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# Predicting Psychological Distress in College Students: The Role of Rumination and Stress

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Psychological distress among college students represents a serious health concern. The aim of this research was to investigate, for the first time, whether interactions between rumination and different measures of stress could differentially predict components of psychological distress, within a diathesis-stress framework. This self-report study employed a longitudinal design, spanning a period of 6 months. One hundred sixty-one undergraduate college students completed selected measures of psychological distress, rumination, and stress at two time points 6 months apart. Both independent and interaction effects were examined through hierarchical regression analyses. Rumination and stress were found to interact significantly to predict the social dysfunction components of psychological distress. Other main effects are reported. The evidence supported the proposed diathesis-stress model and extended previous research by relating rumination to different components of psychological distress prospectively. © 2004 Wiley Periodicals, Inc. *J Clin Psychol* 61: 447–460, 2005.

**Keywords:** psychological distress; rumination; diathesis–stress; depression; social dysfunction

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Psychological distress experienced by young adults represents a major health concern. For example, recent research suggests that more than 50% of university students report depressive symptoms shortly after beginning their studies (Furr, Westefeld, McConnell, & Jenkins, 2001). This problem necessitates a detailed investigation of the predictors of psychological distress in students within a theoretical framework. It is well established that stress is predictive of psychological distress (e.g., Belle, 1982; Chang, 1997; Chang,

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2001; Cohen, Burt, & Bjorck, 1987; O'Connor, Cobb, & O'Connor, 2003) and this relationship is evident irrespective of whether one assesses stress that is global (e.g., Chang, 2001; O'Connor & O'Connor, 2003) or stress that is specific to particular life events (e.g., Cassidy, O'Connor, Howe, & Warden, *in press*; Chang, 1997). Moreover, a diathesis-stress model of cognitive vulnerability (i.e., that a cognitive vulnerability has an especially negative effect on well-being when activated by stress) is often cited to account for the relations between stress and psychological distress (see Ingram & Price, 2001).

There is another issue that requires investigation. In large part, research in this field that uses student participants focuses solely on depression (e.g., Rude & McCarthy, 2003). However, to provide a wider picture of psychological health in students, it would be more useful to examine the broader concept of psychological distress. Psychological distress is often operationalized by using the General Health Questionnaire (GHQ; Goldberg & Williams, 1988), which is widely used with clinical (e.g., Henkel et al., 2003; Sampson, Kinderman, Watts, & Sembi, 2003) and nonclinical populations (e.g., Hamilton & Schweitzer, 2000; O'Connor & O'Connor, 2003) and as a screening tool for detecting psychiatric morbidity (Bowling, 1997). There are several versions of this scale; we employed the 28-item version (GHQ-28) here because it clearly defines four components of distress: (1) anxiety and insomnia, (2) severe depression, (3) social dysfunction, and (4) somatic symptoms. We postulated that social dysfunction would be especially pertinent to students, as this dimension focuses on a person's perception of his or her ability to complete tasks—the cornerstone of an academic lifestyle—as well as more generic social regulation (e.g., ability to enjoy normal day-to-day activities).

### Rumination as a Predictor of Psychological Distress

A plethora of factors have been posited by diathesis-stress theorists to moderate the relationship between stress and distress. In this article, we focused on one such factor: rumination. Martin and Tesser (1996) define *rumination* as "a manifestation of people's tendency to persist in goal-directed action until they have either attained their goal or given up the desire for it" (p.11). Nolen-Hoeksema and coworkers (e.g., Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema, 1991; Nolen-Hoeksema & Morrow, 1991) have examined rumination as a style of thinking that is a response to depressive symptoms. They define this ruminative response style<sup>1</sup> as a series of thoughts and behaviors meaning that an individual is focusing on his or her emotions and is unable to focus on distracting activities that may alleviate symptoms (Nolen-Hoeksema, 1991). Therefore, it is a person's ruminative response to a situation or stressor that maintains depressive behavior, rather than a tendency to ruminate per se. This response points to a diathesis-stress pathway to explain the relationship between rumination and distress; however, this pathway has yet to be established empirically, although a ruminative response style, as a reaction to a particular event and a predictor of distress, has been demonstrated to be an independent predictor in college student populations. For example, Nolen-Hoeksema and Morrow (1991) found that rumination predicted depression over a 9-week period in a student population. These authors also found that stress produced by a specific life event was predictive of depression, but only over a 10-day period. However, no analyses examining the interaction between stress and rumination were reported; therefore, a diathesis-stress model was not directly tested.

