

DISTINCT DIMENSIONS OF ANXIETY AND DEPRESSION: ANXIETY AND
RUMINATION DIFFERENTIALLY PREDICT DEPRESSED MOOD AND LOW POSITIVE
AFFECT

BY
CHINMAYI TENG SHE

THESIS

Submitted in partial fulfillment of the requirements
for the degree of Master of Arts in Psychology
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2015

Urbana, Illinois

Adviser:

Professor Wendy Heller

ABSTRACT

Rumination is an important transdiagnostic construct associated with both anxiety and depression. However, relationships among the three constructs have mainly been investigated using non-domain-specific self-report inventories, which index overlapping symptoms and do not distinguish well between fundamentally distinct dimensions of anxiety (anxious apprehension and anxious arousal) and depression (depressed mood and low positive affect). The present study investigated relationships among distinct anxiety dimensions, rumination, and depression dimensions using domain-specific inventories. Results indicated that anxiety dimensions of anxious apprehension and anxious arousal have differential relationships with depression dimensions of depressed mood and low positive affect. Furthermore, anxious apprehension and rumination have independent associations with both depressed mood and low positive affect, signifying that the former two are distinct and separable constructs. These results were further validated by confirmatory analyses, which indicated that the distinguishable associations among the constructs are not a result of item overlap among the scales. These findings implicate the importance of respecting the domain specificity of these constructs in examining mechanisms and pathways in the development of psychopathology.

Key words: anxious apprehension, anxious arousal, rumination, depressed mood, low positive affect

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION.....	1
CHAPTER 2: METHOD.....	6
CHAPTER 3: RESULTS.....	10
CHAPTER 4: DISCUSSION.....	17
REFERENCES.....	26

CHAPTER 1

INTRODUCTION

A common characteristic of internalizing psychopathology is a tendency to dwell on negative events, thoughts, or experiences, referred to as rumination. Rumination is viewed as a form of repetitive negative thinking (a process of perseverating on negative themes; Ehrling & Watkins, 2008; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008) and is considered to be a transdiagnostic factor because it is present in several disorders (e.g., Mclaughlin & Nolen-Hoeksema, 2011). Research has focused largely on rumination in relation to affective disorders, and studies suggest that it predicts onset, maintenance, and severity of both anxiety and depression (e.g., Nolen-Hoeksema, 2000).

Research has underscored that neither anxiety nor depression is a unidimensional construct (e.g., Nitschke, Heller, Imig, McDonald, & Miller, 2001; Watson, Clark, Weber, Assenheimer, Strauss, & McCormick, 1995; Watson, Weber Assenheimer, Clark, Strauss, & McCormick, 1995). Anxiety has been shown to include the distinct dimensions of anxious apprehension (Barlow, 1988; Meyer, Miller, Metzger, & Borkovec, 1990) and anxious arousal (Watson, Clark et al., 1995), each of which has unique cognitive, emotional, physical, and neurophysiological characteristics (e.g., Engels et al., 2007, 2010; Heller, Nitschke, Etienne, & Miller, 1997; Nitschke, Heller, Palmieri, & Miller, 1999). Anxious apprehension is characterized by a tendency to worry, to experience concern for the future, to have negative expectations, and to engage in verbal rumination and can be accompanied by fatigue, restlessness, and muscle tension. This dimension of anxiety is primarily present in trait anxiety, Obsessive Compulsive Disorder, and Generalized Anxiety Disorder. In contrast, anxious arousal is characterized by the

tendency to be vigilant for and perceive threat in the present situation, an experience of sympathetic hyperarousal, and symptoms including shortness of breath, pounding heart, dizziness, sweating, and a feeling of choking. This kind of anxiety would characterize the experience of a panic attack in its most extreme expression, or, in lesser magnitude, would characterize responses to perceived potentially threatening situations.

Low activity, anhedonia, and social withdrawal are considered to be hallmarks of depression, which distinguish it from anxiety (Clark & Watson, 1991). Furthermore, depression can be separated into distinct dimensions of low positive affect and depressed mood (Nitschke et al., 2001). Whereas low positive affect reflects lack of interest or pleasure, depressed mood relates primarily to sadness, hopelessness, and despondency and is associated with high negative affect. Scales measuring these dimensions of anxiety and depression have been shown to be psychometrically distinct (Nitschke et al., 2001).

Research on rumination in relation to anxiety or depression has not focused on these distinct dimensions. With regard to anxiety, rumination research has focused mainly on its relationship to the anxious apprehension dimension (e.g., Beck & Perkins, 2001; Nolen-Hoeksema, 1991). With regard to depression, studies examining rumination have not distinguished depressed mood from low positive affect. The present study was designed to identify and distinguish relationships among these constructs and the mechanisms linking them by systematically measuring the relationship of rumination to empirically-supported dimensions of anxiety and depression.

In previous studies investigating the relationship of rumination to anxiety, rumination has been shown to be positively correlated with worry (Segerstrom, Tsao, Alden, & Craske, 2000; Beck & Perkins, 2001), supporting a growing trend to believe that worry and rumination

have so many overlapping features that they may be best subsumed under the same descriptor of perseverative thought or repetitive negative thinking (e.g., McEvoy, Mahoney, & Moulds, 2010; but see Berenbaum, 2010). For example, both worry and rumination include repetitive thought content that is self-focused. Both constructs are related to cognitive inflexibility, difficulty in switching attention away from negative content, performance deficits, poor problem-solving, and an abstract style of thinking (Nolen-Hoeksema et al., 2008). Worry and rumination are also similar in that they are both mechanisms to cope with emotional distress (Hong, 2007).

