

Effect of neuroticism, response style and information processing on depression severity in a clinically depressed sample

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ABSTRACT

Background. It is postulated that individuals who score high on neuroticism would ruminate when faced with stress. A ruminative response style to depression is associated with faulty attribution and higher dysfunctional beliefs, which in turn is associated with a higher level of depression and hopelessness. Distraction is associated with less severe depression. Evidence supporting these hypotheses mainly comes from a non-clinical population. Hence it is not clear if these theories apply to clinical depression.

Method. One hundred and nine out-patients suffering from unipolar major depressive disorder were recruited to test these theories, using model-fitting analysis technique.

Results. Certain rumination responses to depression were associated with higher levels of depression and hopelessness, faulty attribution and dysfunctional attitudes when gender and the level of depression were controlled. Principal component analysis of the Rumination Scale yielded four factors: ‘symptom-based rumination’, ‘isolation/introspection’, ‘self-blame’ and ‘analyse to understand’. Unlike the other factors, ‘analyse to understand’ did not correlate with the level of depression. Model fitting analysis, though not reflecting entirely the true model, captures most of the hypothesized relationships between important variables. Neuroticism was associated with stress. Rumination was associated with an increased level of dysfunctional beliefs and faulty attribution, which in turn was associated with increased severity of depression. Distraction, in contrast, was associated with lower levels of negative mood.

Conclusion. The results of our study support the importance of teaching depressed patients to manage their depressive symptoms by avoiding rumination about their symptoms and engaging in distracting and pleasurable activities.

INTRODUCTION

The Response Style Theory of Depression (Nolen-Hoeksema, 1987) postulated that individuals with a ruminative response to depression are prone to having more severe and prolonged depressive episodes. In contrast, people who employ distracting responses have less severe and shorter depressive episodes. Rumination responses are defined as cognitions

and behaviours that repetitively focus depressed individuals’ attention on their symptoms, and the possible causes and consequences of these symptoms. Distracting responses are cognitions and behaviours that take the person’s mind off the symptoms of depression, active attempts to focus on pleasant or neutral activities. The tendency to engage in self-focused, ruminative responses or distracting responses to depressed mood appear to be a fairly stable trait (Just & Alloy, 1997; Nolen-Hoeksema *et al.* 1994; Roberts *et al.* 1998). There is also evidence

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that female subjects tend to score higher on rumination (Nolen-Hoeksema, 1987; Nolen-Hoeksema *et al.* 1991).

Studies have found that rumination increased or maintained dysphoric mood in non-clinical dysphoric subjects (Barden *et al.* 1985; Lyubomirsky & Nolen-Hoeksema, 1993; Nolen-Hoeksema *et al.* 1993; Just & Alloy, 1997), in a naturalistic study of bereavement (Nolen-Hoeksema *et al.* 1994) and in clinically depressed patients (Kuehner & Weber, 1999). The evidence that distracting responses shorten depression seems weaker. Distraction has been found to hasten the lifting of dysphoria in a laboratory study (Morrow & Nolen-Hoeksema, 1990) and to predict reduction in depression severity (Bagby *et al.* 1999). However, distraction was found neither to shorten depressive episodes in a naturalistic study (Nolen-Hoeksema *et al.* 1994) nor to predict the development of depression or the severity of the first depressive episode in college students (Just & Alloy, 1997).

The nature of rumination is not properly understood despite the empirical support for rumination as an important variable in depression. Symptom-focused and self-focused subscales have been found in recent studies (Bagby & Parker, 2001; Cox *et al.* 2001). Roberts *et al.* (1998) derived three factors in the Rumination Scale: Symptom-based rumination, Introspection/Self-isolation and Self-blame. The Rumination Scale consists of conceptually mixed items. Some items focus on their depressive symptoms, while other items focus on trying to understand the reasons behind the depression. Hence, it may be the former items that contribute to the deepening of depression levels. One could argue that analysing and understanding the factors that may have contributed to the onset of depression could be helpful in its alleviation and possibly in preventing future episodes. Therefore, this study also aims to investigate which aspects of rumination may relate with levels of depression.