Furthermore, little research has examined the relationship between rumination and anxiety (Mor & Winquist, 2002). Given that anxiety and depression are frequently

<sup>1</sup>The terms *rumination* and *ruminative response style* are used interchangeably throughout.

comorbid, one may hypothesize that the relationship between rumination and anxiety would reflect that between rumination and depression. Indeed, one of the few studies in this domain has found that rumination does predict anxiety (Nolen-Hoeksema, 2000). However, Nolen-Hoeksema's study focused on rumination as a main effect, rather than investigating its potential moderating effects.

To the authors' knowledge, the relationship between rumination and social dysfunction has yet to be examined. However, as rumination is a cognition used in goal- or task-oriented behavior and social dysfunction focuses on a person's perception of his or her ability to complete tasks (among other factors), it was anticipated that rumination would be predictive of social dysfunction and that this relationship would be amplified in the presence of stress. An additional consequence of the paucity of research probing the potential moderating relationship between rumination and stress is a dearth of studies examining the effects of different types of stress and their interactions with rumination. One of the few studies in this area suggests that suppressing thoughts may serve to increase rumination (Wenzlaff, Wegner, & Roper, 1988); thus, stress resulting from avoidant or intrusive thinking may be particularly pertinent in any examination of the interactions between rumination and stress. For this reason, in addition to a measure of global stress, we included a measure of posttraumatic stress that assesses two types of thinking in response to a stressor: avoidant and intrusive thinking.

### Aims

The central aim of this study was to investigate, for the first time, whether interactions between rumination and different measures of stress could differentially predict the components of psychological distress 6 months later, within a diathesis–stress framework. In short, this study addressed two shortcomings in the literature. First, we extended research by moving beyond the conceptualization of distress as depression to the notion of psychological distress as a multifaceted construct. Second, our study design—a 6-month prospective study—represented a rigorous test of a rumination–diathesis–stress model, which allowed testing of interactions between rumination and different types of self-reported stress to predict changes in distress. The present study also sought to extend previous work on college students through its examination of social dysfunction that may be especially salient in a student population.

Therefore, the key hypothesis examined whether the interaction between ruminative response style and stress would predict changes in psychological distress, specifically in the depression, anxiety, and social dysfunction subscales (beyond their independent effects). We formulated no specific hypotheses concerning somatic symptoms.

### Method

#### *Participants*

Two hundred forty-nine undergraduate students were recruited from a Scottish university. Participants were recruited from intact classes, and everyone who was approached agreed to participate. Before the beginning of the study, all of the students were informed that participation was voluntary and confidential, and that even if they agreed to participate, they could withdraw at any stage without explanation. Of this initial sample, 161 completed measures at both time points, at time 1 (T1) and 6 months later at time 2 (T2). Those who did not complete the T2 measures did not differ significantly from those who did in terms of age,  $t(247) = 1.77, ns$ ; marital status,  $\chi^2 (3, N = 246) = 5.8, ns$ ; and

gender,  $\chi^2 (1, N = 246) = .028, ns$ . This represented a 65% response rate, which is comparable to the rate of similar longitudinal studies in the field (Fife-Schaw, 1995). As a result, the subsequent analyses are based on responses from the 161 participants. Participants were aged 17 to 35 years; mean age was 19.32 years ( $SD = 2.37$ ). Fifty-four males and 104 females participated (three people did not provide complete demographic information). The majority of participants were not married (94%). We did not collect details of the racial–ethnic composition of our sample; 95% of the student population of the university is white.