However, worry may differ from rumination in terms of time orientation, in that worry is typically viewed as more future-oriented and focused on threats that have not yet occurred (Borkovec, Robinson, Pruzinsky, & DePree, 1983; Borkovec, Ray, & Stober, 1998), whereas rumination typically refers to a tendency to dwell on past events and the meaning of those events (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 2008). Additionally, worry and rumination may differ in terms of their functions. Worry may involve more uncertainty, but more possibility of control, regarding an event that has yet to occur, whereas rumination may involve greater certainty, but less control, over an event that has already occurred (Nolen-Hoeksema et al., 2008). To the degree that there are meaningful differences between rumination and worry, they could lead to different psychopathology outcomes (e.g., both worry and rumination together could increase the risk of depressive disorders, whereas worry but not rumination may predict anxiety) and could warrant different preventive or ameliorative interventions.

A direct relationship between rumination and depression after controlling for various factors such as neuroticism and other negative cognitive styles has been identified in many studies (e.g., Flett, Madorsky, Hewett, & Heisel, 2002; Thomsen, 2006; Nolen-Hoeksema et al., 2008). Research on gender differences in depression, which indicates that women ruminate more

than men (e.g., Butler & Nolen-Hoeksema, 1994; Roberts, Gilboa, & Gotlib, 1998a) and have earlier onset as well as higher prevalence rates for depression (Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993) suggests that rumination plays a role in the onset of depression (Nolen-Hoeksema et al., 2008). Rumination has also been implicated in the maintenance of depression (Nolen-Hoeksema 2000; Nolen-Hoeksema et al., 2008). Individuals who persevere in ruminating about the causes and effects of symptoms of distress are likely to remain depressed for longer periods and are more vulnerable to future episodes (Roberts, Gilboa, & Gotlib, 1998b).

Despite the well-established role of rumination in depression (e.g., Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Nolen-Hoeksema et al., 2008), questions have been raised about the measures that have been used to assess this relationship. The most commonly used self-report questionnaire to measure individual differences in rumination—the Ruminative scale of the Response Style Questionnaire (RRS; Nolen-Hoeksema & Morrow, 1991; Treynor et al., 2003,)—has been heavily criticized for its overlap with other depression measures such as Beck Depression Inventory (BDI; Smith & Alloy, 2009). More specific measures may facilitate attempts to understand the relationship between rumination and different dimensions of depression.

The present study overcomes this concern by employing a newer rumination measure, the Rumination-Reflection Questionnaire, which assumes that rumination is a maladaptive form of self-attention (RRQ; Trapnell & Campbell, 1999). In the context of this instrument, which is based on the Five Factor Model of personality (FFM), rumination is defined as the aspect of self-attentiveness that focuses on events perceived to be negative. Reflection, in contrast, is the aspect of self-attentiveness that is motivated by open curiosity or interest in knowing oneself. Rumination is associated with the neuroticism factor on the FFM and reflection with the

openness to experience factor on the FFM, further distinguishing the two constructs. The RRQ rumination scale thus has a narrower focus than the RRS in that the RRQ includes only items that refer to chronic self-attention to negative past events, rather than to affect related to negative thinking in general (Trapnell & Campbell, 1999). This reduces the possibility of shared variance with other scales measuring similar constructs (but see Teasdale & Green, 2004).

Whereas rumination has been shown to be associated with anxious apprehension as well as depression, its links with anxious arousal and the separable dimensions of depression have not been investigated. In the present study, self-report measures were used to examine relations among the distinct constructs of anxious apprehension, anxious arousal, rumination, depressed mood, and low positive affect. Given the weak links between anxious apprehension and anxious arousal and between anxious arousal and depression (e.g., Nitschke et al., 2001), anxious arousal was expected to have weak associations with rumination. Additionally, rumination was expected to have an independent association with depressed mood after controlling for dimensions of anxiety. It was hypothesized that the relationships would be a result of actual variance shared among the constructs rather than an overlap among the items on the six scales. No factor-analytic studies have collectively examined the scales in question, but confirmatory factor analyses were expected to substantiate claims of internal stability of the six scales used in the study.

CHAPTER 2

METHOD

Participants

A total of 600 (420 female) primarily freshman undergraduate psychology students (age range 18-23, Mean 18.81, SD 0.98) were tested in groups of 40-50 individuals and were asked to complete questionnaire measures. The majority of the participants were European American (75.33%), 9.50% were Asian American, 4.83% were African American, 6.83% were Hispanic, 0.50% were Native American, 3.50% were Multiracial and 3.00% preferred not to respond. Participants were recruited through the Psychology Department subject pool and received class credit for participation. Some participants did not complete all questionnaire measures, but at least 576 subjects' scores were available for each scale. The study was approved by the University Institutional Review Board.

Questionnaires

Sample items from questionnaires used in this study are provided in Table 1. The Penn State Worry Questionnaire (PSWQ) was used to assess anxious apprehension (Meyer et al., 1990). This 16-item scale asks participants to rate how characteristic (1= not at all to 5=very typical) each statement is for them. Items on the PSWQ are future-oriented in keeping with the characteristics of worry as described above. Some items on the PSWQ are reverse-scored. The Anxious Arousal subscale of the Mood and Anxiety Symptom Questionnaire (MASQ-AA) was used to assess anxious arousal (Watson, Clark et al., 1995; Watson, Weber et al., 1995). This 17-item state measure asks participants to rate the level of experience (1=not at all to 5=extremely) with each item during the previous week. The Anhedonic Depression scale of the MASQ

(MASQ-AD) was used to assess anhedonic depression (Watson, Clark et al., 1995; Watson, Weber et al., 1995). This 22-item state measure uses the same rating procedure as the MASQ-AA scale. Items load onto two factors, which can be referred to as depressed mood (MASQ-AD8; 8 items) and low positive affect (MASQ-AD14; 14 items; see Nitschke et al., 2001). All items related to low positive affect are reverse-scored.