There is evidence that rumination and neuroticism predicted an increase in depressive symptoms, particularly among those with an initial high depression level (Nolan *et al.* 1998). Neuroticism, a personality trait, was hypothesized to link with heightened sensitivity to life stressors, high levels of worry and a tendency to experience negative emotions (Eysenck & Eysenck,

1985). Numerous studies have found neuroticism a powerful variable for unipolar depression. It has been found to be associated with vulnerability to depression in initially non-depressed people (Hirschfeld *et al.* 1989; Boyce *et al.* 1991) and with the long-term course of clinical depression (Kerr *et al.* 1972; Weissman *et al.* 1978; Akiskal *et al.* 1981; Hirschfeld *et al.* 1986; Duggan *et al.* 1990; Scott *et al.* 1992). The association between neuroticism and depression is hypothesized in part to be due to individuals with high level of neuroticism tending to experience negative life events in various longitudinal studies (Watson & Clark, 1984; Eysenck & Eysenck, 1985; Fergusson & Horwood, 1987; Magnus *et al.* 1993; Saudino *et al.* 1997). Nolen-Hoeksema (1991) also postulated that rumination influenced mood by using a depressogenic explanation for negative life events. Ruminative responses, in turn, were hypothesized to potentiate negative thinking by augmenting the effects of negative moods on information processing (Smith & Greenberg, 1981; Ingram & Smith, 1984; Lewinsohn *et al.* 1985; Pyszcznski & Greenberg, 1987; Nolen-Hoeksema, 1991). Indeed Lyubomirsky & Nolen-Hoeksema (1995) found that dysphoric students induced to ruminatively self-focus on their feelings and personal characteristics endorsed significantly more faulty internal, global and stable attributions for hypothetical negative events than non-dysphoric students or dysphoric students who were asked to distract and problem-solve. As a result of misattribution, individuals were likely to maintain their dysfunctional beliefs of excessive self-blame, overgeneralization or dichotomous thinking, which in turn leads to more negative thoughts. Furthermore, it was found that dysphoric students who ruminated were also found to have increased negative expectancies about the future (Carver *et al.* 1979; Needles & Abramson, 1990).

To sum up, there is substantial evidence of rumination being associated with the maintenance of depressive symptoms, faulty attributions, less optimism and less sense of control from studies using non-clinical dysphoric populations. Despite the impressive evidence from non-clinical samples, the evidence that rumination accentuates depression and interferes with information processing in clinically

depressed subjects is relatively sparse. Whether the findings of rumination studies cited above apply to clinically depressed patients is unknown. In this study, we explicitly test the path model regarding the mechanism of how rumination and distraction may affect mood. More specifically we hypothesize that after experiencing stress, such as life events or social difficulties, subjects who score high on neuroticism tend to ruminate. Rumination about depression symptoms is associated with higher dysfunctional beliefs and faulty attributions of negative events to themselves and perception that these events are global and stable. These are associated with higher levels of depression. On the other hand, distraction is associated with less severe depression.

The purposes of this clinical study are four-fold: (1) to investigate whether the Rumination subscale of the Response to Depression Questionnaire is a unitary construct or whether it consists of several constructs, some of which may not relate to levels of depression; (2) to investigate if distraction is associated with less severe depression; (3) to investigate whether the tendency to engage in rumination was associated with endorsing faulty attributions and a higher level of dysfunctional assumptions; and (4) to test the hypothesized relationships between relevant psycho-social variables in unipolar depression using statistical modelling techniques.

METHOD

Participants

Patients were recruited from two groups of consecutive referrals to a mood disorders specialist service, the Affective Disorders Outpatients Unit of the South London and Maudsley National Health Service Trust. One hundred and nine patients suffering from DSM-IV (American Psychiatric Association, 1994) unipolar depression, were recruited into the study. The sample had a mean age of 44.4 (S.D. = 12.8). The majority (60/109) was female. The mean number of past episodes was 4.8 (S.D. = 4.7) and the average age of onset of 27.4 (S.D. = 13.0). The criteria of chronic depression were fulfilled by 78.6% of the sample. Marital status was: 53.2% married or cohabiting, 14.7% divorced, 31.2% single and 0.9% widowed. Over half of the

sample (60.6%) was in full or part-time employment. There were no significant differences between the first and second groups of patients in terms of demographic variables. All patients were taking antidepressant medications.

Procedure

This is a cross-sectional study. Questionnaires were sent out with the letter of appointment four weeks in advance. Patients were asked to fill in all the questionnaires and bring them back as part of a thorough out-patients' assessment. On the day of the assessment, the research assistant, who was a psychology graduate and was trained in the Structured Clinical Instrument for DSM-III-R (SCID) (First *et al.* 1996) and the Hamilton Rating Scale for Depression (HAM-D) (Hamilton, 1960) interviewed the patients. The patients then attended a medical interview with one of the junior psychiatrists working in the Affective Disorders Unit. Final diagnoses were made in the meeting with the consultant psychiatrist, using all relevant information from the SCID, the medical interview and medical notes. There was 100% independent agreement between the SCID and the clinical diagnosis of major depressive disorder.

