028
2	SRR	33.79	1	33.79	8.72	.001	
	Risk × SRR	49.29	1	49.29	12.72	.001	.049
	Error	554.23	143	3.88			
HD total duration							
1	BDI	1,26,836.50	1	1,26,836.50	34.90	.001	
	Risk	14,090.55	1	14,090.55	3.88	.05	.019
2	SRR	24,998.04	1	24,098.04	7.84	.006	
	Risk × SRR	40,256.32	1	40,256.32	12.62	.001	.055
	Error	4,55,983.95	143	3,188.70			

Note. BDI = Beck Depression Inventory; Risk = Negative Cognitive Styles; SRR = Stress-Reactive Rumination; MD = Major Depression; HD = Hopelessness Depression.

Hypothesis 2

In this hypothesis, we predicted that private self-consciousness (PSCS subscale) and depressive rumination (RSQ Rumination subscale) would not interact with Risk (negative cognitive styles) to predict the rate, number, and duration of MD and HD as well as would SRR. Thus, all regression analyses conducted to test Hypothesis 1 were rerun replacing SRR with either PSCS or the RSQ Rumination subscale as a predictor. The Risk × PSCS interaction did not predict any of the six dependent variables significantly and the rate, number, and duration of MD and HD episodes were roughly equivalent among HR participants, regardless of whether they were high or low in private self-consciousness. When the RSQ Rumination subscale was

Table III. Means and *SD*s for Prospective Rate (%), Number, and Duration (in Days) of Major Depression (MD) and Hopelessness Depression (HD) Episodes by Risk/SRR Group Status

	LR/low SRR (n = 52)		LR/high SRR (n = 23)		HR/low SRR (n = 24)		HR/high SRR (n = 50)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
MD rate	5.8%	0.24	4.3%	0.21	12.5%	0.34	34.0%	0.48
MD number	0.12	0.47	0.04	0.21	0.17	0.48	0.59	1.10
MD duration	1.90	7.70	0.39	10.88	2.58	7.61	13.49	27.95
HD rate	11.5%	0.32	17.4%	0.39	29.2%	0.46	53.1%	0.50
HD number	0.17	0.55	0.35	0.83	0.46	0.83	2.33	3.12
HD duration	3.06	11.36	8.52	23.61	8.00	17.25	71.71	108.23

Note. LR = Low Risk; HR = High Risk; SRR = Stress-Reactive Rumination; MD = Major Depression; HD = Hopelessness Depression.

substituted for SRR in the regression analyses, the Risk $\times$ RSQ interaction did not predict significantly the rate, number, or duration of MD episodes or the rate of HD episodes. However, the Risk $\times$ RSQ interaction did significantly predict the number, $F(1, 124) = 6.24$, $p < .02$, $\Delta R^2 = .036$, and duration, $F(1, 124) = 4.75$, $p < .03$, $\Delta R^2 = .027$, of HD episodes. HR/High RSQ participants experienced a higher number of HD episodes and longer duration HD episodes than did the other three groups. Thus, although depressive rumination moderated the effects of negative cognitive styles for two of the six dependent variables we examined, the findings were far less dramatic than when stress-reactive rumination was used as the moderator of negative cognitive styles.

In the additional follow-up analysis to address Hypothesis 2, the regression model including the SRRS was a significantly better predictor of total duration of MD episodes as well as the number of HD episodes than either the RSQ or the PSCS model (see Table IV). There was also a statistical trend suggesting that the SRRS was

Table IV. Comparisons of Models Including the SRR Versus the RSQ and the PSCS

DV	Risk $\times$ IV	R	R²	t	df	p
DSM-III-R major depression (rate)	SRRS	.37	.14			
	RSQ	.34	.12	0.53	119	*ns*
	PSCS	.30	.09	1.54	121	*ns*
DSM-III-R major depression (number of episodes)	SRRS	.37	.14			
	RSQ	.35	.12	0.28	119	*ns*
	PSCS	.30	.09	0.92	121	*ns*
DSM-III-R major depression (total duration)	SRRS	.36	.13			
	RSQ	.26	.07	3.20	119	.002
	PSCS	.30	.09	16.32	121	.001
Hopelessness depression (rate)	SRRS	.55	.30			
	RSQ	.48	.23	1.32	118	*ns*
	PSCS	.51	.26	0.68	120	*ns*
Hopelessness depression (number of episodes)	SRRS	.66	.44			
	RSQ	.53	.28	2.46	118	.02
	PSCS	.49	.24	3.52	120	.001
Hopelessness depression (total duration)	SRRS	.61	.38			
	RSQ	.54	.29	1.96	119	.06
	PSCS	.53	.28	1.81	121	.08