### *Measures*

**Rumination.** The Response Styles Questionnaire—Short Form (Short RSQ; Davis & Nolen-Hoeksema, 2000; Nolen-Hoeksema, personal communication) measured participants' ruminative tendencies in negative situations (e.g., "I think about how alone I feel"). The form consists of 10 items derived from the original RSQ (Nolen-Hoeksema & Morrow, 1991). It is argued that the Short RSQ provides a more accurate reflection of a ruminative response style than the original version, by omitting a number of items that may be interpreted as "automatic negative thoughts" (Nolen-Hoeksema, personal communication). Participants are instructed to think about how they act when they are "sad, down or depressed" before scoring each of the statements on a four-point scale. The scale has demonstrated significant test–retest reliability over 1 year ( $r = 0.47, p < .001$ ) and construct validity (Just & Alloy, 1997; Nolen-Hoeksema & Morrow, 1991). Internal consistency in this sample was good (Cronbach's  $\alpha = .82$ ).

**Stress.** Stress was measured by using two self-report scales. First, the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) was used as a global measure of stress (e.g., "In the last month, how often have you been upset because of something that happened to you unexpectedly?"). It consists of 14 items rated from 0 to 4. Participants were asked about their feelings in the preceding 2 weeks. Higher scores reflected higher global stress levels. The PSS yields good test–retest reliability ( $r = 0.70$ , O'Connor & O'Connor, 2003), and it has adequate predictive validity (Hewitt, Flett, & Mosher, 1992; Cohen & Williamson, 1988). Good internal consistency was demonstrated in this sample at both T1 (Cronbach's  $\alpha = .78$ ) and T2 (Cronbach's  $\alpha = .82$ ). A second measure of stress, the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979), was used to give a measure of stress with respect to a specific life event; it is generally recognized as a measure of posttraumatic stress. Participants were asked to recall their most stressful life event in the past 6 months, before completing 15 items about how they dealt with this event by using a five-point scale. There are two subscales: experience of intrusive thoughts and experience of avoidant thoughts. Although the test was originally developed as a measure of posttraumatic stress, the same patterns of responses have also been found for stressful events that may not be considered traumatic (McDonald, 1997). The IES has good test–retest reliability ( $r = 0.80$ ; Thewes, Meiser, & Hickie, 2001), construct validity, and content validity (Eid, Thayer, & Johnsen, 1999; Thewes et al., 2001). Higher scores are illustrative of higher levels of stress. Both of the subscales yielded good internal consistency (range of  $\alpha$ , .85–.92).

**Psychological Distress.** The General Health Questionnaire (GHQ-28; Goldberg & Williams, 1988) is a measure of psychological distress. This 28-item measure comprises four subscales (seven items each). The subscales assess (1) somatic symptoms, (2) anxiety and insomnia, (3) social dysfunction, and (4) extreme depression (e.g., "Have you

been feeling perfectly well and in good health?"'). Each of these subscales represents one variable. Higher scores reflect elevated psychological distress. The scale has been shown to be valid and reliable: it correlates well with psychiatric diagnoses of morbidity and depression (Finlay-Jones & Murphy, 1979), and it has good construct validity (Berwick et al., 1987; Huppert & Garcia, 1991) and predictive validity (Bowling, Farquhar, Grundy, & Formby, 1992). Split-half reliability is acceptable, with a correlation of 0.95 reported in the literature (Bowling, 1997). Internal consistency in this sample was good (range of  $\alpha$ , .70–.88).

