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Ruminative Thought Styles and Depressed Mood

Rumination is most commonly defined as self-focused thoughts on depressed mood and the possible causes and consequences of that mood (Butler & Nolen-Hoeksema, 1994). The relationship between depressive rumination and depressed mood has been supported consistently in the research literature (Abela, Payne & Moussaly, 2003; Conway, Mendelson, Giannopoulos & Csank, 2004; Ito et al., 2003; Lyubomirsky & Nolen-Hoeksema, 1993; Martin & Dahlen, 2005; Nolen-Hoeksema, Morrow, & Fredrickson, 1993; Nolen-Hoeksema, Parker & Larson, 1994; Street, 2002). Adults who ruminate in response to their depressed mood are more likely to experience future depressed mood, and to exhibit a longer duration and more extreme levels of depression than those who distract in response to distress (Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema, et al., 1993; Nolen-Hoeksema & Morrow, 1993; Nolen-Hoeksema, et al., 1994). These results have been replicated in adolescent (Garnefski et al., 2002; Kraaj et al., 2003), child (Abela, Brozina & Haigh, 2002), and geriatric (Kraaij, Pruyboom & Garnefski, 2002) samples. Concerns have been raised, however, that the current conceptualization of rumination, and the instrument most commonly used to assess this construct, may be biased by depressive symptoms (Treyner, Gonzales & Nolen-Hoeksema, 2003). Because of these criticisms, it may be prudent to explore new ways to measure rumination to clarify our understanding of this construct and its relation to depressed mood.

Depressive Rumination and Depressed Mood

Depressive rumination and its relationship to depressed mood have been investigated extensively in both survey studies and experimental designs. Experiments

have typically involved assigning participants to either a rumination or distraction condition. These studies have demonstrated that dysphoric participants, assigned to the rumination condition, experience greater increases in depressed mood than do dysphoric participants who distract and non-dysphoric controls in either condition (Lyubomirsky, Caldwell & Nolen-Hoeksema, 1999; Lyubomirsky, Kasri and Zehm, 2003; Trask & Sigmon, 1999). Rumination also appears to impair performance on subsequent cognitive tasks (e.g., concentration; Lyubomirsky, et al., 2003) and increases retrieval of negative autobiographical memories (Lyubomirsky, et al., 1999).

Survey studies are more commonly used to examine the relationship between rumination and depressed mood in both cross-sectional and longitudinal designs. For example, Nolen-Hoeksema et al. (1993) followed participants for a period of 30 days as they completed daily diaries of mood and reported on how they typically responded to their mood. Gender differences were found in response to depressed mood with women more likely to ruminate than men. Those who engage in depressive rumination also experienced more days of severe depressed mood than people who did not ruminate in response to their depressed mood. Similarly, Just and Alloy (1997) followed a sample of undergraduate participants and found that non-depressed participants who reported a ruminative coping style were significantly more likely to experience a depressive episode in the following 18 months than individuals who did not report a ruminative coping style. A ruminative response style at baseline also predicted more severe subsequent episodes of depression.

Although much of the research on rumination and depression is based on non-clinical samples, research with clinical populations supports the generalizability of these

findings to clinical levels of depression. Keuhner and Weber (1999), for example, examined rumination in a sample of hospital patients diagnosed with unipolar depression. Their findings showed that greater rumination was significantly and positively related to depressed mood. At follow-up (four weeks after discharge from hospital) participants who continued to experience clinically significant levels of depression reported more ruminative coping than did participants who had remitted from their episodes.

Limitations of the Current Definition and Measurement of Rumination

The majority of research investigating rumination employs Nolen-Hoekema's definition of rumination: thoughts and behaviours that focus the depressed individual's attention on his or her symptoms and the possible causes and consequences of those symptoms (Butler & Nolen-Hoeksema, 1994). This conception of rumination is as a coping mechanism, a style of responding to depressed mood as the name of the questionnaire (i.e., the Response Style Questionnaire [RSQ]; Butler & Nolen-Hoeksema, 1994) suggests. This definition restricts the possible content of ruminative experiences. Martin and Tesser (1996), for instance, suggest a ruminative style of thinking can include a varying topics, valence and temporal direction. Rumination is process or style of thinking, not a content domain. Thus, while understanding ruminations about depressed mood is important, this definition precludes the exploration of rumination in other possible domains.

In addition to definitional issues, the majority of rumination research employs the RSQ designed to assess depressive rumination. The instructions for the scale ask participants to rate how often they engage in certain thoughts when they are "feeling

sad, blue or depressed” (Treyner et al., 2003, p. 251). Assessing rumination as a coping response to current depressed mood is an important area of research, but again this instructional set leaves little room for the investigation of ruminative thought during times when an individual is not experiencing depressed mood. During remission from a depressive episode, for example, the questionnaire would direct individuals to what they did when they were depressed, not what they currently do.

Previous research suggests that rumination may not simply be a reaction to a current depressed mood (Ali & Toner, 1996) but may also be a reaction to a negative event prior to the development of depressed mood (Boelen, van de Bout, & van de Hout, 2003; Ito et al., 2003; Nolen-Hoeksema, et al., 1994). Nolen-Hoeksema (1994) noted that, prior to adolescence, boys show equal or higher levels of depression than girls. Yet, even at this stage, girls demonstrate greater ruminative behaviors suggesting that rumination is not always related to higher levels of current depressed mood. Nolen-Hoeksema (1994) proposed that difficulties arise when girls enter puberty and begin to encounter a greater frequency of uncontrollable stressors than do boys. This author argues it is the combination of rumination and uncontrollable problems that initially elicits depressed mood and brings about the shift in gender differences in depression prevalence. However, this proposition highlights the potential problem with the current conceptualization of rumination. If rumination is a response style to depressed mood, how could it exist prior to the experience of that mood?