Note. DV = dependent variable; IV = independent variable; SRRS = Stress-Reactive Rumination Scale; RSQ = Response Styles Questionnaire; PSCS = Private Self-Consciousness Scale.

better at predicting total duration of HD. The comparisons using the other dependent measures were not significant, although in all cases the SRRS model accounted for more variance than the models including either of the other two measures.

DISCUSSION

To summarize our major findings, controlling for depressive symptoms, cognitive risk status predicted the prospective incidence and number of MD and HD episodes, replicating Alloy et al. (1999, 2002) in this much smaller subsample of the CVD Project sample, as well as predicting the duration of HD episodes. Although the main focus of this study was on the role of different forms of rumination or self-focus in interaction with negative cognitive styles in predicting depressive episodes, this replication of the main effect of negative cognitive styles in this much smaller subsample is noteworthy.

Consistent with Hypothesis 1, the predictive association between negative cognitive styles and prospective rate, number, and duration of MD and HD episodes was moderated by stress-reactive rumination. Individuals who both exhibited negative cognitive styles and the tendency to ruminate about negative inferences following stressful events were more likely to have an onset, had a greater number, and a longer duration of MD and HD episodes than did individuals with only one or neither of these two risk factors. Finally, consistent with Hypothesis 2, this interaction effect was rather specific to the measure of stress-reactive rumination. Specifically, the findings provided no support for the role of trait self-focus as a risk factor for depression in combination with negative cognitive styles. In addition, although there was some support for the role of depressive rumination, the results suggested that stress-reactive rumination was a better and more consistent predictor of depressive episodes and their duration in combination with negative cognitive styles than was depressive rumination. Given that the measures of stress-reactive rumination (SRRS) and depressive rumination (RSQ) shared close to 50% of their variance in common, the fact that they had differential predictive validity for depressive episodes in combination with negative cognitive styles suggests that there is a unique component of stress-reactive rumination that is important in contributing to the onset and maintenance of depression. It is possible that this unique component involves the content of the ruminations, inasmuch as stress-reactive rumination as operationalized here involves rumination on negative inferences specifically. Future research will need to examine more precisely the nature of this unique aspect of stress-reactive rumination.

Implications for the Hopelessness Theory of Depression

The hopelessness theory (Abramson et al., 1989) delineates a multistage causal pathway culminating in hopelessness depression. The current results suggest that another contributory cause of depression should be incorporated into the model, stress-reactive rumination. This additional factor, in interaction with negative cognitive styles appears to add to the predictive power of the model. Those individuals who were high in stress-reactive rumination as well as exhibited negative cognitive

styles were at increased risk for depression in comparison to those who had either risk factor but not both.

Our results are consistent with the logic of hopelessness theory. According to the theory, the impact of negative attributions and inferences on vulnerability to depression is mediated by their effect on level of hopelessness. Individuals who ruminate about their negative attributions and inferences following a stressful event would reasonably be expected to experience a greater sense of hopelessness than those who distract themselves from these inferences either intentionally or automatically. That is, negative inferences are more likely to be hopelessness-inducing if they are repeatedly activated through rumination. The greater hopelessness then would be more likely to cross over the individual's threshold for developing a HD episode. Future research could examine this mediational hypothesis directly by testing whether level of hopelessness mediates the relationship between the Risk $\times$ SRR interaction and prospective rate, number, and duration of depressive episodes.

Implications for Self-Focus Theories of Depression

The goal of the current study was not to test the existing self-focus theories of depression, but rather the role of the new construct of stress-reactive rumination in the onset and duration of depression. However, the results from the present study are relevant to existing self-focus theories of depression. Pyszczynski and Greenberg (1987) proposed that stressful life events that cause a discrepancy between the individual's real self-image and his/her ideal self-image on an important self-relevant dimension result in behaviors intended to reduce this discrepancy. When these attempts fail, the person can be left in a self-focused depressed state that can then result in a full-blown depressive episode. The results from this study are consistent with, but do not directly demonstrate, the causal link between a ruminative or self-focused state and the onset of a depressive episode. However, the fact that ruminative focus on negative inferences was found to be a superior predictor of depressive episodes when compared to depressive rumination and trait self-focus, would suggest that it is specifically the self-focus on negative inferences following a stressor that puts the person at risk for depression. This specific form of self-focus appears to be closely related to self-focus on a real-ideal self discrepancy. Interestingly, Pyszczynski and Greenberg implied that the self-focus state itself is a kind of coping mechanism that is an attempt to repair the real-ideal discrepancy. However, when this attempt fails, the coping strategy can become a source of repeated failure if the individual can not disengage from it.