As the GHQ-28 assesses *extreme* depression, lest there was a floor effect, we included an additional measure of depression: the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item measure of depression (e.g., "I thought my life had been a failure"). Participants are required to rate the frequency of symptoms experienced in the past week from "Rarely" (less than 1 day) to "Most of the time" (5–7 days). It has good psychometric properties; it is valid and reliable (Hann, Winter, & Jacobsen, 1999; Hops, Lewinsohn, Andrews, & Roberts, 1990; Knight, Williams, McGee, & Olaman, 1997). Test-retest reliabilities are acceptable, for example, .57 and .63 (e.g., Hann et al., 1999; Roberts, Rhoades, & Vernon, 1990) over 2–4 weeks; it also has adequate construct validity in patient and community samples (Hann et al., 1999; Roberts & Vernon, 1983). Internal consistency in the current sample was good at T1 and T2 ( $\alpha$  = .86 at both time points).

### Procedure

All participants were given a brief introduction to what the study would require and were invited to participate. At time 1 (T1), all 249 participants completed measures of stress, rumination, and psychological distress. At time 2 (T2), 6 months later, 161 of the participants completed measures of stress and psychological distress. To enhance the likelihood that self-reported psychological well-being would change over the study period, we assessed the participants at a relatively high stress period (T1, when many of the students had degree-related coursework submission deadlines) and at a lower stress period (T2, when there were no coursework deadlines). Consistent with universities in other countries, universities in the United Kingdom have coursework submission deadlines that differ from class to class. To ensure that we sampled from a relatively high stress period at time 1 relative to time 2, we ensured that participants were only recruited from classes in which they had degree-related coursework at that time and not at time 2. All study measures were administered to participants from three intact classes. All those who were approached agreed to participate. To control for transfer effects, the order of presentation of the measures was counterbalanced at both time points. To ensure anonymity but to allow for follow-up, we instructed participants to place a pseudonym (code) on the study measures. Six months later, those participants who had completed the measures at T1 and who were present in the classes were asked to complete the T2 measures. The attrition between time 1 and time 2 is mainly the result of participant absence from the testing session rather than refusal. Ethical approval had been obtained from the University Psychology Department's ethics committee.

### Results

Analysis of variance (ANOVA) revealed that there was a significant decrease in psychological distress from T1 to T2 as mean GHQ scores fell from 20.49 ( $SD$  = 9.69) to 18.58

( $SD = 8.87$ ),  $F(1,156) = 4.61$ ,  $p < 0.05$ . Also, consistent with the study design, the perceived stress levels were significantly lower at T2 relative to T1,  $t(160) = 6.27$ ,  $p < .001$ . Correlations, means, and standard deviations for both the predictors and the dependent variables are shown in Table 1. In the interest of brevity, we have included only the correlations between rumination and the T2 measures; however, the same pattern of correlations was evident for the T1 variables. Total psychological distress (GHQ total T2) was significantly correlated with all other variables ( $r = 0.28$ – $0.83$ ,  $p < .01$ ). CES-D was found to be significantly correlated with each of the GHQ subscales ( $r = 0.22$ – $0.53$ ,  $p < .01$ ). In addition, all measures of stress were significantly intercorrelated ( $r = 0.24$ – $0.71$ ,  $p < .01$ ). Rumination significantly correlated with each subscale of the GHQ, CES-D, and intrusive thoughts ( $r = 0.18$ – $0.44$ ,  $p < .05$  at least).