Measures

Response Style Questionnaire (RSQ)

The RSQ (Nolen-Hoeksema & Morrow, 1991) consists of a 21-item Ruminative Response Scale (RRS) and a 11-item Distracting Response Scale (DRS) that assess responses to depressed mood. The RRS assesses three types of response to depressed mood: focusing on the self; focusing on the symptoms; and focusing on the possible consequences and causes of moods. The DRS assesses how often participants engage in pleasant, non-dangerous activities in response to depression. Each item in the RSQ consists of four-point Likert scales ranging from 'almost never' to 'almost always'. The RSQ was reported to have good test-retest reliability ($r = 0.7$ after 5 months, Nolen-Hoeksema *et al.* 1994).

Attributional Style Questionnaire (ASQ)

The ASQ (Peterson *et al.* 1982) measures the extent subjects make global, internal and stable attributions to hypothetical events. The authors reported good internal reliability (alpha coefficient 0.8 to 0.7) and test-retest reliability

(r ranged from 0.57 to 0.70). The events could be grouped into achievement or affiliation events. In this study, a modified version of 10 negative events was used. Each item is scored on a seven-point scale. Composite scores, used in the Model Fitting, are calculated for global, internal or stable attributions separately.

Short Version of Dysfunctional Attitude Scale (DAS)

The short version of the DAS (Power *et al.* 1994) is a 24-item self-report inventory designed to measure maladaptive attitudes. The items are rated on a seven-point scale ranging from 'totally agree' to 'totally disagree'. The shortened version is derived from a factor analytical study of the original DAS Form A and Form B. In the validation study, the total score was 75.7 (s.d. = 20.76) in a GP sample and 85.6 (s.d. = 22.8) in a depressed sample.

Beck Depression Inventory (BDI)

The BDI (Beck *et al.* 1961) is a well known 21-item inventory designed to measure the severity of depression in adults and adolescents. The inventory enquires into the somatic, cognitive and behavioural aspects of depression. Each item of the BDI is scored on a four-point scale (0–3). Good validity and test–retest reliability are reported.

Beck Hopelessness Scale (BHS)

The BHS (Beck *et al.* 1974) 20-item true–false inventory. The items consist of statements, which reflect different facets of the spectrum of attitudes and expectations about the future. The scale has good internal consistency (coefficient alpha 0.93) and construct validity.

Eysenck Personality Questionnaire (EPQ)

The EPQ (Eysenck & Eysenck, 1991) is a 106 yes–no items schedule. Neuroticism (N) is a subscale of the EPQ. A typically high N scorer is hypothesized to be moody and frequently depressed and also hypothesized to be overly emotional and to find it difficult to get back to an even keel after each emotionally arousing experience. The EPQ is found to have high test–retest reliability after 1 month (r ranged from 0.77 to 0.89).

List of Recent Experiences

The List of Recent Experiences (Henderson *et al.* 1981) is a self-report checklist of life events. The authors reported an acceptable level of reliability. It consists of 71 life events pertaining to illness, injury or accident; bereavement; pregnancy or childbirth; changes in relationship; separation; change in living conditions; studying or work situation; financial situation and legal difficulties.

List of Chronic Difficulties

The List of Chronic Difficulties is a list of 15 chronic difficulties based on the List of Recent Experiences (Henderson *et al.* 1981). Chronic difficulties are defined as social difficulties lasting 2 years or longer. It is intended to capture social stress in the area of health, employment, close relationship, caring for sick relatives, religion and finances.