The Rumination and Reflection Questionnaire (RRQ: Trapnell & Campbell, 1999) was used to assess rumination and reflection. This measure has two subscales, the rumination subscale with 12 items (RRQ-run) and the reflection subscale with 12 items (RRQ-ref). Participants are asked to rate items on a 5-point scale (1=strongly disagree to 5=strongly agree). The RRQ has high internal consistency ($\alpha = .90$ for the rumination scale and $\alpha = .91$ for the reflection scale).

Table 1: Sample items from each measure

PSWQ

- If I don't have enough time to do everything, I don't worry about it.
- My worries overwhelm me.
- I don't tend to worry about things.
- Many situations make me worry.

Anxious Arousal Scale of MASQ

- Startled easily
- Felt faint
- Was trembling or shaking
- Had trouble swallowing

Anhedonic Depression Scale of MASQ (depressed mood items)

- Felt really slowed down.
- Thought of death or suicide.

Anhedonic Depression Scale of MASQ (positive affect items)

- Felt like I had a lot of interesting things to do.
- Felt like I had accomplished a lot.

Rumination scale of RRQ

- My attention is often focused on aspects of myself I wish I'd stop thinking about.
- I always seem to be "re-hashing" in my mind recent things I've said or done.
- Sometimes it is hard for me to shut off thoughts about myself.
- I tend to "ruminate" or dwell over things that happen to me for a really long time afterward.

Table 1(cont.)

Reflection scale of RRQ

- I love exploring my "inner" self.
- My attitudes and feelings about things fascinate me.
- I don't really care for introspective or self-reflective thinking.

CHAPTER 3

RESULTS

Descriptive statistics

Means and standard deviations for the six scales [PSWQ (anxious apprehension), MASQ-AA (anxious arousal), RRQ-rum (rumination), RRQ-ref (reflection), MASQ-AD8 (depressed mood), and MASQ-AD14 (low positive affect),] are provided in Table 2. The values for the descriptive statistics for PSWQ, MASQ-AA, and RRQ-rum are similar to those reported in other studies (e.g., Nitschke et al., 2001; Letkiewicz, Miller, Crocker, Warren, Infantolino, Mimnaugh, & Heller, 2014).

Correlation analyses

Zero-order correlations are provided in Table 3. The PSWQ, MASQ-AA, MASQ-AD8, and MASQ-AD14 were correlated with each other and with the RRQ-rum at $p < 0.05$ [$r(576)$ range 0.09 to 0.52]. As predicted, higher anxious apprehension, higher anxious arousal, higher depressed mood, and lower positive affect were associated with higher rumination. Further, the anxiety dimensions, especially anxious arousal (MASQ-AA), had a significantly higher correlation with depressed mood (MASQ-AD8) than with low positive affect (MASQ-AD14). Rumination (RRQ-rum) had a higher correlation with anxious apprehension than with anxious arousal and a higher correlation with depressed mood than with low positive affect (see Table 4). The RRQ-ref (reflection) did not correlate significantly with any scale except the RRQ-rum [$r(576) = 0.10$, $p < 0.05$].

Linear regression analyses

Two sets of linear regression analyses were conducted with anxiety dimensions and rumination as predictor variables and depression dimensions as dependent variables. This selection of predictor and dependent variables follows research that indicates that anxiety typically precedes depression (e.g., Cole, Peeke, Martin, Truglio, & Seroczynski, 1998; Mineka, Watson, & Clark, 1998).

The first set of linear regression analyses was conducted to examine the relations among dimensions of anxiety, rumination, and the depressed mood dimension of depression. The first regression analysis was conducted with all three predictors in the model. In combination MASQ-AA (anxious arousal), and RRQ-rum (rumination) accounted for a substantial 42% of the variance in MASQ-AD8 [total $R^2 = 0.42$, $F(3, 572) = 140.16$, $p < 0.001$] although PSWQ (anxious apprehension) did not approach significance. Additional regression analyses were conducted to examine the incremental variance accounted for by each of the predictors in MASQ-AD8. See Table 5 for complete results. Of note, PSWQ independently contributed 7% of the variance in combination with MASQ-AA, and 1% of the variance in combination with RRQ-rum. Thus, the results of the first set of regression analyses indicate that both anxious arousal (MASQ-AA) and rumination (RRQ-rum) independently predicted depressed mood (MASQ-AD8). Anxious apprehension (PSWQ) contributed unique variance only in combination with MASQ-AA or RRQ-rum, but not both together.

The parallel set of linear regression analyses was conducted with the low positive affect dimension of depression (MASQ-AD14) as the dependent variable. The first regression analysis was conducted with all three predictors in the model. PSWQ (anxious apprehension) in combination with RRQ-rum (rumination) accounted for 15% of the variance in MASQ-AD14

[total $R^2 = 0.15$, $F(3, 572) = 32.59$, $p < 0.001$], although MASQ-AA (anxious arousal) did not approach significance. Additional regression analyses were conducted to examine the incremental variance accounted for by each of the predictors in MASQ-AD14. See Table 5 for complete results. Of note, MASQ-AA did not contribute unique variance to MASQ-AD14 in combination with PSWQ or in combination with RRQ-rum. Thus, the results of the second set of regression analyses indicate that both anxious apprehension (PSWQ) and rumination (RRQ-rum) independently predicted low positive affect (MASQ-AD14). However, anxious arousal (MASQ-AA) did not contribute additional variance over and above anxious apprehension (PSWQ) and rumination (RRQ-rum).