### *Rumination as a Predictor of Psychological Distress*

A series of hierarchical regression analyses were conducted to examine diathesis–stress models of psychological distress, using rumination and stress as predictors/moderators.<sup>2</sup> All variables were mean centered before inclusion in regression analyses and, when necessary, log transformed. As we were interested in whether rumination and stress interact to predict each component of psychological distress differentially, we conducted a separate analysis for each subscale. As recommended by Cohen, Cohen, West, and Aiken (2003) and Aiken and West (1991), we controlled for initial levels of distress and stress as follows: psychological distress at time 2 (e.g., GHQ social dysfunction T2) was used as the dependent variable in each model, and the corresponding time 1 psychological distress variable (e.g., GHQ social dysfunction T1) was entered into the first step of the model. Next, stress at T1 and T2 (either PSS, avoidant thoughts, or intrusive thoughts) was entered at the second step in each regression. Rumination was added at the third step. At the final step, to test for moderation, the appropriate multiplicative term (e.g., PSS-T2  $\times$  rumination) was entered. Consistent with the findings of Nolen-Hoeksema and Morrow (1991), no gender differences were observed on any of the variables; therefore, the data for both genders were combined for analyses.

The first group of regression analyses showed that changes in anxiety and insomnia were consistently predicted by stress and anxiety and insomnia at time 1 (see Table 2). This result suggests that even when initial levels of anxiety and insomnia are controlled for, higher levels of stress predict higher levels of anxiety and insomnia ( $\beta$ s range from .162 to .763). However, neither rumination nor its interaction with stress predicted anxiety and insomnia at time 2.

Next, the analyses concerning social dysfunction showed that it was predicted by stress irrespective of type of measurement. Three interaction effects were also evident (see Table 3). As hypothesized, rumination interacted significantly with each measure of stress to predict changes in social dysfunction (i.e., global stress [PSS], intrusive thinking, and avoidant thinking). To probe the interactions, the regression lines of best fit were plotted at high (one standard deviation above the mean) and low (one standard deviation below the mean) levels of stress and rumination. Consonant with Aiken and West (1991), follow-up tests were carried out on these slopes to establish whether they were significantly different from 0. These analyses revealed that the high slope was significantly different from 0 for perceived stress,  $\beta = .214$ ,  $t(157) = 2.12$ ,  $p < .05$ ; intrusive thoughts,

<sup>2</sup>Regression analyses were conducted by using the total scores for the GHQ as well as the subscales. As they followed the same pattern as those for the social dysfunction subscale, they are not reported here.

Table 1  
Correlations, Means, and Standard Deviations for Rumination, Psychological Distress (GHQ T2), and Depression Scores (CES-D T2)

	CES-D T2	GHQ Somatic Symptoms T2	GHQ Anxiety & Insomnia T2	GHQ Social Dysfunction T2	GHQ Extreme Depression T2	GHQ Total Score T2	IES		PSS T2	RSQ T1
							GHQ Social Dysfunction T2	GHQ Extreme Depression T2		
CES-D T2 <sup>a</sup>	1	.506***	.533***	.342***	.265***	.384***	1	.513***	.707***	1
GHQ Somatic Symptoms T2		.593***	.533***	.245***	.829***	.582***		.116	.276***	
GHQ Anxiety & Insomnia T2			.504***	.220***	.331***	.177*		.203*	.294***	
GHQ Social Dysfunction T2				.432***	.136	.293***		.170*	.308***	
GHQ Extreme Depression T2					.139	.340***		.225***	.933***	
GHQ Total Score T2						.477***		.330***	.605***	
IES Intrusion T2								.287***	.260***	
IES Avoidance T2								.172*	.385***	
IES Total Score T2									.205***	
PSS T2									.125	
RSQ T1										
Mean	11.24	6.05	4.54	6.97	0.79	18.35	10.59	9.34	19.93	22.34
SD	8.19	3.96	3.57	1.93	1.63	8.17	6.93	6.12	12.06	6.86
										4.34

<sup>a</sup>T1 and T2 refer to the measures as assessed at time 1 and time 2, respectively. CES-D, Center for Epidemiological Studies; GHQ, General Health Questionnaire; IES, Impact of Event Scale; PSS, Perceived Stress Scale; RSQ, Response Styles Questionnaire.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

Table 2

*Hierarchical Multiple Regression Analyses Testing the Effects of Stress and Rumination in Predicting Change in Anxiety and Insomnia Scores at Time 2*