The current measure of rumination may also be too heavily focused on the symptoms of depression themselves, thus artificially inflating the relationship between rumination and depressed mood. Treyner et al. (2003), for instance, found that 12 of the

22 items on the Response Style Questionnaire (RSQ) were similar to those items found on the Beck Depression Inventory (BDI). Because of this item bias, the authors suggested that the RSQ might assess depressive symptoms more than rumination per se. The authors created a new measure of rumination by removing the depression-biased items from the RSQ. The remaining 10 items revealed a two factor structure: brooding and reflection. The brooding items, while not similar to BDI items, still relate to depressed mood. Further, one of the remaining items, "Listen to sad music" does not appear to assess ruminative thinking. Thus, the majority of items on the RSQ specifically assess ruminations related to depressed mood.

The focus on depressive content does not easily allow for an investigation of rumination about other topics or in other areas (e.g., anxiety). Researchers have suggested that it may be the content of rumination that distinguishes between depressive rumination and worry. Martin and Tesser (1996) proposed that the difference between worry and rumination lies in the temporal direction of the thoughts, with worry being oriented toward the future, and rumination oriented to the past. Therefore, although both depressive rumination and worry involve intrusive, uncontrollable, recurrent and repetitive thoughts, depressive rumination involves negative thoughts about the past whereas worry pertains to negative thoughts about potential future threats. Worry is a cardinal feature of generalized anxiety disorder (American Psychiatric Association, 2000) and depressive rumination is related depressed mood. Given the high comorbidity of depression and anxiety (and GAD in particular; Kendler, Gardner, Gatz, & Pedersen, 2007), it is reasonable to suggest that the two constructs are related. If the content is different, but the process is the same, worry and

depressive rumination may spring from the same well. It is possible that the underlying style of thinking (i.e., repetitive, intrusive, recurrent, and uncontrollable) manifests as different disorders depending on the content. Again, the RSQ does not allow for an assessment of the general tendency towards a ruminative style of thinking.

Setting aside content and considering a dispositional ruminative thought style allows for a broader investigation of its influence on mood. Assessing the general tendency to think repetitively, recurrently, uncontrollably and intrusively, would allow for an examination of how a ruminative style, in response to a stressor, increases the likelihood of experiencing depressed mood. Indeed, it would be possible to assess how rumination might increase the salience and impact of stressors. Ruminating about minor stressors may inflate their perceived importance, thereby increasing their emotional impact. Answers to these questions are possible once rumination is conceptualized and measured as a stable disposition towards repetitive, recurrent, intrusive and uncontrollable thinking.

McIntosh, Harlow and Martin (1995) created a measure of Global Rumination to assess this general style of thinking. Unfortunately, the scale has not demonstrated adequate internal reliability. It could be argued that the poor internal reliability of the Global Rumination Scale is simply the result of the small number of items, however internal reliability is especially important to a scale that is intended to measure a single construct as is the case for the phenomenon of a dispositional style of thinking. A ruminative style of thinking should comprise a single phenomenon, and therefore a single construct, making it prudent to create a scale that is as sound as the theory on which it is based. A psychometrically sound measure of a ruminative thought style,

which is not biased by valence, content or temporal orientation was developed. This article describes the development and evaluation of the Ruminative Thought Style Questionnaire (RTS) The first two studies describe the creation and evaluation of the RTS and the final study employs this new measure to investigate fluctuations in rumination and mood over time via a diary study of undergraduate students.

Studies 1 and 2 – Scale Development and Evaluation

Studies 1 and 2 were designed to develop and evaluate the Ruminative Thought Style Questionnaire (RTS) as a measure of the general tendency for a ruminative style of thinking. Based on Martin and Tesser's definition, and using the rational sequential approach to scale construction, items were generated to tap four characteristics (i.e., repetitive, recurrent, uncontrollable and intrusive thinking) that differed by both valence (i.e., included were positive, negative, and neutral items) and temporal orientation (i.e., items that emphasized the past, present and future were included). As suggested by Golden, Sawicki, and Franzen (1984) more items were generated for the initial pool than was actually necessary, and the validation process then pared down this set of items. Sixty items were generated for the initial item selection phase to allow for a final scale of approximately 20 items. A final scale of 20 items was decided upon a priori because this number is sufficient to achieve good internal reliability while maintaining ease of administration (Kline, 1993).

Items consisted of several statements of ruminative behaviors that respondents rated in terms of their self-descriptiveness. Ratings were made on a 7-point, Likert-type scale from 1 (not at all descriptive of me) to 7 (describes me very well). Once the initial pool was created, three separate raters examined the items for clarity of wording,

appropriateness to the construct and comprehensiveness of the definition of global rumination. No items were dropped or changed at this stage. The first sample was used for item selection and validation. The second sample was used to examine the psychometric properties of the RTS and to cross-validate the initial findings.