Pyszczynski and Greenberg's (1987) self-focusing theory can be integrated with the hopelessness theory (Abramson et al., 1989) in a way that suggests that the interaction of stress-reactive negative cognitive content and stress-reactive self-focus may lead to a greater risk for depression than either construct alone. The degree to which an individual makes negative attributions and inferences in response to a negative life event may affect the probability assessment featured in the self-focusing theory of Pyszczynski and Greenberg. Stable and global attributions in response to a negative life event would likely yield a lower probability estimate for reducing

the real-ideal discrepancy, thus increasing the probability that the individual will become depressed. Furthermore, negative cognitive content in response to a stressor may lower the individual's motivation to engage in discrepancy reducing behaviors. In other words, if based on his or her negative inferences, an individual believes that no behavioral response can reduce or eliminate the real-ideal discrepancy, the discrepancy reducing behavior ceases and the individual is left in a depressed and self-focused state.

It is also possible that people who have negative cognitive styles and are high in stress-reactive rumination on negative inferences also possess depressive self-focusing styles (Pyszczynski & Greenberg, 1987) and, therefore, are both less likely to yield resolutions from their stress-reactive self-focus and less likely to be able to disengage from self-focusing when increased self-focus does not yield a resolution. However, one important finding from this study was that individuals in a nonde-pressed state who report tending to make negative inferences and then ruminating about them are more vulnerable to depression than individuals who do not report doing these two things. Thus, these results do not support the hypothesis that de-pressogenic cognitive styles exist only when the individual is actively depressed and then remit when the depressed state remits. Pyszczynski and Greenberg specifically state that the depressive self-focusing style occurs as a reaction to depressed affect and, therefore, by implication, that an individual who is nondepressed should not exhibit a depressive self-focusing style. The theoretical overlap of Pyszczynski and Greenberg's self-focusing style and the present concept of stress-reactive rumination therefore requires futher clarification.

Implications for Response Styles Theory

Although stress-reactive rumination, a slightly different form of ruminative thinking than Nolen-Hoeksema's (1991) depressive rumination, was found to be a better predictor of depression in combination with negative cognitive styles than was depressive rumination, the importance of rumination as an etiological factor in the onset of depression has important implications for response styles theory. The current findings provided additional support that rumination is not only a maintain-ing factor of depression, but also a predictor of who becomes depressed (see also Just & Alloy, 1997; Nolen-Hoeksema, 2000; Spasojevic & Alloy, 2001).

The overlap between these two constructs was clear based on the high correla-tion between the two measures. Although the new measure introduced in this study and Alloy et al. (2000) did do a better job at predicting depression in combination with negative cognitive styles than did depressive rumination, it is still an empirical question as to whether or not there is a meaningful distinction between rumination about negative inferences in response to stressful events and rumination about de-pressive symptoms and their consequences. It is possible that the two constructs are better conceptualized as being aspects of a more general tendency to ruminate in times of psychological distress. However, the present findings suggest that more re-search on both the timing and content of rumination may be fruitful in helping to determine who is at risk for developing depression.

Conclusion

In conclusion, the present findings suggest that individuals who tend to both make negative inferences for negative life events and then constantly activate these negative interpretations through rumination are at particularly high risk for developing episodes of major and hopelessness depression and for experiencing longer duration depressive episodes. These dual vulnerabilities have implications for both self-focus theories of depression and for the cognitive content theories of depression. Rearding self-focus theories, our results suggest that both the stress-reactive nature and the content of the self-focused thoughts matter in predicting who is at risk for depression. Regarding hopelessness and Beck's theories, our results suggest that the degree to which an individual recursively ruminates on his or her negative inferences following stressful events is also an important predictor of depression in combination with a negative cognitive style itself.

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