Confirmatory factor analyses

Confirmatory factor analyses were conducted to provide evidence that the differential relationships among anxious apprehension, anxious arousal, rumination, depressed mood, and low positive affect were not merely a result of item overlap among the scales that did not reflect shared constructs. The Reflection subscale (RRQ-ref) was included in these analyses. After preliminary analyses for skewness and kurtosis of items on the scales, Cronbach's α analyses were conducted to check internal consistency of each scale. Cronbach's α ranged from 0.78 to 0.94 for the scales, indicating high reliability.

Confirmatory factor analysis was conducted on the entire sample (579 participants who completed all the questionnaire items). Multi-item composites were created for each scale such that each scale would have 3 indicators; 18 indicators across the 6 scales would load onto 6 factors of anxious apprehension, anxious arousal, depressed mood, low positive affect, rumination, and reflection. Given that each scale was reliable, it was assumed that the 18

indicators would load onto these 6 factors. Confirmatory analyses were conducted in SPSS-AMOS, using Maximum Likelihood Estimation (which closely approximates normality). Three different models were tested. In model 1, each scale was assumed to load onto one of the six separate factors listed above. In model 2, PSWQ and RRQ-rum were assumed to load onto one factor (on the assumption that anxious apprehension and rumination are similar constructs), and in model 3 RRQ-rum and MASQ-AD8 were assumed to load onto a single factor (on the assumption that rumination and depressed mood are similar constructs). Table 5 provides fit indices for all three models. Model 2 and model 3 provided poor fit for the data, whereas model 1 provided a more acceptable fit [model 1: $X^2(120) = 407.61$, $p < 0.001^{**}$, RMSEA= 0.06, TLI= 0.95, CFI= 0.96].

Confirmatory factor analyses results indicate that the 6 scales are homogenous and have high internal reliability. Thus, the differential relationships among the constructs as found by hierarchical linear regression analyses do not result simply from item overlap across the scales but from substantive associations among anxiety and depression dimensions and rumination.

**** The significance of the chi-square statistic was disregarded, as the sample size in the present study was large. Large sample sizes increase the probability of obtaining significant X^2 values (Tabachnick & Fidell, 2001). The X^2/df ratio, which is often used as a more acceptable fit value (407.61/120), was 3.40 in the present study [values between less than 2 (Ulman, 2001 in Tabachnick and Fidell, 2001) and 5 (Schumacher & Lomax, 2004) are considered acceptable (see Schermelleh-Engel, Moosbrugge, & Müller, 2003 for additional discussion)]. Furthermore, other indices supported the goodness of fit of the model.

Table 2: Means and Standard Deviations for Anxiety, Depression, Rumination, and Reflection Scales (N=576)

Scale	Mean (SD)	Mean (SD) for comparative reference (Nitschke et al., 2001; N=783)
PSWQ	51.54 (15.03)	48.23 (15.83)
MASQ-AA	28.51 (9.21)	27.60 (8.29)
MASQAD-8	17.43 (5.38)	--
MASQAD-14	36.20 (11.11)	--
MASQAD-22	53.62 (14.59)	57.39 (13.73)
RRQ-rum	39.70 (10.64)	--
RRQ-ref	38.87 (9.72)	--

Table 3: Correlations for Anxiety, Depression, Rumination, and Reflections Scales (N = 576)

	MASQ-AA	MASQ-AD8	MASQ-AD14	RRQ-rum	RRQ-ref
PSWQ	0.32**	0.43**	0.37**	0.69**	0.03
MASQ-AA	-	0.53**	0.09*	0.29**	0.04
MASQ-AD8		-	0.51**	0.52**	0.04
MASQ-AD14			-	0.37**	-0.04
RRQ-rum				-	0.10*
RRQ-ref					-

* $p < 0.05$ level (2-tailed).

** $p < 0.01$ level (2-tailed).

Table 4: Significance tests for comparison of correlations

	PSWQ	MASQ-AA	z	MASQ-AD8	MASQ-AD14	z
MASQ-AA	-	-	-	0.53	0.09	11.65**
RRQ-rum	0.69	0.29	10.41**	0.52	0.27	4.20**

* $p < 0.05$ level (1-tailed).

** $p < 0.01$ level (1-tailed).

Table 5: Linear Regression Analyses with MASQ-AD8 and MASQ-AD14 as predictors.

	MASQ-AD8			MASQ-AD14		
	$R^2/\Delta R^2$	F/t	p-value	$R^2/\Delta R^2$	F/t	p-value
	Full model with all three predictors	0.42	140.16	<0.001	0.15	32.54
PSWQ added second to MASQ-AA	0.07	8.28	<0.001	0.10	8.13	<0.001
PSWQ added second to RRQ-rum	0.01	2.81	=0.005	0.01	2.67	=0.008
MASQ-AA added second to PSWQ	0.16	11.97	<0.001	0	-0.67	=0.50
MASQ-AA added second to RRQ-rum	0.16	12.49	<0.001	0	-0.47	=0.64
RRQ-rum added second to PSWQ	0.10	8.66	<0.001	0.04	5.07	<0.001

Table 5 (cont.)

RRQ-rum added second to MASQ-AA	0.15	11.97	<0.001	0.13	9.17	<0.001
PSWQ added third to MASQ-AA and RRQ-rum	0.01	0.98	=0.33	0.01	2.79	=0.005
MASQ-AA added third to PSWQ and RRQ-rum	0.15	12.08	<0.001	0	-0.96	=0.34
RRQ-rum added third to PSWQ and MASQ-AA	0.07	8.40	<0.001	0.04	5.14	<0.001

Table 6: Fit Indices for Confirmatory Factor Analyses for the 6 scales

Model	<i>df</i>	X^2	CFI	GFI	RMSEA	TLI	AIC	BIC
1 (6 factors)	120	407.61	0.96	0.93	0.06	0.95	509.61	732.04
2 (5 factors; Anxious Apprehension-Rum)	125	960.56	0.88	0.81	0.11	0.85	1052.56	1253.18
3 (5 factors; Rum-Depressed Mood)	125	824.522	0.90	0.84	0.09	0.87	.916.52	1117.14