Method (Studies 1 & 2)

Participants

Study 1 – The first sample was comprised of 118 psychology undergraduate students from the University of Western Ontario who participated for course credit. The mean age was 18.86 ($SD = 1.08$) with a range of 17 to 24 years. Seventy-seven percent of the participants were female and 97% were Caucasian.

Study 2 – The second sample consisted of 309 undergraduate students. The mean age was 18.96 ($SD = 3.72$) with a range of 17 to 48 years. Sixty-seven percent of participants were female and the majority of participants were Caucasian (64%). All students participated for course credit in an introductory psychology course.

Materials

Ruminative Thought Style Questionnaire (RTS). At this stage, the scale consisted of 60 items describing possible facets of global rumination (e.g., “I find myself reliving events again and again” or “When I am looking forward to an exciting event, thoughts of it interfere with what I am working on”). Respondents were asked to rate each item on how well it described them using a Likert scale where 1 = “Not at all” and 7 = “Very well”. In the first sample, Cronbach’s alpha for the 60-item scale was .95.

Response Styles Questionnaire (RSQ). The RSQ (Butler & Nolen-Hoeksema, 1994) consists of 22 items that describe how people might respond to depressed mood

(e.g., I think “why can’t I get going”). On a Likert-type scale, ranging from 1 – “never” to 4 – “always”, participants were asked to rate how often they responded to depressed mood in a ruminative fashion. The scale exhibits excellent internal consistency (e.g., Cronbach’s $\alpha = .90$) as well as adequate convergent and predictive validity (Butler & Nolen-Hoeksema, 1994; Nolen-Hoeksema, 2000). The internal reliability in study 1 was $\alpha = .90$.

Automatic Thoughts Questionnaire (ATQ). The ATQ (Hollon & Kendall, 1980) was developed to measure the frequency with which an individual experiences negative automatic thoughts over a one-week period. This scale consists of 30 items, each of which is rated on a 5-point scale, with higher scores indicative of a greater frequency of negative thinking. Example items include “I can’t get started.” and “What’s wrong with me?”. The ATQ has excellent reliability with split-half and coefficient alphas of .97 and .96, respectively (Hollon & Kendall, 1980). The internal consistency for the ATQ in this study was $\alpha = .95$.

Global Rumination Scale. The Global Rumination Scale (McIntosh, Harlow, & Martin, 1995) is a 10-item scale designed to measure rumination as a general tendency towards repetitive thought. The items tap into the tendency for mental rehearsal, increased frequency and decreased controllability of thoughts. Respondents rate items on how well they describe their usual behavior. Sample items include “I seldom think about things that happened in the past” (reverse scored) or “I often get distracted from what I am doing with thoughts about something else” (McIntosh et al., 1995). Cronbach’s alpha for the current study was marginally acceptable ($\alpha = .63$).

Beck Depression Inventory II (BDI-II). This 21-item scale was used to measure

the intensity of depressed symptoms (Beck, Steer, & Brown, 1996). For each item, participants chose the statement that best described how they felt in the past two weeks. Each statement has a numerical value ranging from 0 to 3 with higher scores indicating greater depressive symptomology. The scale has excellent psychometric properties and is considered appropriate for use in non-clinical samples (Dozois & Covin, 2004). For the current study, Cronbach's alpha was .88.

Beck Anxiety Inventory (BAI). The Beck Anxiety Inventory (Beck & Steer, 1990) is a 21 item scale assessing the frequency of various symptoms of anxiety. Participants are asked to rate how often they have been bothered by the symptoms on a scale of 0 to 3. For the current study, Cronbach's alpha was .92.

Penn State Worry Questionnaire (PSWQ). The Penn State worry questionnaire (Meyer, Miller, Metzger & Borkovec, 1990) is a 16 item scale assessing general worry. The scale has a possible range of scores from 0 to 80. Participants are asked to rate how typical items are of themselves where 1 = not at all typical and 5 being very typical. Items include "I worry if I do not have enough time to do everything" or "Many situations make me worry". For the current study, Cronbach's alpha was .94

Shipley Institute of Living. The Shipley Institute of Living Scale (Shipley, 1940) is a measure of verbal ability. Participants are asked to find the most appropriate synonym for a list of 40 words. This measure was included as a test of divergent validity as rumination should not be related to verbal ability.

Marlowe-Crowne Social Desirability Scale. The Marlowe-Crowne Social Desirability Scale (Crowne & Marlow, 1960) is a self report questionnaire consisting of 33 true/false items. Items include "I am always courteous, even to people who are

disagreeable” or “Before voting I always thoroughly investigate the qualifications of all the candidates”. Scores range from 1 to 33 with higher scores suggesting a greater attempt at positive self presentation. This questionnaire was also included as a measure of divergent validity and to ensure that social desirability did not influence responses on the RTS.

Procedure

Participants were tested in groups of 20 or less. Upon arrival at the testing room, an explanation of the research was provided for the participants, as well as instructions on how to complete the questionnaires. Participants were given the opportunity to ask questions before proceeding. If participants wished to continue participating, they were asked to sign consent forms. Once completed, packages of the questionnaires were administered. Following testing, participants were given a debriefing sheet which outlined the research hypotheses in greater detail, and provided resources for further information. The procedure for study 2 was the same as that for study 1 except that participants also completed the RTS by phone 2 weeks later to allow for an examination of test-retest reliability.