Predictor Variable	Adjusted $R^2$	$\Delta$ Adjusted $R^2$	Final $\beta$	$F(1,159)$
Step 1: Anxiety & Insomnia T1 <sup>a</sup>	.136		.242**	26.13***
Step 2: PSS T1	.354	.218	.266*	27.81***
PSS T2			.763***	
Step 3: RSQ	.353	—	.286	.91
Step 4: RSQ $\times$ PSS T2	.354	—	-.308	1.29
Step 1: Anxiety & Insomnia T1	.136		.260***	26.13***
Step 2: Avoidance T1	.226	.090	.162*	10.22***
Avoidance T2			.249	
Step 3: RSQ	.231	.004	.139	2.20
Step 4: RSQ $\times$ Avoidance T2	.227	—	-.038	.04
Step 1: Anxiety & Insomnia T1	.136		.269***	26.13***
Step 2: Intrusive T1	.227	.091	.011	10.38***
Intrusive T2			.361*	
Step 3: RSQ	.237	.010	.187	3.12
Step 4: RSQ $\times$ Intrusive T2	.233	—	-.093	.22

<sup>a</sup>T1 and T2 refer to the measures as assessed at time 1 and time 2, respectively. PSS, Perceived Stress Scale; RSQ, Response Styles Questionnaire.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

$\beta = .236$ ,  $t(157) = 2.08$ ,  $p < .05$ ; and avoidant thoughts,  $\beta = .220$ ,  $t(157) = 2.02$ ,  $p < .05$ . However, none of the low slopes differed significantly from 0. Therefore, the effects of high levels of each type of stress were amplified by high levels of rumination, but there was no effect at low levels of these variables.

Third, time 2 extreme depression was predicted by time 1 extreme depression (range of  $\beta$ , .213–.252). However, no significant interaction effects were observed. As anticipated, extreme depression was not normally distributed (the standard deviation was greater than the mean; see Table 1); therefore, in addition, we conducted the same set of regression analyses to predict CES-D at time 2 (with CES-D at time 1 entered at the first step). These analyses revealed that, as anticipated, rumination ( $\beta = .214$ –.315) predicted CES-D depression at time 2 in the avoidant and intrusive thinking regression models (see Table 4). Although the addition of rumination in the PSS (global stress) model significantly increased the variance explained at step 3, in the final model, its effect was rendered not significant. There were no significant interactions. Finally, with respect to somatic symptoms, somatic symptoms at time 1 ( $\beta = .218$ –.286,  $p < .01$ ) and global stress at time 2 ( $\beta = .669$ ,  $p < .001$ ) were significant independent predictors of change. No other main effects or interactions were evident.

## Discussion

The present study provided support for the central hypothesis and represented a rigorous test of a specific diathesis–stress model to predict change in different components of psychological distress. The hypothesis, that the interaction between rumination and stress would predict changes in anxiety and insomnia, social dysfunction, and depression, was partially supported. Change in anxiety and insomnia was consistently predicted by stress,

Table 3

*Hierarchical Multiple Regression Analyses Testing the Effects of Stress and Rumination in Predicting Change in Social Dysfunction Scores at Time 2*

	Predictor Variable	Adjusted $R^2$	$\Delta$ Adjusted $R^2$	Final $\beta$	$F(1, 159)$
Step 1:	Social Dysfunction T1 <sup>a</sup>	.061		.178*	11.267***
Step 2:	PSS T1	.153	.092	-.349**	9.508***
	PSS T2			.099	
Step 3:	RSQ	.150	—	-.563*	.395
Step 4:	RSQ $\times$ PSS T2	.187	.037	.891**	8.101**
Step 1:	Social Dysfunction T1	.061		.261**	11.267***
Step 2:	Avoidance T1	.099	.038	.051	4.339
	Avoidance T2			-.132	
Step 3:	RSQ	.094	—	-.185	.171
Step 4:	RSQ $\times$ Avoidance T2	.117	.023	.450*	4.883*
Step 1:	Social Dysfunction T1	.061		.248**	11.267***
Step 2:	Intrusive T1	.080	.021	-.102	2.582
	Intrusive T2			-.168	
Step 3:	RSQ	.080	—	-.139	1.034
Step 4:	RSQ $\times$ Intrusive T2	.101	.021	.467*	4.576*