CHAPTER 4 DISCUSSION

Prior studies have examined associations among anxiety, rumination, and depression (e.g., McEvoy & Brans, 2013; McLaughlin & Nolen-Hoeksema, 2011). However, to date, no study has looked at the specific links among the distinct anxiety dimensions of anxious apprehension and anxious arousal, the distinct depression dimensions of depressed mood and low positive affect, and rumination. Findings from the present study indicated that distinct anxiety dimensions had differential associations with dimensions of depression. Furthermore, rumination had an independent relationship with each dimension of depression, after controlling for both dimensions of anxiety. In addition, anxious apprehension and rumination independently predicted both depressed mood and low positive affect (in the absence of anxious arousal). Validating the distinctiveness of these constructs, confirmatory analyses indicated that the associations among the variables were not due to item overlap among the scales. A primary implication is therefore that rumination and anxious apprehension (worry) are not identical constructs. Additional research examining their relationship to depression and other aspects of psychopathology as well as the mechanisms involved is warranted.

Previous studies have shown that anxious apprehension and depression are closely related, and the present study confirmed that anxious apprehension is associated with both dimensions of depression, depressed mood and low positive affect. However, the anxious apprehension-low positive affect relationship appears more robust than the anxious apprehension-depressed mood relationship. Specifically, the anxious apprehension-low positive affect association persisted even in the absence of anxious arousal and rumination, whereas the

anxious apprehension-depressed mood association appears to be completely accounted for by anxious arousal and rumination.

The lack of an independent association between anxious apprehension and depressed mood suggests that features common to both dimensions of anxiety and rumination play a role in this relationship. One feature common to both dimensions of anxiety and rumination is negative affect, the predisposition to experience negative mood states (e.g., Segerstrom et al., 2000). Although research has shown that anxious apprehension and anxious arousal are distinct from negative affect and from each other, moderate correlations have been found between negative affect and dimensions of anxiety (Nitschke et al., 2001). In terms of the present study, this suggests that negative affect is one feature associated with the variance shared by anxiety dimensions and rumination that links them with depressed mood.

The lack of an independent association between anxious apprehension and depressed mood also indicates that anxious apprehension shares additional common features with rumination. These results are consistent with research that indicates that anxious apprehension (worry) and rumination share the common characteristic of repetitive thought, which has been shown to predict anxiety and depression (Segerstrom et al., 2000). Repetitive thought [also known as repetitive negative thinking (Ehring & Watkins, 2008) and perseverative thought (Ruscio et al., 2011)] indicates constant negative self-focused attention. Research suggests that constant negative self-focus can lead to depressed mood through multiple possible pathways. One pathway is that negative self-focus increases maladaptive response to failures (e.g., with negative thoughts, feelings, and isolating behaviors) and reduces adaptive responses to success (Ruscio et al., 2011). A constant focus on one's failures in addition to constant negative self-focus leads to negative affect and thus depressed mood. Thus, present results suggest that the

features of negative affect and repetitive thought account substantially for the association between anxious apprehension and depressed mood.

With regard to the distinct and robust association of anxious apprehension with low positive affect, results are consistent with research that suggests that anxious individuals show less positive affect even after controlling for co-occurring depression (e.g., Brown, Chorpita & Barlow, 1998). McLaughlin, Borkovec, and Sibrava (2007) induced state worry and rumination in a group of participants high in trait worry and rumination and found that both state inductions independently led to low positive affect. They also found that rumination had a larger impact on low positive affect than did worry. Present results show a similar pattern, wherein anxious apprehension and rumination are both independently associated with low positive affect. Additionally, research indicates that individuals who have been diagnosed with anxiety disorders such as GAD, in which worry is a large component, have been found to have a tendency to engage in reduced expressions of positive affect (Eisner, Johnson, & Carver, 2009).

Numerous pathways have been suggested for the reduction in positive affect due to anxiety (Eisner et al., 2009). Work done in the area of social anxiety indicates that socially anxious individuals tend to engage in safety behaviors such as emotion suppression in order to be prepared for and prevent social threats; however, emotional suppression results in reduced opportunities for hedonic activities (Kashdan & Steger, 2006). This model of social anxiety may also explain the association between anxious apprehension and low positive affect. Individuals high in anxious apprehension are likely to be intolerant of situations that have an uncertain outcome (e.g., Dugas, Gosselin, & Ladauceur, 2001) and consequently may engage in safety-seeking behaviors such as avoidance (Grupe & Nitschke, 2013) that similarly reduces their opportunity to seek or take note of experiences that would lead to increased positive affect.

In contrast to the anxious apprehension dimension of anxiety, anxious arousal showed a significant independent association with depressed mood but no association with low positive affect. Although previous research has not adequately focused on examining associations between anxious arousal and the two separable dimensions of depression, present results are inconsistent with those of Watson, Weber et al. (1995) and Nitschke et al. (2001), both of whom found a low association between anxious arousal and anhedonic depression. However, in these studies anxious arousal was not examined in relation to depressed mood and low positive affect separately, and hence an accurate picture of the relationship between anxious arousal and depression may not have emerged.

Research has shown that severe panic, which is associated with high anxious arousal, is often accompanied by negative affect (Limmer, Kornhuber, & Martin, 2015). It is possible that continuous states of high sympathetic arousal and accompanying uncertainty about sources of this arousal lead to increased negative mood or negative affect and thus depressed mood. This is consistent with research showing moderate correlations between anxious arousal and negative affect (e.g., Nitschke et al., 2001). With reference to the present study, the robust independent association between anxious arousal and depressed mood may result from the constant negative mood states associated with both constructs. Indeed, research on disorders such as PTSD, which is associated with increased anxious arousal, shows high co-occurrence of PTSD symptoms with depression, such as MDD (e.g., Flory & Yehuda, 2015).