Results and Discussion (Studies 1 & 2)

Study 1 - An a priori decision was made that the final scale would be comprised of approximately 20 items. A 20 item scale increases the scale’s internal reliability and assesses a construct comprehensively (Kline, 1993) while keeping administration time to a minimum. The initial pool of 60 items then needed to be reduced. The entire item pool had an alpha of .95. Alpha if item removed was first assessed to identify the weakest items. Deletion of any of the items produced only minimal change in the alpha

coefficient; thus, other considerations were used to reduce the initial item pool. Because global rumination is proposed to be a general style of thought, regardless of content, valence or temporal direction, the final scale should comprise a single factor. Thus, items were arranged in order of item-total correlation from highest to lowest. Each item was then examined on its positive correlation with concurrent measures (e.g., global rumination) and lack of correlation with divergent measures (e.g., verbal ability). The final scale included items from all of the intended domains (repetitiveness, intrusiveness, uncontrollability, and recurrence), both future and past temporal orientation, and positive, negative and neutral valence. All further analyses refer to the final 20 item scale.

The final, 20 item scale (see Appendix A), exhibited excellent internal reliability (coefficient alpha = .92). The means and standard deviations of all measures, and their intercorrelations, are presented in Table 1. The RTS was positively correlated with depressed mood, anxiety, and all other measures of repetitive thought. This instrument did not correlate significantly with social desirability or with verbal ability. These findings support the convergent and divergent validity of the RTS. The correlation between the RTS and global rumination (.64), was significantly larger than the correlation between the RTS and the RSQ (.31; $z = 1.96, p < .05$) suggesting that the RTS assesses a more global style of rumination than depressive rumination. The correlation between the RSQ and BDI-II and the correlation between the RTS and BDI-II were not significantly different ($z = 1.25, n.s.$).

To ensure that the RTS was not simply assessing mood congruent cognitions, partial correlations were conducted between the RTS and BDI-II controlling for

automatic negative thoughts The correlation between the RTS and BDI-II remained significant ($r = .24, p < .01$). Partial correlations were also conducted controlling for RSQ to ensure that the RTS was not only assessing depressive ruminations. Again, the correlation between RTS and BDI-II remained significant ($r = .23, p < .01$).

Study 2 - Means and standard deviations of all measures are presented in Table 2. The alpha coefficient for the 20 item RTS scale (see Appendix A) was .87. The test-retest for the scale was high ($r = .80, p < .01$). It should be noted that participants first completed the RTS on paper whereas it was administered by telephone at follow-up. Although differences in the modality of administration may have affected the results, this is unlikely. The results suggest that the RTS assesses a fairly stable construct at least over this restricted timeframe. The internal reliability (coefficient alpha) for the RTS at follow-up was .89.

Table 2 also presents the correlations between the RTS and the other measures. These results replicate those found in Study 1, as the RTS correlated with BDI-II, BAI and the other measures of repetitive thought. The one difference between this sample and the sample from study 1 was that all measures were significantly, negatively correlated with social desirability. However, this was not unique to the RTS and the lack of a significant relationship with verbal ability provides continued support for the divergent validity of the RTS. The correlation between RSQ and BDI-II was significantly greater than was the correlation between RTS and BDI-II ($z = 30.89, p < .05$). However, this is not surprising given the depression-biased items of the RSQ. Again, partial correlations showed that RTS scores were significantly and positively correlated with depressed mood after controlling for ATQ ($r = .17, p < .01$) and RSQ ($r = .17, p < .01$).

In order to investigate the factor structure of the RTS, a principal components analysis of the RTS was completed. Interpretation of Cattell's (1966) scree plot suggested that a one-factor solution was the most parsimonious. The first factor accounted for 28.93% of the variance and the item factor loadings for the 20 items ranged between .4 and .8. These findings, in combination with the high internal consistency, support the hypothesis that the scale is comprised of a single factor.

At this stage, the RTS appears to be psychometrically sound with a strong alpha coefficient. Further, it has demonstrated good convergent validity with the RSQ, Global Rumination Scale, and the BDI-II. This measure also correlated with the PSWQ suggesting that it may also tap worry features of ruminative thought, a finding further supported by the significant correlation with the BAI. The scale has demonstrated good divergent validity with measures of social desirability and verbal ability.

Findings from the second study confirm those found in the first replicating the convergent and divergent validity of the RTS. Further, results show that the scale has adequate test-retest reliability. As hypothesized, the scale is comprised of a single factor. Thus, although the scale contains items of different valence and temporal direction, it appears to reliably assess a general tendency towards repetitive, recurrent, intrusive and uncontrollable thoughts.

Study 3 - Longitudinal Diary Study

As previously mentioned, researchers have suggested that depressive rumination is a stable phenomenon (Leen-Feldner, Zvolensky, Feldner, & Lejuez, 2004; Martin & Tesser, 1996; Nolen-Hoeksema et al., 1993). It is possible that a disposition towards ruminative thinking is a vulnerability to experiencing depressed

mood. Also, if a ruminative style is stable over time, and continues even when depressed mood remits, this could be a contributing factor in the relapse of depression. Thus, this study was designed to investigate ruminative thought style and mood over time by following participants over a period of three weeks.