<sup>a</sup>T1 and T2 refer to the measures as assessed at time 1 and time 2, respectively. PSS, Perceived Stress Scale; RSQ, Response Styles Questionnaire.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

irrespective of measurement, and its explanation was beyond initial levels of anxiety and insomnia. However, contrary to Nolen-Hoeksema's (2000) findings, the current study did not find that rumination predicted increased anxiety. Its effect seems to be mediated via initial anxiety and stress levels. Although Nolen-Hoeksema (2000) proposed that rumination may be linked to anxiety when ruminators experienced ambiguity about personal control of their life, our data did not support this postulation. This lack of support may be the result of employing a different measure of anxiety. In addition, as our study was circumscribed to two data points, future research should investigate this relationship more closely by employing more data points, and it should also measure personal control directly.

Nonetheless, it appears that an important factor in triggering anxiety is the way a person responds to a stressful situation. This response is crucial, as when avoidant thoughts and intrusive thoughts are present, increased anxiety is observed. Clearly, avoidant thoughts would limit the likelihood of an individual's confiding in others. This fits with Nolen-Hoeksema and Morrow's (1991) assertion that those who do not confide in others about a stressful event will be more prone to negative reactions. In short, avoidance of the problem may lead to the increased probability of a negative reaction, in the form of anxiety. Research by Wenzlaff and associates (1988) suggests that suppressing thoughts can serve to increase rumination; with respect to the present study this may suggest that avoidant thinking leads to increased rumination, which, in turn, increases anxiety. Further research is necessary to establish the mechanism by which avoidant thoughts increase anxiety. These data also extend the studies that have reported significant associations between anxiety and intrusive thinking in children and patient samples (e.g., Kliewer, Lepore, Oskin, & Johnson, 1998; Muris, De Jong, Merckelbach, Postema, & Vet, 1998).

The social dysfunction findings were clear and consonant with the hypothesis. Change in social dysfunction was predicted by the interaction between rumination and each measure

Table 4

*Hierarchical Multiple Regression Analyses Testing the Effects of Stress and Rumination in Predicting Change in Depression (CES-D) Scores at Time 2*

	Predictor Variable	Adjusted $R^2$	$\Delta$ Adjusted $R^2$	Final $\beta$	$F(1,159)$
Step 1:	Depression T1 <sup>a</sup>	.144		.152	27.43***
Step 2:	PSS T1	.375	.231	-.406***	29.81***
	PSS T2			.611***	
Step 3:	RSQ	.430	.055	.214	15.95***
Step 4:	RSQ $\times$ PSS T2	.427	—	.120	.21
Step 1:	Depression T1	.144		.107	27.43***
Step 2:	Avoidance T1	.213	.069	.167*	7.80***
	Avoidance T2			.113	
Step 3:	RSQ	.284	.071	.315**	16.37***
Step 4:	RSQ $\times$ Avoidance T2	.280	—	.049	
Step 1:	Depression T1	.144		.175*	27.43***
Step 2:	Intrusive T1	.177	.033	-.060	4.12*
	Intrusive T2			.043	
Step 3:	RSQ	.266	.089	.277*	19.58***
Step 4:	RSQ $\times$ Intrusive T2	.265	—	.196	.97