Literature on interoceptive awareness and interoceptive accuracy in panic and depression suggests possible explanations for the non-association of anxious arousal to low positive affect. Individuals who are high in anxious arousal have been shown to have superior interoceptive awareness (ability to detect changes in the body; Dunn, Stefanovitch, Evans, Oliver, Hawkins, &

Dalgleish, 2010). Research suggests that the hyperarousal seen in disorders such as Panic disorder appears to stem from heightened sympathetic arousal, the awareness of that arousal (interoceptive awareness), and misattribution of the sources of that arousal (Limmer et al., 2015). However, in individuals with anhedonic depression, interoceptive awareness has been shown to decrease with increase in anhedonia (Dunn et al., 2010). Although depressed mood and low positive affect were not distinguished in these studies, these results suggest that individuals low in positive affect (greater anhedonia) would have low interoceptive awareness and hyperarousal. Indeed, in the present study, although anxious arousal did not have a significant independent association with low positive affect, there was a trend toward a negative association (see Table 5). This indicates that individuals who are high in anxious arousal tend to have low levels of low positive affect.

Present findings reveal that, in contrast to anxious apprehension, which had a strong association with low positive affect, and anxious arousal, which had a strong association with depressed mood, rumination was associated strongly with both depressed mood and low positive affect. These findings support research that has shown strong links between rumination and depression, although previous findings had not separated the two depression dimensions.

In the present study, rumination had independent associations with depressed mood and low positive affect, over and above anxious apprehension. This suggests that rumination has a unique relationship with both dimensions of depression not necessarily accounted for by the common characteristic of repetitive thinking. This difference could possibly be explained by distinct features of anxiety and depression. Whereas anxiety entails a certain degree of uncertainty about the future, depression is associated with loss in the past and hopelessness about the future (Nolen-Hoeksema, 1998). Research shows that rumination, which focuses on past

negative events, contributes to hopelessness and possibly depression (Nolen-Hoeksema, 2000). Thus, past specific temporal orientation seems to connect both rumination and dimensions of depression, which is not shared with dimensions of anxiety. Nolen-Hoeksema (1998) has argued that the future orientation of anxious apprehension allows for more control over uncertainty, whereas rumination by virtue of its orientation toward the past allows for more certainty over uncontrollability. Thus, individuals who worry and become apprehensive believe that if they engage in worry they have greater possibility of coming up with a plan to mitigate the uncertainty. In contrast individuals who ruminate believe that certain events cannot be controlled because these events took place in the past. This indicates that individuals who engage in worry may be more optimistic about the future, in contrast to individuals who ruminate, and are hence less likely to become depressed. However, if individuals engage in worry for a long duration, they may realize that based on the past certain events in the future are uncontrollable. Thus, they may engage in anxious apprehension, and in turn rumination, and this may lead to depressed mood or low positive affect.

As described above, each dimension of depression is predicted by a specific dimension of anxiety and rumination. Individuals with low positive affect are more likely to have anxious apprehension and rumination, whereas individuals with depressed mood are more likely to have anxious arousal and rumination (see Figure 1). Thus, the particular dimension and magnitude of anxiety in combination with rumination may predict the particular manifestation of depression. Distinct associations among anxiety and depression constructs indicate the importance of identifying precisely the dimension of anxiety or depression in the process of conceptualizing mental health disorders. A greater understanding of the distinct and shared symptoms among

these constructs may provide insight into the emotional, cognitive, and physiological features of relevant disorders (Nitschke et al., 2001).

Additionally, rumination as a construct is differentially associated with depressed mood and low positive affect as a function of anxiety dimensions. This suggests that differential rumination mechanisms associated with differential anxiety dimensions may lead to onset and maintenance of distinct depression disorders. Treatment strategies should take into account these differential associations between rumination, anxiety, and depression for creating specific clinical interventions (Hong, 2007). Also, the rumination measure used here was the RRQ and not the RRS. The RRQ items have a narrow focus in that they do not overlap with depression items (a problem with the RRS). The obtained psychometric distinctions between this rumination measure and MASQ-AD8 (depressed mood) and MASQ-AD14 (low positive affect) in the confirmatory factor analyses validate findings regarding differential associations among the various constructs in this study.

There are several limitations to this study. First, the study was based on self-report measures. Future research should use other experimental paradigms to replicate these results. Second, each construct was tested using only one self-report measure. To increase reliability and validity in future questionnaire studies, each construct should be measured by at least two scales that can capture broad characteristics of these constructs. Third, this study was cross-sectional. Future studies should focus on longitudinal designs that can track temporal progression of anxiety and depression symptoms. Fourth, the uneven gender distribution of the sample, although reflective of base rates in the population, precluded adequate statistical analyses of gender effects. Last, this study was done on a university undergraduate sample, and hence the

generalizability of results to community groups is unknown. Future studies should be conducted on community populations and clinical samples with anxiety and depression disorders.

Despite these limitations, the findings of this study have implications for past and future research on the distinct roles played by each dimension of anxiety and depression, and rumination. Results showed that anxiety dimensions and rumination have distinct and specific associations with each dimension of depression. A greater understanding of the distinct ways in which these constructs relate to each other and come together to predict and perhaps cause disorders may provide insight into how they relate cognitively, emotionally, and physiologically to other constructs that also play a role in the development of psychopathology. The implications of this research suggest that more attention to understanding these distinctions in the context of relevant disorders is needed.

Figure 1: A graphical illustration of linear regression results showing variance accounted for by anxious apprehension, anxious arousal, and rumination in depressed mood and low positive affect.