Depressive rumination has been purported to predict future depressed mood (Just & Alloy, 1997). However because the RSQ contains many items that may be assessing depressive symptoms, these findings may simply be the product of current depressed mood predicting subsequent depressed mood. The Ruminative Thought Style Questionnaire was designed to avoid this confound by excluding items that relate to symptoms of depression. RTS scores were hypothesized to show predictive ability for future depressed mood beyond that of RSQ scores when controlling for baseline mood.

In addition to the examination of a ruminative style and mood over time, stressful events were also included in the daily diary logs. As mentioned previously, it is possible that ruminative thinking may impact the experience of stressful events by inflating the perceived importance of these events due to ruminating on them. Further, Hammen (2006) suggested that depressed individuals may increase the stress they experience by behaving in ways that increase interpersonal stress which, in turn, increases depressed mood. Hammen proposed that behaviors, such as constant reassurance seeking and other dependent behaviors, in addition to clinical factors, such as irritability and pessimism, tax interpersonal relationships thereby leading to negative interpersonal reactions from friends and family. A ruminative style may be another factor that generates stress if ruminative thinking leads to uncontrollable and repetitive discussions

of ones problems. Therefore, greater ruminative thinking at baseline was expected to be related to higher levels of daily stressors.

Method (Study 3)

Participants

Two hundred and thirty one undergraduate psychology students completed the initial set of questionnaires. The mean age of participants was 19.1 ($SD = 4.12$) with a range of 17 to 47 years. Of this initial group, 78% were female and the majority of participants were Caucasian (60%). From this initial group, 227 participants completed all six daily logs; therefore only 4 participants were lost due to attrition. Students participated for course credit in an introductory psychology course.

Materials

Ruminative Thought Style Questionnaire (RTS). The 20 item final scale was used. For the current study, the Cronbach's alpha was .88.

Response Styles Questionnaire (RSQ). The internal reliability in study 3 was $\alpha = .78$.

Beck Depression Inventory II (BDI-II). For the current study, Cronbach's alpha was .86.

Beck Anxiety Inventory (BAI). For the current study, Cronbach's alpha was .88.

Daily Ruminative Thought Style Questionnaire (DRTS). This version of the RTS was created for the purposes of this study. The 20 items were modified to allow respondents to report ruminative behaviors that occurred over the previous 24 hours. For example, the item "I find that my mind often goes over things again and again" was revised to read, "My mind has been going over things again and again". The Cronbach's

alpha of the scale was calculated for each of the 6 log days and ranged from .93 to .96. Test-retest reliability was calculated between the first daily log and the sixth (approximately 3 weeks) and showed moderate reliability ($r = .57, p < .01$). This moderate reliability suggests that the scale is able to detect fluctuations in daily rumination, but that there is some constancy for the tendency to ruminate.

Positive and Negative Affect Scale –Expanded Form (PANAS – X; Watson & Clark, 1994). This scale consists of 20 mood adjectives: ten positive and ten negative. Respondents rate on a five-point scale the degree to which they have experienced each of these moods in the past 24 hours. The scale ranges from 1 – “not at all” to 5 – “very much”. When assessing mood within a 24 hour time period, the positive mood subscale has an alpha of .89; the negative mood subscale has an alpha of .87 (Watson & Clark, 1994).

Stressful Daily Events. (Brantley, Waggoner, Jones, & Rappaport, 1987). This scale consists of 156 daily hassles commonly experienced by people. Examples include “Someone butted in front of you in line” or “You lost something of value”. Respondents endorse items that they have experienced in the past 24 hours.

Procedure

Participation consisted of two stages. During the initial session, participants completed the set of paper and pencil questionnaires in groups of 20 or less. During the next phase, participants completed 6 online diary logs over the following 3 weeks. Participants were informed that they would be sent reminders via e-mail directing them to a website where they could enter their ID numbers and complete the online questionnaires. Questionnaire packages were distributed after informed consent was

obtained. Twice weekly, reminder emails were sent out to all participants asking them to log in and complete the online questionnaires. Once participants had completed the final log, they were sent debriefing information via e-mail and provided with contact information in the event that questions arose regarding the study or their participation. Questionnaires completed at baseline included the RTS, RSQ, BDI-II, BAI. The questionnaires completed for the online diary logs included the DRTS, the PANAS and the Stressful Daily Events.

Results (Study 3)

Correlations of Baseline Measures of Rumination and Mood

Initial correlations between the two forms of rumination (RSQ and RTS) and the two mood measures (BDI-II and BAI) are shown in Table 3 along with the means and standard deviations for each variable. All four variables were significantly and positively intercorrelated. The correlations between RTS and the two mood measures did not differ significantly from the correlations between RSQ and the two measures of mood (BDI, $z = 1.25$, n.s.; BAI, $z = 1.32$, n.s.) To examine the unique variance due to the RTS, partial correlations were conducted between this measure and the two mood measures while controlling for RSQ scores. The RTS remained significantly related to both BDI-II ($r = .36$, $p < .01$) and BAI ($r = .32$, $p < .01$). Neither of these partial correlations was significantly different from the original correlations ($z = .89$, n.s.; $z = .86$, n.s.). Similarly, the RSQ remained significantly related to BDI-II ($r = .23$, $p < .01$) and BAI ($r = .17$, $p < .01$) scores while controlling for RTS. These partial correlations did not significantly differ from the original correlations (BDI-II, $z = 1.17$, n.s.; BAI, $z = 1.07$, n.s.).