<sup>a</sup>T1 and T2 refer to the measures as assessed at time 1 and time 2, respectively. PSS, Perceived Stress Scale; RSQ, Response Styles Questionnaire; CES-D, Center for Epidemiological Studies Depression Scale.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

of stress. This strong, predictive relationship may indicate that social dysfunction was tapping into some elements of academic self-efficacy or self-oriented perfectionism, both of which are salient in student populations (Chemers, Hu, & Garcia, 2001; Flett, Hewitt, Blankstein, & Mosher, 1995; O'Connor & O'Connor, 2003); however, future research is required to investigate potential correlates and concomitants. Furthermore, given that social dysfunction taps into a person's perception of his or her ability to complete tasks and rumination can be conceptualized as a goal-directed process (Martin & Tesser, 1996), it is not surprising that the interaction between rumination and stress was predictive of increased social dysfunction. These moderating effects are all the more striking as they are consistent across the three indices of stress. They also point to the importance of considering psychological distress as a multifaceted concept. If we had assessed only anxiety and depression, we would have concluded wrongly that rumination had more limited predictive utility. Our approach is also consistent with the drive to derive contemporary taxonomies of common distress syndromes (Clarke, Smith, Dowe, & McKenzie, 2003).

Change in depression (CES-D) was predicted by a main effect of rumination in the intrusive and avoidant thinking models. This fits with previous research that has examined rumination and depression (Nolen-Hoeksema & Morrow, 1991); it also extends these findings to a longer time frame, 6 months. The absence of any moderating relationships despite comorbidity and symptom overlap among depression, anxiety, and social dysfunction points to a differential relationship with rumination. Future research should examine the differences between depression, anxiety, and social dysfunction in their respective relationships with rumination and stress, perhaps employing different measures of these constructs.

Some limitations of the present study require note. As the research was conducted with college students it may not be applicable to clinical populations. However, as large numbers of students are reporting psychological distress (Furr, Westefeld, McConnell, &

Jenkins, 2001), it is important for research to address this specific population. Second, the reliance on self-report measures may be a potential limitation and be susceptible to memory biases. Although we cannot rule out that such biases would increase the likelihood that someone who is depressed may, for example, artifactually report higher levels of rumination and stress, the emergence of the interaction effects reduces the likelihood that this is the case. Nevertheless, we ought to replicate these findings by using more objective measures.

Finally, one could argue that the increases in variance explained by the inclusion of the interaction terms are of insufficient magnitude to warrant attention. To our thinking, many studies of this kind are open to this charge; however, in our defense three issues are worthy of comment. First, in this study we have adhered to the accepted guidelines governing statistical significance; hence on this criterion our findings are statistically meaningful. Second, the overarching focus of this study was to test the nature of the relationship between rumination and stress to predict, say, social dysfunction (i.e., moderating or not), not to explain the maximal amount of variance. Third, the ability to predict certain components of psychological distress 6 months after the baseline emphasizes the strength of the relationship between these variables and by implication the magnitude of the effect.

There are clear implications for therapy. Our findings would suggest that in assessing psychological well-being in college students, clinicians should direct attention to components of social dysfunction and rumination, in addition to the traditional focus on anxiety and depression. For example, in the light of recent research that has highlighted that rumination may have positive as well as negative components (Mor & Winquist, 2002), an attempt to enhance one's ability to identify these characteristics would seem sensible. This could be combined with discussion of the strengths and weaknesses of competing coping strategies in the face of stressors (e.g., O'Connor & O'Connor, 2003) and, if necessary, support in implementing changes. This research also points to a dearth in the literature: therapeutic interventions to treat and manage social dysfunction ought to be developed further. To this end, there are some promising findings for group therapy in some patient groups (e.g., Cerbone, Mayo, Cuthbertson, & O'Connell, 1992).

Taking these findings together, we believe that this study represents a rigorous test of a diathesis–stress model that is of clinical and theoretical importance. To conclude, this study demonstrates that rumination and alternate measures of stress are differentially associated with the components of psychological distress. Moreover, it underlines the utility of employing self-report measures that tap different measures of distress, in particular, social dysfunction.

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