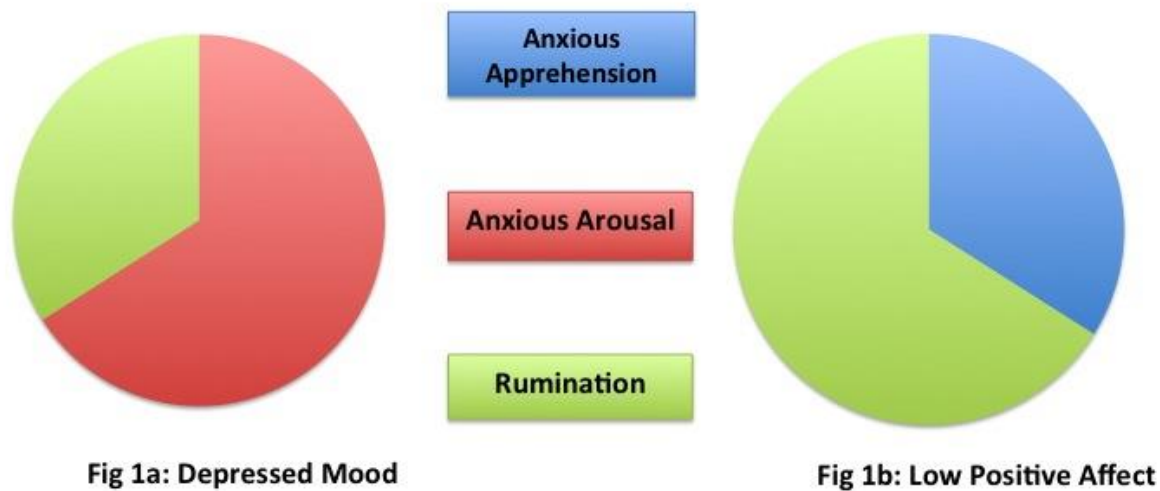


Fig 1a: Anxious apprehension does not account for significant variance in depressed mood in the presence of anxious arousal and rumination, both of which account for significant variance. Fig 1b: Anxious arousal does not account for significant variance in low positive affect in the presence of anxious apprehension and rumination, both of which account for significant variance.

REFERENCES

- Barlow, D. H. (1988). *Anxiety and its disorders: The nature and treatment of anxiety and panic*. New York: Guilford Press.
- Beck, R., & Perkins, T. S. (2001). Cognitive content-specificity for anxiety and depression: A meta-analysis. *Cognitive Therapy and Research*, 25(6), 651-663.
- Borkovec, T. D., Ray, W. J., & Stober, J. (1998). Worry: A cognitive phenomenon intimately linked to affective, physiological, and interpersonal behavioral processes. *Cognitive Therapy and Research*, 22(6), 561-576.
- Borkovec, T. D., Robinson, E., Pruzinsky, T., & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour research and therapy*, 21(1), 9-16.
- Brown, T. A., Chorpita, B. F., & Barlow, D. H. (1998). Structural relationships among dimensions of the DSM-IV anxiety and mood disorders and dimensions of negative affect, positive affect, and autonomic arousal. *Journal of abnormal psychology*, 107(2), 179.
- Butler L.D., Nolen-Hoeksema S. (1994). Gender differences in responses to depressed mood in a college sample. *Sex Roles*, 30, 331–346.
- Clark, L.A., & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology*, 100, 316–336.
- Cole, D. A., Peeke, L. G., Martin, J. M., Truglio, R., & Seroczynski, A. D. (1998). A longitudinal look at the relation between depression and anxiety in children and adolescents. *Journal of Consulting and Clinical Psychology*, 66(3), 451.

- Dugas, M. J., Gosselin, P., & Ladouceur, R. (2001). Intolerance of uncertainty and worry: Investigating specificity in a nonclinical sample. *Cognitive Therapy and Research*, 25(5), 551-558.
- Dunn, B.D., Stefanovitch, I., Evans, D., Oliver, C., Hawkins, A., Dalgleish, T., (2010). Can you feel the beat? Interoceptive awareness is an interactive function of anxiety- and depression-specific symptom dimensions. *Behav. Res. Ther.* 48, 1133–1138.
- Engels, A.S., Heller, W., Mohanty, A., Herrington, J.D., Banich, M.T., Webb, A.G., & Miller, G.A. (2007). Specificity of regional brain activity in anxiety types during emotion processing. *Psychophysiology*, 44(3), 352-363.
- Engels, A.S., Heller, W., Spielberg, J.M., Warren, S.L., Sutton, B.P, Banich, M.T., & Miller, G.A. (2010). Co-occurring anxiety influences patterns of brain asymmetry in depression. *Cognitive, Affective, and Behavioral Neuroscience*, 10(1), 141-156.
- Ehring, T., & Watkins, E. R. (2008). Repetitive negative thinking as a transdiagnostic process. *International Journal of Cognitive Therapy*, 1(3), 192-205.
- Eisner, L. R., Johnson, S. L., & Carver, C. S. (2009). Positive affect regulation in anxiety disorders. *Journal of Anxiety Disorders*, 23(5), 645-649.
- Flett, G.L., Madorsky, D., Hewitt, P.L., & Heisel, M.J. (2002). Perfectionism cognitions, rumination, and psychological distress. *Journal of Rational-Emotive and Cognitive Behavior Therapy*, 20, 33–47.
- Flory, J. D., & Yehuda, R. (2015). Comorbidity between post-traumatic stress disorder and major depressive disorder: alternative explanations and treatment considerations. *Dialogues in clinical neuroscience*, 17(2), 141.