Longitudinal Diary Analyses

Hierarchical Multiple Regression. Hierarchical multiple regressions were conducted to test the ability of the RTS and RSQ to predict negative mood longitudinally as measured on the first and final day of the diary study. It was hypothesized that because the RSQ may be tapping depressed mood, the RTS would be a better predictor of future depressed mood when controlling for current depressed mood. The RTS was a significant predictor of negative mood at both 1-week ($\beta = .20, p > .01$) and 3-week follow-up ($\beta = .32, p > .01$), even after controlling for baseline BDI-II scores. In contrast, the RSQ was not a significant predictor at either time period after controlling for baseline BDI-II scores (time 1, $\beta = .07, n.s.$; time 2, $\beta = .11, n.s.$).

To examine the influence of mood and rumination on stress, baseline mood and the two forms of rumination were entered as predictors of subsequent stressful events. Each of these instruments significantly predicted the total number of stressful events reported over the diary period (RTS, R^2 change = .10, $p < .05$; BDI, R^2 change = .18, $p < .05$; RSQ, R^2 change = .04, $p < .05$). However, RTS continued to be a significant predictor of follow-up stress after controlling for initial BDI-II scores ($\beta = .16, p > .01$), whereas the RSQ did not ($\beta = .07, n.s.$).

To investigate if negative mood at baseline was predictive of daily ruminative thoughts, initial BDI-II scores were entered into a regression with daily rumination on the final day of the diary study as the criterion. Results showed that the BDI-II was a significant predictor ($\beta = .26, p > .01$). However, when baseline RTS scores were entered in the first step, and BDI-II scores in the second, the predictive ability of BDI-II scores was no longer significant ($\beta = .08, n.s.$).

Hierarchical Linear Modeling (HLM). HLM was used to to examine the relationship between baseline measures and longitudinal data. Level 1 variables included daily mood, daily stressful events and daily ruminative thinking (DRTS). Because of the nature of the RSQ's instructions, (What do you generally do when you are depressed, down or blue?) it was not possible to adapt this to a measure of daily depressive rumination. Level 2 variables included baseline mood, RTS scores, and RSQ scores. Using HLM analyses, we tested for moderation effects by examining the interaction among variables. For example, the impact of a stress by ruminative thinking interaction on daily fluctuations in mood was examined.

Level 1 Analyses

HLM was used to investigate the possible interaction of negative mood and stress predicting level of daily ruminative thoughts. There were significant main effects for negative mood, $t(228) = 11.14$, $p < .05$ (Coefficient = 1.58), and stress, $t(228) = 5.648$, $p > .05$ (Coefficient = 1.01), but the interaction of negative mood and stress did not significantly predict daily rumination $t(228) = -1.60$, n.s.) beyond the main effects. Because Hammen (2006) suggested that depressed individuals are likely to experience an increase in interpersonal problems, stressful events that were interpersonal in nature were selected out as a measure of interpersonal stress. The interaction between interpersonal stress and negative mood was assessed for its ability to predict daily rumination. Again, significant main effects were found for negative mood $t(228) = 14.90$, $p < .05$ (Coefficient = 1.60), and interpersonal stress, $t(228) = 4.71$, $p < .05$ (Coefficient = 2.52). The interaction was still not significant at the $\alpha = .05$ level, but there did appear to be a trend towards significance, $t(228) = -1.73$, $p = .08$.

Both daily rumination, $t(228) = 10.22$, $p < .01$ (Coefficient = .13), and daily stress, $t(228) = 2.95$, $p < .01$ (Coefficient = .15), were significant predictors of daily negative mood. However, the interaction between the two was not significant, $t(228) = .43$, n.s. This finding suggests that greater rumination and stress independently predict increased negative mood on a particular day. However, ruminating specifically in response to stress, does not appear to predict increases in depressive symptoms beyond that of each construct individually.

Level 2 Analyses

Baseline BDI-II scores were entered as a level 2 variable to examine their relationship to the daily diary (i.e., level 1) variables. There was a significant main effect for BDI-II scores predicting daily negative mood even after controlling for daily stress and daily rumination, $t(228) = 4.04$, $p < .01$. Baseline BDI-II significantly predicted the degree to which daily stress and daily negative mood were related, $t(228) = -.2.485$, $p < .05$ where individuals with lower baseline depressed mood showed a stronger relationship between daily rumination and daily stress. The RSQ was entered as a level 2 variable to examine its relationship to within person variance at level 1. RSQ significantly predicted variance in daily negative mood, $t(228) = 4.29$, $p < .05$. However, once baseline BDI-II was entered into the equation, RSQ was no longer significant $t(227) = 1.84$, n.s

RTS scores were also entered as a level 2 variable to examine their relationship to mood over the diary period. The RTS significantly predicted mood over time, $t(228) = 8.25$, $p < .01$, and continued to be a significant predictor even after baseline BDI-II score was controlled for, $t(228) = 5.31$, $p < .01$. Further, the RTS was a significant predictor of

negative mood even after including daily stress into the equation, $t(227) = 4.67, p < .01$. Only when daily rumination was added to the equation did baseline RTS fail to be a significant predictor, $t(227) = .48, n.s.$ This result suggests that once daily ruminations are accounted for, the trait measure of ruminative thought style no longer adds to the prediction of daily negative mood.