RESULTS

Subjects mean scores of the main variables were: BDI 27.1 (s.d. = 14.4); HAM-D 13.8 (s.d. = 8.1); BHS 11.9 (s.d. = 6.4); Rumination 35.4 (s.d. = 11.7); Distraction 13.8 (s.d. = 5.8); DAS 99.4 (s.d. = 24.9); Neuroticism 17.9 (s.d. = 4.4). The mean ASQ scores were: Internal 5.0 (s.d. = 1), Stable 4.5 (s.d. = 1.3) and Global 4.0 (s.d. = 1.3). BDI scores correlated significantly with HAM-D scores ($r = 0.73$, $P < 0.01$). The number of past episodes did not correlate significantly with rumination, distraction, BDI or HAM-D. Female patients had a significantly higher rumination mean score (37.5, s.d. = 12.1) than male (32.9, s.d. = 10.7), $t = 2.05$, $P < 0.05$, two-tailed. There was no significant difference between male and female patients in their distraction scores. After controlling for gender, rumination total scores predicted significantly BDI total scores ($B = 0.35$, s.e. = 0.12, $t = 2.82$, $df = 2,91$, $P = 0.006$) but not HAM-D. Distraction total scores predicted significantly BDI total scores ($B = -0.54$, s.e. = 0.24, $t = -2.24$, $df = 2,91$, $P < 0.03$) and predicted significantly HAM-D scores ($B = -0.42$, s.e. = 0.13, $t = -3.14$, $df = 2,99$, $P = 0.002$) after gender was controlled.

A series of linear multiple regressions was carried out to predict BHS scores, DAS scores, neuroticism scores, attribution total scores and

Table 1. Details of multiple regressions when BDI and gender were controlled for using 'enter' procedure

Dependent variable	Regression					Predicting variable	B	S.E.	t	P
	R	R ²	F	df	P					
BHS	0.72	0.52	22.77	4,85	0.001	BDI	0.27	0.04	7.01	0.001
						Gender	-2.47	1.00	-2.46	0.001
						Ruminat.	0.09	0.05	2.01	0.05
						Distract.	-0.21	0.09	-2.47	0.02
DAS	0.57	0.26	7.44	4,86	0.001	BDI	0.37	0.17	2.11	0.05
						Gender				NS
						Ruminat.	0.86	0.21	4.04	0.001
						Distract.				NS
Neuroticism	0.44	0.19	4.23	4,86	0.001	BDI				NS
						Gender				NS
						Ruminat.	0.13	0.04	3.30	0.001
						Distract.				NS
Attribution	0.48	0.23	5.46	4,77	0.001	BDI	0.05	0.23	2.61	0.01
						Gender				NS
						Ruminat.	0.881	0.03	2.99	0.004
						Distract.				NS
No. past episodes	0.38	0.14	3.57	4,89	0.001	BDI				NS
						Gender	2.15	1.00	2.14	0.04
						Ruminat.				NS
						Distract.	0.22	0.09	2.43	0.02

Gender, male = 1, female = 2; Ruminat., rumination; Distract., distraction.

number of past episodes. The predicting variables were subjects' rumination scores and distraction scores after gender and BDI scores were controlled for using the 'enter' procedure. Table 1 gives the details of the regressions. As can be seen, rumination contributed significantly to all the regressions after gender and current levels of BDI were controlled. When HAM-D was used instead of BDI, regression analyses yielded similar results.

Principal component analysis

Principal component analysis was used to abstract factors from the Rumination Scale using varimax rotation and factors were subjected to orthogonal rotation. Items with factor loading of value >0.4 on only one factor were included. The Rumination Scale yielded four factors: factor 1 'symptom-based rumination' ($\alpha=0.79$) accounted for 35.2% of the total variance. Factor 2 'isolation/introspection' ($\alpha=0.78$) accounted for 8.1% of the total variance. Factor 3 'self-blame' ($\alpha=0.67$) accounted for 7.3% of the total variance and factor 4 'analyse to understand' ($\alpha=0.77$) accounted for 6.5% of the total variance. BDI scores

correlated significantly with factor 1 ($r=0.38$, $P<0.001$ two-tailed), factor 2 ($r=0.26$, $P<0.02$ two-tailed) and factor 3 ($r=0.23$, $P<0.05$ two-tailed). Similarly BHS scores correlated with factor 1 ($r=0.31$, $P<0.002$ two-tailed), factor 2 ($r=0.32$, $P<0.002$ two-tailed) and factor 3 ($r=0.24$, $P<0.02$ two-tailed). Factor 4 did not correlate significantly with BDI or BHS. Table 2 summarizes the items and their loadings.

Model fitting

The final stage of data analysis of this clinical sample involved structural equation model fitting. Model fitting was conducted on standardized variables using raw maximum likelihood estimation of the program Mx (Neale *et al.* 1999). The fit of a model to the observed data is indicated by the χ^2 , the number of degrees-of-freedom (df), and associated P value. In raw data analyses, the χ^2 index is derived by the difference in log-likelihood ($-2LL$) of the data under the hypothesized model and the $-2LL$ of a saturated model (model with maximal number of parameters). Precision of path estimates were obtained by likelihood-based confidence intervals (CI) in Mx (Neale & Miller, 1997).

Table 2. Factor loadings of Ruminative Response Scale*

	F1	F2	F3	F4
1 Think about how you don't seem to feel anything anymore	0.749	0.241	0.246	-0.110
2 Think about how you don't feel up to doing anything	0.748	0.215	0.270	0.118
3 Think about how hard it is to concentrate	0.679	0.172	0.043	0.127
4 Think about how passive and unmotivated you feel	0.583	0.094	0.169	0.360
5 Think about feelings of fatigue and achiness	0.538	-0.166	0.253	0.140
6 Think about all your shortcomings, failings, faults and mistakes	0.447	0.350	0.230	0.248
7 Go away by yourself and think about why you feel this way	0.153	0.811	0.179	0.007
8 Go some place alone to think about your feelings	0.109	0.779	0.245	0.032
9 Think about how alone you feel	0.290	0.598	0.037	0.310
10 Think 'Why can't I get going?'	0.261	0.086	0.839	0.087
11 Think 'Why do I always react this way?'	0.295	0.143	0.790	0.211
12 Listen to sad music	0.025	0.191	0.566	0.025
13 Analyse recent events to try to understand why you are depressed	0.023	0.171	0.016	0.797
14 Analyse your personality to try to understand why you are depressed	0.178	0.040	0.237	0.767
15 Try to understand yourself by focusing on your depressed feelings	0.370	0.160	0.126	0.688

* Loadings for items selected for factor scales are represented in boldface.

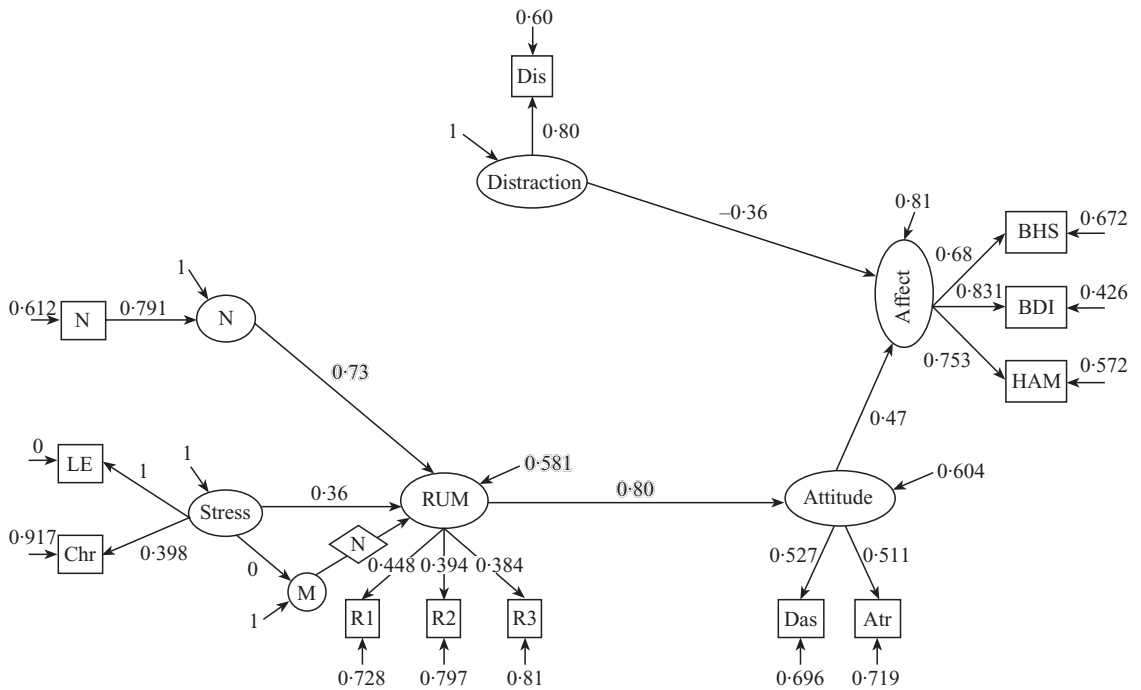


FIG. 1. Standardized path coefficients of the moderator model. (N, Neuroticism (EPQN); LE, life events, Chr, chronic difficulties; RUM, rumination; Das, Dysfunctional Attitude Scales; Atr, Attribution; Dis, distraction; HAM, Hamilton Rating Scale for Depression; BDI, Beck Depression Inventory; BHS, Beck Hopelessness Scale.)

The purpose of the model fitting analysis was not to test all possible models, but to test models based on conceptual hypotheses. In the framework of this modelling, the hypothesized position of the latent variables (from Stress to Affect, Model 1) was based on theories on

the aetiology of depression. The standardized parameter estimates of Model 1 are depicted in Fig. 1. Subjects with high neuroticism tended to ruminate when experiencing social stress (Watson & Clark, 1984). Rumination is associated with an increased level of dysfunctional

Table 3. *Maximum Likelihood estimations of the correlations between the 12 variables*

	LEDS	CHR	NEUR	RUM1	RUM2	RUM3	DAS	ATTR	BHS	BDI	HAM	DIS
LEDS	1											
CHR	0.42	1										
NEUR	0.19	0.20	1									
RUM1	0.15	0.00	0.30	1								
RUM2	0.22	0.09	0.37	0.44	1							
RUM3	0.20	0.11	0.23	0.51	0.38	1						
DAS	0.30	0.19	0.36	0.35	0.40	0.29	1					
ATTR	0.22	0.16	0.46	0.36	0.38	0.25	0.48	1				
BHS	0.14	0.22	0.44	0.29	0.28	0.21	0.40	0.38	1			
BDI	0.09	0.11	0.27	0.37	0.21	0.22	0.34	0.39	0.66	1		
HAM	-0.11	0.03	0.31	0.26	0.08	0.09	0.33	0.35	0.57	0.74	1	
DIS	0.06	-0.08	-0.09	-0.19	0.06	0.17	-0.16	-0.09	-0.32	-0.21	-0.28	1

beliefs and faulty attribution (Ingram & Smith, 1984; Pyszcznski & Greenberg, 1987; Nolen-Hoeksema, 1991), which in turn is associated with increased severity of depression (Nolen-Hoeksema, 1991). Distraction, on the other hand, is associated with lower depression affect (Nolen-Hoeksema, 1987). The positioning of the latent variables in the diagram was further justified by the observed correlational pattern: variables loading on affect (BDI, BHS, HAM-D) were more correlated with variables that were positioned closer in the chain (i.e. ASQ, DAS) than the ones further away (i.e. life events). In Table 3 the expected correlations between the standardized variables of the saturated model are given.

In Model 1, neuroticism was entered once as an independent variable and once as a moderator variable, indicated by a diamond shape on the path from stress through M to rumination. M denotes the part of the effect of stress on neuroticism that is proportional to neuroticism. Because the path is the observed variable neuroticism itself, the effect of this path on rumination would be proportional to the product of stress and neuroticism, i.e. the interaction between the two variables. This model specified six latent factors: stress (life events plus chronic difficulties), neuroticism (N), rumination, distraction, attitude (ASQ plus DAS) and affect (BDI plus BHS plus HAM-D). The model assumed both a depression-increasing pathway via rumination and a depression-decreasing pathway via distraction. Rumination represented the total of three factors of the rumination subscale: factor 1 'symptom-based rumination', factor 2 'isolation/introspection' and factor 3

'self-blame'. Factor 4 'analyse to understand' was not included as it did not correlate with depression symptoms.

This moderator model did not account well for the observed relationships in the data, indicated by the significant P value ($\chi^2=77.4$, $df=50$, $P=0.008$, $AIC=-22.6$). All regression coefficients were significant except the moderator effect of neuroticism on the effect of stress on rumination. This path could be dropped without significant decline in fit ($\chi^2=77.4$, $df=51$, $P=0.01$, $AIC=-24.6$). Hence a model (Model 2) was specified without the moderator effect and compared to a new saturated model (with neuroticism entered only as an independent variable) to deduce the fit. All regression coefficients were significant ($\chi^2=81.7$, $df=49$, $P=0.002$, $AIC=-16.3$).

To improve the fit of Model 2, a path from stress to neuroticism was added (Model 3) ($\chi^2=76.9$, $df=48$, $P=0.003$, $AIC=-19.1$), but the path from stress to rumination became weaker. Dropping this path showed no decline in fit. The regression coefficients of the final model (Fig. 2) were high and significant. The fit of this model was better (indicated by the lowest AIC value) but unfortunately still remained significant ($\chi^2=76.9$, $df=49$, $P=0.01$, $AIC=-21.1$). The final model depicted neuroticism as a state (rather than trait) influenced by social stress that is associated with rumination. Rumination is associated with higher levels of dysfunctional assumptions and faulty attribution which in turn are associated with subjects' level of depression. The negative regression coefficient from distraction to affect indicated that distractive coping is associated with lower depression.

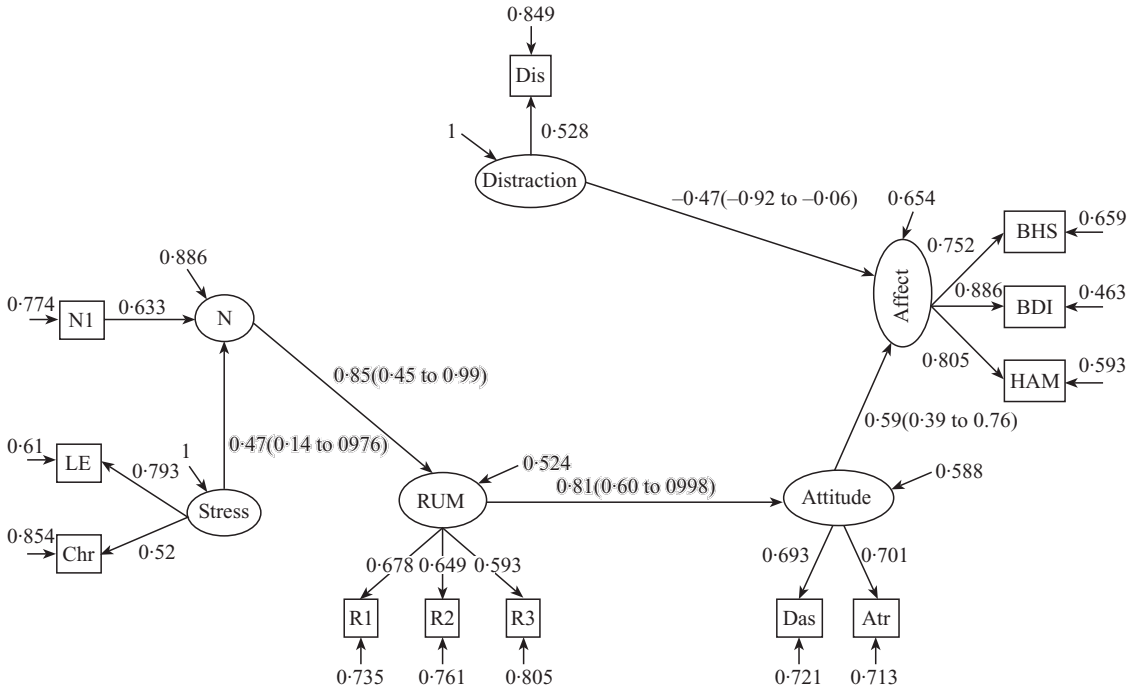


FIG. 2. Standardized path coefficients of the final model. (N, Neuroticism (EPQN); LE, life events; Chr, chronic difficulties; RUM, rumination; Das, Dysfunctional Attitude Scales; Atr, Attribution; Dis, distraction; HAM, Hamilton Rating Scale for Depression; BDI, Beck Depression Inventory; BHS, Beck Hopelessness Scale.) Squares indicate observed variables and circles latent factors. Variances of observed and latent variables are constrained to unity. This implies that all coefficients are standardized and that the amount of variance they account for at each point can be calculated from the squared path estimates i.e. the EPQN score explains 40% of the latent N factor; the latent Stress factor explains 22% of latent N, whereas 78% is residual variance (0.886²). Since Stress and Distraction are not influenced by other latent factors in the model, their variance is entirely determined by residual variance (1).

DISCUSSION

The findings in this cross-sectional study of depressed patients are consistent with the predictions of the Response Style Theory (Nolen-Hoeksema, 1987). Rumination was found to be associated with high depression scores and distraction with a low level of depression. Furthermore, rumination contributed significantly to greater hopelessness and distraction contributed significantly to less hopelessness.

Consistent with previous studies (Nolen-Hoeksema *et al.* 1991), female subjects in this study scored significantly higher on rumination than male subjects. This may account for higher incidence of depression in females. However, the findings of ruminative or distracting response in clinical depression reported in this study are not confounded by individuals' current level of

depression or subjects' gender. Both depression and gender were controlled for when a ruminative or distracting response was used to predict other psychological variables. These findings suggest that people who make an effort to take their minds off their depressive feelings by engaging in activities that used to make them feel better are more likely to feel more in control of their moods and hence less helpless and hopeless. On the other hand, people who dwell on their depressive symptoms are likely to be more hopeless.

The results of the Principal Component Analysis of the Rumination Scale yielded four factors. Our first three factors are very similar to the three factors in the study of Roberts *et al.* (1998). However, factor 4 'analyse to understand' was not found in their study. This factor consists of items such as 'analyse recent events

to try to understand why you are depressed', 'analyse your personality to try to understand why you are depressed' and 'try to understand yourself by focusing on your depressed feelings'. Factor 4 did not correlate with the mood scores. This suggests that analysing events or one's own personality to understand the depression may not be a detrimental activity. In a way one could argue that trying to understand is the first step in problem-solving or changing one's own behavioural pattern in order to get out of the current episode and to prevent further relapses or recurrences. Our finding suggests that the concept of rumination needs further refinement.

Rumination contributed significantly to ASQ and hopelessness scores in regression analyses. These results are consistent with the findings that rumination induction leads to endorsement of faulty internal, global and stable attribution in students (Lyubomirsky & Nolen-Hoeksema, 1995) and increased negative expectancies about the future (Carver *et al.* 1979). Rumination also contributed significantly to the DAS scores. The items of the DAS reflects dichotomized thinking, self-blame and over-generalization, which lead to more negative thoughts and increased level of depression (Beck, 1976). Hence our findings support that rumination accentuates depression and interferes with information processing in clinical depression.

The final path model in this study does not reflect entirely the true model because of a number of non-significant small correlations between certain variables. For example, there was a non-significant correlation between distraction and rumination factor 1 as well as distraction and dysfunctional attitudes. However, the final model does capture the important relationships between variables as hypothesized. According to our path modelling results, distraction is associated with lower negative affect. On the whole, rumination seems to be a strong variable. The rumination arm of our final model had a moderate fit. However, the hypothesized outcome on rumination from the interactive effect between neuroticism and stress was not borne out in our study. When we tested the effect of neuroticism interacting with stress, the pathway from stress to the moderating variable had a value of zero. Hence our finding does not support the postulation that individuals who scored high on neuroticism are likely to

ruminate and self-focus (Roberts *et al.* 1998). Instead, our study suggests that irrespective of the baseline level of neuroticism, subjects' level of stress was associated with neuroticism, which is associated with high levels of rumination. In our model it is suggested that subjects' dwelling on depressive symptoms is associated with making faulty information processing. One possible reason for ruminators' tendency to be associated with depressogenic attributions and dysfunctional assumptions is that rumination activates the individual's negative schema and memories (Ingram & Smith, 1984; Nolen-Hoeksema, 1991; Pyszcznski & Greenberg, 1987). According to the cognitive model (Beck, 1976), the individual's beliefs about the events in their world regarding causality are dictated by the more central assumptions. Individuals who have strong beliefs about themselves being a fraud or taking excessive responsibility when things go wrong are more likely to ruminate. Negative memories of past rumination and self-focused depressive episodes and ineffectual coping may be associated with more depressogenic attributions. Internal attribution may feed into self-blame cognitions and activate incompetence or unlovable schema. Global attribution may contribute to over-generalization. Stable attribution contributes to hopelessness.

To conclude, our findings suggest that it is important to teach depressed patients to use adaptive mood management, particularly not to dwell on their self-focused rumination. Distraction may have the desirable outcome of less depression and less hopelessness, which in turn may enable patients to problem-solve and think more clearly. Initially, patients could be taught to use distraction as a short-term measure to relieve their mood. When their information processing and thinking is less negative, patients can then be guided to examine their attributions and assumptions from different perspectives.

Our finding that distraction contributes to the number of previous episodes in the regression analyses is unexpected and needs replicating. It may be a spurious finding. However, the relationship between distraction, rumination and the number of previous episodes may be quite complex. Rumination may lead to more depressive episodes initially. However, as patients experience more depressive episodes, they may learn to distract to cope better.

There are certain drawbacks of this study. The cross-sectional design excludes any statements of causality. A longitudinal follow-up of the sample may shed more light. This study is further weakened by the lack of a normal control sample. Lastly, our understanding of what makes people become less depressed is very limited. In the full model, the path between distraction and affect is not very strong. Further research into depressed patients' coping strategies is warranted.

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