- Grupe, D. W., & Nitschke, J. B. (2013). Uncertainty and anticipation in anxiety: an integrated neurobiological and psychological perspective. *Nature Reviews Neuroscience*, *14*(7), 488-501.
- Heller, W., Nitschke, J.B., Etienne, M.A., & Miller, G.A. (1997). Patterns of regional brain activity differentiate types of anxiety. *Journal of Abnormal Psychology*, *106*, 376-385.
- Hong, R. Y. (2007). Worry and rumination: Differential associations with anxious and depressive symptoms and coping behavior. *Behaviour Research and Therapy*, *45*(2), 277-290.
- Kashdan, T. B., & Steger, M. F. (2006). Expanding the topography of social anxiety an experience-sampling assessment of positive emotions, positive events, and emotion suppression. *Psychological Science*, *17*(2), 120-128.
- Kessler R.C., McGonagle K.A., Swartz M., Blazer D.G., Nelson C.B. (1993). Sex and depression in the National Comorbidity Survey: I. Lifetime prevalence, chronicity and recurrence. *Journal of Affective Disorders*, *29*, 85–96.
- Letkiewicz, A. M., Miller, G. A., Crocker, L. D., Warren, S. L., Infantolino, Z. P., Mimnaugh, K. J., & Heller, W. (2014). Executive function deficits in daily life prospectively predict increases in depressive symptoms. *Cognitive Therapy and Research*, *38*(6), 612-620.
- Limmer, J., Kornhuber, J., & Martin, A. (2015). Panic and comorbid depression and their associations with stress reactivity, interoceptive awareness and interoceptive accuracy of various bioparameters. *Journal of affective disorders*, *185*, 170-179.

- McEvoy, P. M., & Brans, S. (2013). Common versus unique variance across measures of worry and rumination: Predictive utility and mediational models for anxiety and depression. *Cognitive therapy and research*, 37(1), 183-196.
- McEvoy, P. M., Mahoney, A. E., & Moulds, M. L. (2010). Are worry, rumination, and post-event processing one and the same?: Development of the Repetitive Thinking Questionnaire. *Journal of Anxiety Disorders*, 24(5), 509-519.
- McLaughlin, K. A., Borkovec, T. D., & Sibrava, N. J. (2007). The effects of worry and rumination on affect states and cognitive activity. *Behavior Therapy*, 38(1), 23-38.
- McLaughlin, K. A., & Nolen-Hoeksema, S. (2011). Rumination as a transdiagnostic factor in depression and anxiety. *Behaviour Research and Therapy*, 49(3), 186-193.
- Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy*, 28, 487-495.
- Mineka, S., Watson, D., & Clark, L. A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual review of psychology*, 49(1), 377-412.
- Nitschke, J.B., Heller, W., Imig, J.C., McDonald, R.P., & Miller, G.A. (2001). Distinguishing dimensions of anxiety and depression. *Cognitive Therapy and Research*, 25, 1-22.
- Nitschke, J. B., Heller, W., Palmieri, P. A., & Miller, G. A. (1999). Contrasting patterns of brain activity in anxious apprehension and anxious arousal. *Psychophysiology*, 36(05), 628-637.
- Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, 100(4), 569.

- Nolen-Hoeksema, S. (1998). The other end of the continuum: The costs of rumination. *Psychological Inquiry*, 9(3), 216-219.
- Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology*, 109, 504-511.
- Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. *Journal of Personality and Social Psychology*, 61, 115–121.
- Nolen-Hoeksema, S., Wisco, B., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3, 400-424.
- Roberts J.E., Gilboa E., Gotlib I.H. (1998a). Ruminative response style and vulnerability to episodes of dysphoria: Gender, neuroticism, and episode duration. *Cognitive Therapy and Research*, 22, 401–423.
- Roberts, J., Gilboa, E., & Gotlib, I. H. (1998b). Ruminative response style and vulnerability to depressive episodes: Factor components, mediating processes, and episode duration. *Cognitive Therapy & Research*, 22, 401-425.
- Ruscio, A. M., Seitchik, A. E., Gentes, E. L., Jones, J. D., & Hallion, L. S. (2011). Perseverative thought: A robust predictor of response to emotional challenge in generalized anxiety disorder and major depressive disorder. *Behaviour research and therapy*, 49(12), 867-874.
- Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of psychological research online*, 8(2), 23-74.
- Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling*.

Psychology Press.

- Seegerstrom, S.C., Tsao, J.C.I., Alden, L.E., & Craske, M.E. (2000). Worry and rumination: Repetitive thought as a concomitant and predictor of negative mood. *Cognitive Therapy and Research*, 24, 671–688.
- Smith, J.M., & Alloy, L.B. (2009). A roadmap to rumination: A review of the definition, assessment, and conceptualization of this multifaceted construct. *Clinical Psychology Review*, 29, 116–128.
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics*. (4thed.). Needham Heights, MA: Allyn & Bacon.
- Teasdale, J.D., & Green, H.A.C. (2004). Ruminative self-focus and autobiographical memory. *Personality and Individual Differences*, 36, 1933–1943.
- Thomsen, D. K. (2006). The association between rumination and negative affect: A review. *Cognition & Emotion*, 20, 1216–1235.
- Trapnell, P.D., & Campbell, J.D. (1999). Private self-consciousness and the five-factor model of personality: Distinguishing rumination from reflection. *Journal of Personality and Social Psychology*, 76, 284–304.
- Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, 27, 247–259.
- Watson, D., Clark, L. A., Weber, K., Assenheimer, J. S., Strauss, M. E., & McCormick, R. A. (1995). Testing a tripartite model: II. Exploring the symptom structure of anxiety and depression in student, adult, and patient samples. *Journal of Abnormal Psychology*, 104, 15–25.

Watson, D., Weber, K., Assenheimer, J. S., Clark, L. A., Strauss, M. E., & McCormick, R. A. (1995). Testing a tripartite model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. *Journal of Abnormal Psychology*, 104, 3-14.