Discussion (Study 3)

As expected, both measures of rumination were significantly and positively related to baseline depressed and anxious mood as well as to each other. Neither form of rumination was more strongly related to the mood measures than the other, and both forms of rumination offered unique variance in accounting for depressed mood. This finding suggests that indices of rumination assess related but separate constructs. The Ruminative Thought Style Questionnaire appears to tap ruminative thoughts beyond those that are negative in content or related to depressed mood. Its construction, to include positive and neutral items, as well as future and past focused items, allows the RTS to measure aspects of repetitive thought beyond that assessed by the RSQ.

A second difference between the RTS and the RSQ involves their ability to predict negative mood longitudinally. The RTS predicted negative mood at both the first and last day of the diary study after controlling for baseline depressed mood. The RSQ, on the other hand, did not. The depression-heavy items on the RSQ may explain this. If both the BDI-II and the RSQ tap into depressive symptoms, then they would share much of the same variance. If this were the case, including BDI-II scores in the first step of a hierarchical regression would absorb much of the variance in the prediction of subsequent negative mood, leaving little to be accounted for by the RSQ. Given that

the RTS was not limited to depressive rumination, this measure provides an assessment of ruminative thought beyond that directly concerning depressed mood. As such, the RTS explained additional variance in negative mood at later time points. The HLM analyses provided further support that the RTS measures repetitive thinking beyond that of the RSQ. The RTS was able to predict fluctuations in daily negative mood, daily stress and daily ruminations after controlling for baseline mood, whereas the RSQ was not.

Both the RTS and the RSQ were able to predict total stressful events reported over the 3-week diary period. However, the RSQ was unable to predict total stressful events after controlling for baseline depressed mood. Again, this finding could be a function of the RSQ and BDI-II assessing similar constructs. It may seem counter-intuitive to consider rumination leading to subsequent stressful events, however, ruminating about even minor stressors would increase attention paid to them. Ruminative thinking may act as a form of rehearsal, moving the event from short term memory to long term memory, increasing the likelihood that the person will recall and report more of the stressors they encountered than individuals who did not focus as much attention on their daily hassles.

Baseline negative mood was a significant predictor of daily rumination, daily negative mood and daily stress. Further, time 1 BDI-II scores were able to predict the strength of the relationship between daily negative mood and daily rumination. People reporting greater depressed mood at baseline reported greater daily negative mood overall. Further, for those with greater baseline depressed mood, a stronger relationship was demonstrated between daily rumination and daily negative mood than

those with lower baseline depressed mood. In other words, people who showed higher levels of depressed mood at initial testing exhibited greater fluctuations in mood with changes in daily rumination. This is an interesting finding because it suggests that greater daily rumination may result in greater fluctuations in mood for those with higher baseline depressed mood. This finding is in line with what might be expected with a ruminative thinking style. Because the RTS does not only assess ruminations on negative content, it is possible that ruminations of neutral or positive content can shift mood.

HLM analyses also showed that both daily rumination and daily stress were related to daily fluctuations in negative mood. However, the interaction between daily rumination and daily stress did not add any predictive value beyond that of the main effects suggesting that rumination in response to specific stress was not related to changes in negative mood. These results support those of Morrison and O'Connor (2005) who also did not find an interaction between stress and depressed mood. Previous research has found that rumination in response to loss is predictive of subsequent depression (Ito et al., 2003; Nolen-Hoeksema, et al., 1994); however, the non-significant interaction between stress and rumination suggests that the type of stress may influence this relationship. This is also in contrast to findings that suggest rumination moderates the relationship between stress and mood (Moberly & Watkins, 2006). This is an interesting finding because it highlights the possibility that ruminative thinking is not merely a reaction to a stressful event but is an independent contributor to negative mood.

General Discussion

This series of studies was designed to create and implement a new measure of rumination that would allow for the assessment of ruminative thought that is unbiased by current mood, valence and temporal direction. The Ruminative Thought Style Questionnaire showed good psychometric properties and appeared to be a reliable and valid measure of a repetitive, recurrent, intrusive and uncontrollable thinking style. Factor analysis supported the hypothesis that a ruminative thought style is a cohesive construct and that the RTS is composed of one factor. The scale showed good test-retest reliability suggesting that a ruminative thought style is a stable phenomenon over short periods.

The RTS appears to measure a more general thinking style than the RSQ. Partial correlations showed that the RTS accounted for variance in depressed mood even after controlling for RSQ scores. Further, the RTS remained a significant predictor of future negative mood after controlling for baseline depressed mood whereas the RSQ did not. It is possible that this finding may be due to the shared variance of depressed mood and the RSQ because of the depression biased items. If both the BDI-II and RSQ are assessing depressive symptoms, it is likely that the RSQ would not have enough predictive value to account for subsequent depressed mood beyond that of prior depressed mood.

These results bring with them some important theoretical implications. Instead of depressive rumination being the sole focus of investigation, it becomes only one possible topic of ruminative thought. A ruminative style of thinking broadens the scope of potential investigation by making it possible to examine rumination in a much larger context to include periods free of depressed mood. Results of future research into this

general thinking style may clarify the link between separate episodes of depression. It is well understood that the best predictor of future depressed mood is past depression (Lewinsohn et al., 1998), and now there is a hint as to what might underlie this phenomenon. The first influence of rumination in this model is suggested by a ruminative thought style is predicting subsequent stressful events. There are two possible explanations for this finding. First, a dispositional ruminative style may result in paying added attention to stressors, inflating their perceived importance and their subsequent effect on mood. Second, it may be that verbalizing ruminations repetitively places strain on interpersonal relationships increasing the likelihood of interpersonal conflict.

A disposition to ruminate may also exacerbate depressed mood directly. Increased self focus has been consistently related to increased depressed mood (see Mor & Winquist, 2002, for review). The increased self focused attention that coincides with excessive ruminations about ones own experiences could directly increase depressed mood. Further, a ruminative style may lead to greater depressive rumination. This focus on the depressed mood itself may heighten the perceived severity of depressed mood. This increase in depressive rumination could then further impede attempts at problem solving by increasing cognitive load and using up cognitive energies needed to address the initial problem. Also, increased focus on the symptoms of depression could exacerbate feelings of fatigue and lethargy thereby reducing motivation for the individual to take actions to solve their problems (Lyubomirsky et al., 1999).

Another interesting implication of this research is the potential link between a ruminative style and worry. If depressive rumination and worry stem from the same underlying mechanism, this would help to explain the high comorbidity of anxiety and depression. A thought style that is recurrent, repetitive, intrusive and uncontrollable may underlie both worry and depressive rumination. Researchers have suggested that GAD may be a precursor to other anxiety and mood disorders (Clark, Watson & Mineka, 1994). It is possible that the temporal direction of the thoughts shift from future to past, and thus from worry to rumination. Dozois, Dobson and Westra (2004) suggest that constant worry about unpredictable future events leads individuals to experience anxiety and a sense of helplessness. They go on to propose that, over time, this helplessness turns to hopelessness and depressed mood. Thus, it may be that chronic worry about future events creates a sense of helplessness shifting the content of the ruminative thought to past oriented thoughts of failure to adequately anticipate all possible outcomes.

One limitation of these studies was that they focused on undergraduate samples. It is not unreasonable to expect that these results would replicate in clinical samples given that the vast amount of previous research examining depressive rumination has showed similar results with both clinical and non-clinical samples. Much of the previous research on undergraduate samples, for example, has been replicated in clinical samples (Abela et al., 2003; Kuehner & Weber, 1999; Yamada, Nagayamaa, Tsutiyamaa, Kitamuraab & Furukawac, 2003).

Assessing the relationship between worry and depressive rumination is an area of future research that is now possible with the creation of the RTS. Because the RTS

was designed to assess both future and past oriented rumination, the scale is able to assess both depressive rumination and worry. This scale may allow for a better examination of the relationship between these two constructs as well as the relationship between depression and anxiety. Future oriented worry may help individuals to anticipate and prepare for negative future events (Borkovec & Lyonfields, 1993; Borkovec, Ray & Stober, 1998; Freeston, et al., 1994; Wells, 1995, 1997) but, at some point, the focus of the repetitive, recurrent and intrusive thoughts changes in temporal direction to the past. This shift from worry to rumination may result in depressed mood.

Viewing ruminative thought as a tendency toward ruminative thought may also allow for new ways to investigate the etiology of this behavior. A paucity of research has been conducted to examine the antecedents of a ruminative style. Understanding why some individuals develop this tendency to ruminate may help researchers to devise better treatment and preventative strategies. The Ruminative Thought Style Questionnaire will also allow for an expansion of research in this area to identify the role of rumination aside from that specifically in response to depressed mood. This scale will enable us to examine rumination prior to and during remission from depressive episodes, which may help us to determine its link to the onset of and relapse into depression. It may also be used to examine the relationship between rumination and worry, and the possible underlying mechanism shared by the two constructs, thereby clarifying the comorbid relationship between depression and anxiety. This is a significant shift from the current conceptualization of rumination and the future implementation of this scale may bear out some very important research in the depression area.

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Appendix A

Ruminative Thought Style Questionnaire (RTS)

For each of the items below, please rate how well the item describes you.

| | Not at all | | | | | | Very well |
|---|-------------------|---|---|---|---|---|------------------|
| 1. I find that my mind often goes over things again and again | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. When I have a problem, it will gnaw on my mind for a long time | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. I find that some thoughts come to mind over and over throughout the day | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. I can't stop thinking about some things | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. When I am anticipating an interaction, I will imagine every possible scenario and conversation | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. I tend to replay past events as I would have liked them to happen | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. I find myself daydreaming about things I wish I had done. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. When I feel I have had a bad interaction with someone, I tend to imagine various scenarios where I would have acted differently. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. When trying to solve a complicated problem, I find that I just keep coming back to the beginning without ever finding a solution | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. If there is an important event coming up, I think about it so much that I work myself up | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. I have never been able to distract myself from unwanted thoughts | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. Even if I think about a problem for hours, I still have a hard time coming to a clear understanding | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. It is very difficult for me to come to | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

a clear conclusion about some problems, no matter how much I think about it.

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| 14. Sometimes I realize I have been sitting and thinking about something for hours | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. When I am trying to work out a problem, it is like I have a long debate in my mind where I keep going over different points | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16. I like to sit and reminisce about pleasant events from the past | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17. When I am looking forward to an exciting event, thoughts of it interfere with what I am working on | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18. Sometimes even during a conversation, I find unrelated thoughts popping into my head | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19. When I have an important conversation coming up, I tend to go over it in my mind again and again | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 20. If I have an important event coming up, I can't stop thinking about it. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |