

Responding to Anxiety with Rumination and Hopelessness: Mechanism of Anxiety-Depression Symptom Co-Occurrence?

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Abstract The current research proposes that certain anxiety response styles (specifically, responding to anxiety symptoms with rumination or hopeless cognitions) may increase risk of depressive symptoms, contributing to anxiety-depression comorbidity. We delineate preliminary evidence for this model in three studies. In Study 1, controlling for anxiety response styles significantly reduced the association between anxiety and depressive symptoms in an undergraduate sample. In Study 2, these findings were replicated controlling for conceptually related variables, and anxiety interacted with anxiety response styles to predict greater depressive symptoms. In Study 3, anxiety response styles moderated the prospective association between anxiety and later depression in a generalized anxiety disorder sample. Results support a role for anxiety response styles in anxiety-depression co-occurrence, and show that hopeless/ruminative anxiety response styles can be measured with high reliability and convergent and divergent validity.

Keywords Depression · Anxiety · Comorbidity · Anxious rumination · Hopelessness · Response styles

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Introduction

Research has robustly demonstrated substantial comorbidity between anxiety and depression (e.g., Lewinsohn et al. 1997; Maser and Cloninger 1990; Mineka et al. 1998; Regier et al. 1990), with 57.5% of individuals with major depression also meeting 12-month criteria for an anxiety disorder (Kessler et al. 2007). The presence of co-occurring depression and anxiety, in turn, is associated with a wide range of dysfunction, including poorer prognosis, worse treatment outcomes, academic problems, suicide attempts, and greater symptom severity (Kessler et al. 1999; Ledley et al. 2005; Lewinsohn et al. 1995; Young et al. 2006).

Despite its ubiquity and negative consequences, research has largely failed to specify mechanisms driving anxiety-depression comorbidity. Although several comorbidity theories exist (Alloy et al. 1990; Merikangas 1990; see Mineka et al. 1998 for a review), the most prominent ones attribute anxiety-depression comorbidity to shared structural components. For example, Clark and Watson's (1991) tripartite model hypothesizes that anxiety is uniquely defined by physiological hyperarousal and depression by anhedonia, but that both disorders share the common thread of elevated negative affectivity. Other researchers have presented similar structural models, in which shared underlying factors account for depression-anxiety co-occurrence (Barlow 1991; Barlow et al. 2004; Brown and Barlow 1992; Tellegen et al. 1985).

The tripartite model and other structural models have greatly expanded our understanding of anxiety-depression comorbidity, providing a nuanced view of which aspects of anxiety and depressive symptoms are most likely to co-occur. However, these models do not sufficiently explain depression-anxiety co-occurrence, for several reasons. First, although a number of studies have supported the

tripartite model's three factors (e.g., Joiner 1996; Watson et al. 1995a), others have not (for a review, see Anderson and Hope 2008; Burns and Eidelson 1998; Ollendick et al. 2003). Second, studies have shown both that physiological hyperactivity is correlated with depression and that anhedonia is correlated with anxiety (Chorpita and Daleiden 2002; Jacques and Mash 2004), contradicting the specificity hypothesis of the tripartite model and suggesting that co-occurrence is not entirely accounted for by the hypothesized shared substrates. Third, structural models of comorbidity are largely descriptive, detailing which aspects of symptoms are most likely to co-occur rather than explaining why symptoms co-occur. To fully understand comorbidity, mechanisms of symptom co-occurrence must be identified. Finally, structural theories do not explain the temporal sequencing of anxiety and depression. Numerous studies have reported that anxiety often (though not exclusively; Moffitt et al. 2007) precedes depression (Cole et al. 1998; de Graaf et al. 2003; Essau 2003; Lewinsohn et al. 1997; Wittchen et al. 2000), with potentially important implications for why anxiety and depression co-occur. Note that despite these caveats, the tripartite theory has added greatly to our understanding of symptom co-occurrence, and that our model is not intended as a challenge to this theory, but rather as a supplement to it.

Several researchers have suggested that anxiety acts as a causal risk factor for later depressive symptoms (e.g., Lewinsohn et al. 1997; Wittchen et al. 2003). This idea parsimoniously explains both anxiety-depression comorbidity and the temporal antecedence of anxiety to depression. Few researchers, however, have proposed mechanisms through which anxiety may lead to later depressive symptoms, or identified conditions under which anxiety may be more likely to lead to depressive symptoms. Grant et al. (2007) showed that dysfunctional interpersonal styles mediated the relationship between social anxiety and later depressive symptoms (also see Starr and Davila 2008). However, this research focused solely on social anxiety, and no other research has expanded upon this idea or identified mechanisms of comorbidity for other types of anxiety symptoms.

One way that anxiety may lead to depressive symptoms is by activating processes that contribute to the development, maintenance, or exacerbation of depressive symptoms. Specifically, certain ways of responding to anxiety symptoms may be depressogenic. For example, anxiety could prompt two related cognitive responses: ruminative thought and hopeless cognitions. Defined as passive and repeated thoughts about symptoms and their causes and consequences (Nolen-Hoeksema et al. 2008), ruminative responses have been shown to predict depressive responses to stressors, prolong or worsen existing depressive symptoms, and predict onset of depressive episodes (Just and

Alloy 1997; Nolen-Hoeksema 1991, 2000; Nolen-Hoeksema and Morrow 1991), and are most pronounced in those with mixed depression-anxiety episodes (Nolen-Hoeksema 2000). Rumination has traditionally been defined as a means of responding to depressive symptoms; for example, dysphoric individuals may ruminate by repeatedly thinking about how unmotivated and unhappy they feel (Nolen-Hoeksema 1991). However, rumination may also focus on anxiety symptoms. For example, an anxious individual may think "I won't be able to go anywhere without feeling anxious or panicking," or "Why am I anxious all the time?" This type of *anxious rumination*, may, like depressive rumination, instill pessimistic thinking, evoke negative autobiographical memories, and disrupt adaptive problem-solving, leading to elevated depressive symptoms (Lyubomirsky et al. 1998, 1999; Nolen-Hoeksema et al. 1994). In a recent study, Rector et al. (2008) supported anxious rumination as distinct from depressive rumination and other related constructs and predictive of anxiety symptom severity.

Similarly, some people may develop hopeless cognitions about anxiety symptoms. Abramson et al. (1989) define hopelessness as negative expectations about important outcomes that one feels helpless to change. Anxiety is a negative experience that can be persistent and difficult to control and which can be extremely disruptive to goals and aspirations. Thus, many anxious people may develop hopeless thoughts about their anxiety and the effects it has on their lives. In turn, several researchers have identified hopelessness and related attributions as a key risk factor for depressive symptoms (e.g., Abramson et al. 1989; Brown and Harris 1978), and empirical evidence has supported this idea (Joiner et al. 2005; Metalsky et al. 1993; Rholes et al. 1985). Importantly, hopeless responses to anxiety are not entirely separate from anxious rumination: people may ruminate with hopeless thoughts, and hopelessness may for many people provoke rumination, and many rumination assessments may tap aspects of hopelessness and vice versa. Furthermore, one study found that hopelessness mediated the relation between rumination and later depression and anxiety (Sarin et al. 2005). As a result, it may be difficult at this stage to parse ruminative and hopeless responses to anxiety. In this pilot research, we are interested in the broad idea that cognitive responses to anxiety could lead to depressive symptoms, rather than isolating specific response styles; thus, we examine hopeless and ruminative responses to anxiety as a single, overlapping construct.

Thus, according to the model we have proposed above, anxiety leads to depressive symptoms in part by prompting maladaptive responses (i.e., rumination and hopelessness about anxiety symptoms), consistent with a mediation model. Alternatively, it is also possible that the tendency to

engage in maladaptive responses to anxiety acts as a diathesis that, when combined with the stress of anxiety symptoms, produces an increased risk for comorbid depressive symptoms. This moderation model implies that anxiety and depressive symptoms would be more likely to co-occur in individuals who tend to respond to anxiety with ruminative and hopeless reactions. The idea that response styles would need to be experienced in combination with symptoms in order to produce increases in symptoms is consistent with experimental rumination research, which has shown that induced rumination produces increases in depressive symptoms only in participants who were initially dysphoric (Lyubomirsky et al. 1998; Lyubomirsky and Nolen-Hoeksema 1993, 1995).

The current study presents the results of pilot research testing several of the basic assumptions of this model. A preliminary goal was to design and validate a questionnaire that measures the type of hopeless and ruminative anxiety response styles that are central to our model. Although several measures of hopelessness and rumination exist (Beck et al. 1974; Horowitz et al. 1979; Nolen-Hoeksema and Morrow 1991; Siegle et al. 2004), none focus explicitly on responses to anxiety symptoms. In an exception, a new measure (Rector et al. 2008; published in the time since the current research was initiated and hence not included here) assesses anxious rumination, but not other potentially depressogenic anxiety response styles, such as hopeless cognitions about anxiety. Our measure, the Response to Anxiety Questionnaire (RAQ, based on existing validated measures), assesses ruminative and hopeless responses to symptoms of anxiety. Here, we test the RAQ for reliability and convergent and divergent validity. By testing the validity of the RAQ, we also hope to determine the validity of the underlying anxiety response styles construct.

Our primary goal was to test several of our model's specific predictions. Based on the above logic, we predicted that anxiety response styles would at least partially account for the relationship between depressive symptoms and anxiety (i.e., that controlling for anxiety response styles would decrease the association between anxiety and depressive symptoms). We also tested the alternative (but not necessarily competing) hypothesis that anxiety response styles would moderate the associations between anxiety and depressive symptoms, with stronger associations between anxiety and depressive symptoms for individuals with more ruminative and hopeless anxiety response styles. We evaluated these predictions in three studies. Study 1 explores anxiety response styles in a cross-sectional sample, testing associations with depressive rumination and hopelessness and examining basic model predictions. Study 2 further tests discriminant validity, contrasting anxiety response styles with several additional conceptually related constructs. Finally, Study 3 extends

findings by testing hypotheses in a longitudinal, clinical sample.

Study 1

In Study 1, we evaluated several hypotheses related to the validity of the RAQ and underlying model predictions. First, given model predictions that negative anxiety response styles accompany anxiety and in turn lead to depressive symptoms, we predicted that the RAQ would be related to both anxiety and depressive symptoms. Second, we expected these associations to hold when controlling for depressive rumination and hopelessness scales. Finally, we tested two alternative (but not necessarily mutually exclusive) potential roles of anxiety response styles in symptom co-occurrence: that anxiety response styles would (a) statistically account for, or (b) moderate the association between anxiety and depressive symptoms.

Method

Participants and Procedure

Four hundred and seventy undergraduate psychology students at Stony Brook University participated in the study (302 female, 164 male, 4 did not report gender). Mean age was 20.22 years ($SD = 3.63$). Participants belonged to a diverse range of racial and ethnic backgrounds: Non-Latino Caucasian = 42.6%, Southeast Asian = 21.1%, Latino = 9.6%, African-American = 8.9%, Mixed Ethnicity = 3.4%, other = 14.1%.

Participants were recruited from two sources. First, 266 introductory psychology students were recruited through the Stony Brook University psychology department participant pool. Participants attended lab sessions where they gave informed consent and filled out study questionnaires, and were compensated with course credit. Second, 204 participants were recruited through two Abnormal Psychology classes. Class members were invited to participate in a "research day," in which they filled out questionnaires for this and other studies for course extra credit. Because of time limitations, the Mood and Anxiety Symptom Questionnaire (MASQ) was not used for these participants. Researchers ensured that no one participated twice. There were no differences between recruitment groups on the Depression Anxiety Stress Scales (DASS; Lovibond and Lovibond 1995) anxiety and depression subscales, RAQ, age, or ethnicity, although participants recruited from the Abnormal Psychology classes were more likely to be female ($\chi^2(1) = 9.54, P < .05$). This research was approved by the Stony Brook University Committee on Research Involving Human Subjects and the UCLA Institutional Review Board.

Measures

Anxiety Response Styles: Item pool development. We devised the RAQ to measure responses to anxiety symptoms that are potentially depressogenic (specifically, ruminative and hopeless responses¹) following a thorough review of literatures on rumination, hopelessness, and depression-anxiety co-occurrence. The RAQ asks participants to rate thoughts and behaviors that they engage in when anxious on a Likert-type scale ranging from *almost never* to *always*, and initially contained 36 items. The RAQ was heavily based on existing validated measures of rumination and hopelessness, including the Ruminative Response Scale (RRS; Nolen-Hoeksema and Morrow 1991) and the Beck Hopelessness Scale (BHS; Beck et al. 1974). The instructions are identical to those of the RRS, except where the RRS asks participants what they do when they feel “sad, blue, or depressed,” the RAQ asks participants to rate how they respond when they feel “anxious, nervous, or worried.” Similarly, where the RRS includes items specifically geared to depressive symptoms (e.g., “Think about your feelings of fatigue and achiness”), the RAQ instead applies questions toward anxiety symptoms² (“Think about how restless or keyed up you feel”). In addition to questions drawn from existing measures, the RAQ includes original theoretically-driven face valid items. For example, based on the Abramson et al. (1989) conception of hopelessness, the RAQ includes items assessing the degree to which the individual views their anxiety as uncontrollable and likely to negatively affect important outcomes. Item responses were summed to yield a total score.

Factor analysis. To determine dimensionality (particularly whether the RAQ is better conceptualized using rumination and hopelessness subscales), an exploratory factor analysis using a maximum likelihood extraction and

a Promax rotation was conducted on the 36 RAQ items. Eigenvalues suggested the presence of seven factors; however, Kaiser’s rule of retaining factors with eigenvalues >1 has often been criticized as relatively arbitrary and often inaccurate (Costello and Osborne 2005; Fabrigar et al. 1999). Here, using several alternative oblique and orthogonal rotations, the pattern of seven factor loadings was not conceptually interpretable, an important criterion for factor analysis validity (Fabrigar et al. 1999). The scree plot indicated the presence of a single factor, and the high ratio of the first to second eigenvalues (5.79:1) also supported unidimensionality, so in subsequent analyses one factor was extracted. Four items showed low loadings ($<.40$) on this factor and were dropped from the scale. Factor analysis of the remaining 32 items produced a solution with a single factor (eigenvalue = 13.82) accounting for 43.18% of variance; all items loaded on this factor. The 32-item version of the RAQ (see appendix) showed excellent internal reliability (Cronbach’s $\alpha = .96$) and was used in all subsequent analyses.

Anxiety and Depressive Symptoms

Because the current study requires measures that can readily distinguish between anxiety and depressive symptoms, we chose scales that have demonstrated strong discriminant validity. The 21-item form of the DASS (Lovibond and Lovibond 1995) has shown excellent convergent and divergent validity, with psychometric properties and factor structure replicated in clinical and community samples (Antony et al. 1998). Here, we used the depression (DASS-D; Chronbach’s $\alpha = .88$) and anxiety (DASS-A; $\alpha = .80$) subscales, and as shown in Table 1, the subscales were highly but not overly correlated. In this sample, 17.1% met the clinical cut-off for anxiety (≥ 8) and 14.9% for depression (≥ 10 ; Lovibond and Lovibond 1995).

Because of the importance of the tripartite theory (Clark and Watson 1991) in the comorbidity literature, we also included a measure of the tripartite factors. The MASQ (Watson et al. 1995b) includes 62 items specifically designed to differentiate between anxiety and depression. The MASQ includes four subscales: anhedonic depression and anxious arousal (designed to measure unique aspects of depression and anxiety, respectively, and showing strong divergent validity), and general distress depression and general distress anxiety (designed to measure overlapping aspects of depression and anxiety, with correspondingly lower discriminant validity). The MASQ has shown strong psychometric properties, including convergent, divergent, and factorial validity (Reidy and Keogh 1997; Watson et al. 1995b), and in this study, patterns of correlations between subscales converged with tripartite theory

¹ Although the RAQ items were designed to assess tendency to respond to anxiety with hopeless cognitions, a reasonable concern is whether the RAQ actually assesses current feelings of hopelessness, which could artificially inflate associations with depression. To explore this issue, we constructed an alternate version of the RAQ, purging items that could potentially tap hopelessness (#22, 23, 24, 26). This version was very highly correlated with the original RAQ ($r = .99$). We re-ran all analyses using this version, and all results were identical in significance and near identical in magnitude.

² Most RAQ items referred to general symptoms of anxiety, rather than symptoms of specific anxiety disorders. Items #12, 13, 14, 17, and 18 arguably apply to symptoms of specific anxiety disorders, and to ensure that their inclusion did not bias results, we recomputed the scale excluding these items. The modified scale was correlated with the original scale at $r = .996$ and generated identical results.

Table 1 Bivariate correlations among variables in studies 1 and 2

	1	2	3	4	5	6	7	8	9
Study 1 ($N = 260\text{--}470$)									
1. RAQ	–								
2. DASS-A	.61***	–							
3. DASS-D	.61***	.59***	–						
4. MASQ-AA	.48***	.68***	.43***	–					
5. MASQ-GDA	.61***	.65***	.52***	.74***	–				
6. MASQ-AD	.51***	.31***	.62***	.26***	.44***	–			
7. MASQ-GDD	.65***	.55***	.77***	.53***	.70***	.68***	–		
8. RRS	.82***	.51***	.64***	.43***	.55***	.56***	.66***	–	
9. BHS	.50***	.33***	.58***	.28***	.39***	.60***	.62***	.48***	–
<i>M</i>	67.75	3.85	4.42	23.14	18.96	32.47	23.85	48.09	4.28
<i>SD</i>	19.59	4.09	4.55	6.88	6.77	15.91	10.19	14.93	4.02
Study 2 ($N = 112$)									
1. RAQ	–								
2. DTS	-.45***	–							
3. ASI	.43***	-.25***	–						
4. CSQ Neg	.44***	-.27***	.24**	–					
5. PSWQ	.60***	-.47***	.22*	.30**	–				
6. DASS-A	.58***	-.38***	.48***	.29**	.45***	–			
7. DASS-D	.65***	-.44***	.39***	.32***	.49***	.67***	–		
<i>M</i>	69.11	3.14	16.98	13.09	49.88	3.63	4.81		
<i>SD</i>	19.75	0.81	13.34	2.87	14.70	3.87	4.96		

RAQ Response to Anxiety Questionnaire, RRS Ruminative Response Scale, BHS Beck Hopelessness Scale, DASS-A and DASS-D Depression Anxiety Stress Scales-21, anxiety and depression subscales respectively, MASQ-AA, MASQ-AD, MASQ-GDA, and MASQ-GDD Mood and Anxiety Symptom Questionnaire, anxious arousal, anhedonic depression, general distress anxiety, and general distress depression subscales respectively, DTS Distress Tolerance Scale, ASI Anxiety Sensitivity Index-3, CSQ Neg negative attribution subscale from the Cognitive Styles Questionnaire

* $P < .05$; ** $P < .01$; *** $P < .001$

predictions (see Table 1) and internal reliability for these subscales was as follows: anhedonic depression = .76, anxious arousal = .86, general distress depression = .94, general distress anxiety = .85.

Depressive Rumination and Hopelessness

The RRS, the most widely used depressive rumination measure, prompts participants to think about what they generally do when they feel “sad, blue, or depressed” and rate how often they engage in 22 ruminative thoughts or behaviors on a Likert-type scale ranging from “not at all” to “often.” The RRS has good internal consistency and external validity (Butler and Nolen-Hoeksema 1994; Nolen-Hoeksema and Morrow 1991). Cronbach’s alpha was .94. The BHS (Beck et al. 1974), a widely used measure of hopelessness, includes 20 true/false statements of hopelessness and reverse-coded hopefulness. Studies support the BHS’s construct validity and internal reliability (Beck

et al. 1974; Velting 1999), and in this study internal reliability was .86.

Results and Discussion

Bivariate Correlations

Table 1 displays intercorrelations and descriptive data for study variables. All anxiety and depressive symptom measures were correlated with each other. As predicted, the RAQ was significantly, positively correlated with all measures of depressive and anxiety symptoms. On the MASQ, the RAQ was strongly associated with all scales, but was significantly more closely related to the general distress subscales than to the anxiety- and depression-specific subscales of anxious arousal ($z = 3.30$, $P = .001$) and anhedonic depression ($z = 3.41$, $P < .001$), according to the procedures of Meng et al. (1992). Note that the RRS and BHS were also correlated with symptom measures.

The RAQ was highly correlated with both the RRS and the BHS, supporting convergent validity.

Are Anxiety Responses Styles' Associations with Symptom Measures Better Explained by Depressive Rumination and Hopelessness?

The high correlations between the RAQ and the BHS and RRS could imply that the RAQ is redundant with these two other measures, and perhaps that the correlation between the RAQ and the symptom measures is a consequence of depressive rumination's and hopelessness's relationships with symptoms. To exclude this possibility, we computed partial correlations between the RAQ and all symptom measures, controlling individually for the RRS and BHS. Table 2 presents these results. Controlling for the RRS, the RAQ was still related to all symptom measures, including anxiety and depressive symptom measures. Controlling for the BHS yielded similar results, except the RAQ was no longer significantly related to anhedonic depression ($pr = .11$, $P = .075$). As shown in Table 2, controlling simultaneously for the RRS and BHS yielded similar results. We also conducted the reverse analyses: examining whether the RRS and BHS remained related to depressive and anxiety symptoms when controlling for the RAQ. Importantly, although the RRS was still related to depressive symptoms, it was no longer related to anxiety symptoms. Similarly, controlling for RAQ, the BHS was related to depression scales but not anxiety scales, with the exception of MASQ general distress anxiety. These results suggest that the RAQ taps a construct unique from

depressive rumination and hopelessness, supporting its discriminant and incremental validity.

Do Anxiety Response Styles Account for the Association Between Anxiety and Depressive Symptoms?

We next tested whether controlling for the RAQ reduced or eliminated the association between anxiety and depressive symptoms. As shown in Table 3, we conducted several sets of regression analyses using the DASS and MASQ (using the subscales from the same measure in each analysis to control for method variance). In each analysis, we followed the steps outlined by Baron and Kenny (1986) to determine whether the RAQ accounted for significant variance in depressive symptoms while also reducing the amount of variance in depressive symptoms accounted for by anxiety symptoms (note that although these steps were designed to test mediation, it is inappropriate to refer to the current analyses as such because of the cross-sectional design). First, we tested whether anxiety predicted the RAQ. Second, we tested whether anxiety predicted depressive symptoms. Third, we tested whether including the RAQ in the regression equation reduced the degree to which anxiety predicted depressive symptoms (entering anxiety as the first step in the regression and the RAQ as a second step). Note that the RAQ also predicted all depressive symptom scales (see Table 1).

DASS

In Step 1, DASS-A significantly predicted the RAQ. In Step 2, DASS-A predicted DASS-D. In the final step,

Table 2 Study 1 Partial correlations between the Response to Anxiety Questionnaire, depressive rumination, hopelessness, and symptom measures

	RAQ			RRS	BHS
	Controlling for			Controlling for	
	RRS	BHS	RRS + BHS	RAQ	
Anxiety measures					
DASS-A	.34***	.54***	.38***	.02	.04
MASQ-AA	.25***	.41***	.24***	.08	.05
MASQ-GDA	.34***	.52***	.32***	.10	.13*
Depressive symptom measures					
DASS-D	.20***	.45***	.13**	.30**	.40***
MASQ-AD	.11	.30***	.02	.29***	.47***
MASQ-GDD	.27***	.50***	.20**	.28***	.45***

N ranges from 254 to 467

RAQ Response to Anxiety Questionnaire, *RRS* Ruminative Response Scale, *BHS* Beck Hopelessness Scale, *DASS-A* and *DASS-D* Depression Anxiety Stress Scales-21, anxiety and depression subscales respectively, *MASQ-AA*, *MASQ-AD*, *MASQ-GDA*, and *MASQ-GDD* Mood and Anxiety Symptom Questionnaire, anxious arousal, anhedonic depression, general distress anxiety, and general distress depression subscales respectively

* $P < .05$; ** $P < .01$; *** $P < .001$

confirming predictions, DASS-A's beta was reduced when the RAQ was entered into the regression equation. The reduction in beta was significant according to Sobel's (1982) test, although anxiety was still a significant predictor of depressive symptoms.

MASQ

We examined symptom co-occurrence using the MASQ subscales in two different ways. First, we examined anxious arousal and anhedonia symptom co-occurrence, as these symptoms are most clearly differentiated but still co-occur. Second, we examined co-occurrence of the general distress components of anxiety and depressive symptoms, as these most frequently co-occur. Results are reported in Table 3.

First, we report results for anxious arousal and anhedonia. In the first step, anxious arousal predicted the RAQ. In the second step, anxious arousal predicted anhedonia. In the final step, when both anxious arousal and the RAQ were included in the regression equation, anxious arousal no longer was a significant predictor of anhedonia. The indirect effect of anxious arousal on anhedonia via anxiety response styles was significant according to a Sobel's (1982) test.

Next, we report the results for general distress anxiety and depression. In Step 1, general distress anxiety predicted the RAQ. In the second step, the general distress anxiety predicted general distress depression. In the final step, both general distress anxiety and the RAQ were included in a regression equation predicting general distress depression, and the beta for general distress anxiety was reduced but still significant. A Sobel's (1982) test confirmed that the reduction in beta was significant.

Do Anxiety Response Styles Moderate the Relationship Between Anxiety and Depressive Symptoms?

To address this question, we conducted several hierarchical regression analyses predicting depressive symptoms. For each analysis, we first entered anxiety symptoms and the RAQ (both centered), and next entered their interaction. We conducted these analyses for DASS-A predicting DASS-D, MASQ anxious arousal predicting anhedonic depression, and MASQ general distress anxiety predicting general distress depression. In none of these analyses were the interaction terms significant (all P s > .05).

Discussion

Overall, Study 1 supported the RAQ's reliability and validity and offered preliminary support for several of the basic tenets of our model, including evidence that the association between anxiety and depressive symptoms is significantly reduced when controlling for anxiety response styles. However, Study 1 tested a limited number of constructs potentially related to anxiety response styles. Comparing the RAQ to additional theoretically related concepts would bolster the validity of both the RAQ measure and its underlying construct.

Study 2

Study 2 featured similar methods to Study 1, but with the inclusion of additional questionnaires to further test for divergent and convergent validity.

The literature delineates several anxiety-related cognitive processes that may overlap with anxiety response

Table 3 Study 1 results of Baron and Kenny (1986) steps and Sobel's (1982) tests of anxiety response styles as a mechanism of anxiety and depressive symptom co-occurrence

IV	DV	Baron and Kenny (1986) Steps						Sobel's (1982) test	
		Step 1		Step 2		Step 3		z	P
		β	P	β	P	β	P		
DASS-A	DASS-D	.61	<.001	.67	<.001	.41	<.001	11.38	<.001
MASQ-AA	MASQ-AD	.48	<.001	.26	<.001	.01	.51	6.47	<.001
MASQ-GDA	MASQ-GDD	.61	<.001	.70	<.001	.47	<.001	9.24	<.001

N ranges from 266 to 470

Step 1 = Anxiety predicting RAQ

Step 2 = Anxiety predicting depressive symptoms

Step 3 = Anxiety predicting depressive symptoms, controlling for RAQ

Sobel's Test = Significance testing of reduction in beta from Step 2 to Step 3

DASS-A and DASS-D Depression Anxiety Stress Scales-21, anxiety and depression subscales respectively, MASQ-AA, MASQ-AD, MASQ-GDA, and MASQ-GDD Mood and Anxiety Symptom Questionnaire, anxious arousal, anhedonic depression, general distress anxiety, and general distress depression subscales respectively

styles. In addition to anxiety response styles as defined in the RAQ, existing constructs also describe individual differences in reactions to negative affect. For example, distress tolerance is a meta-emotion concept that describes the ability to tolerate, accept, adapt to, and regulate distress (Leyro et al. 2010; Simons and Gaher 2005), and low distress tolerance predicts a wide range of psychopathology (Leyro et al. 2010). We would anticipate that the RAQ would be negatively correlated with measures of distress tolerance, but as the RAQ specifically focuses on ruminative and hopeless responses to anxiety, we would not expect them to be overly correlated. Anxiety sensitivity reflects an additional style of responding to anxiety, representing the degree to which people fear their physiological anxious arousal symptoms based on appraisals of their danger and is associated with anxiety disorders (for a review, see Naragon-Gainey 2010; Taylor et al. 2007). Unlike our definition of maladaptive anxiety response styles, which selects for response styles with depressogenic properties, anxiety sensitivity represents “fear of fear,” or the tendency to react to arousal symptoms with greater anxiety. Conceptually, this is distinct from anxiety response styles as defined by the RAQ, but they should be empirically distinguished.

Next, individual differences in anxiety response styles may be linked to cognitive attributional styles. Maladaptive cognitive styles (i.e., viewing stressors as internal, stable, and global; see Abramson et al. 1989) have been linked to prospective onset of major depression (see Alloy et al. 2006). The RAQ and negative attributional styles share conceptual ties to hopelessness theory (Abramson et al. 1989) and should be examined for similarities.

In addition, worry, a central component of many types of anxiety (particularly generalized anxiety; Borkovec et al. 1998), conceptually overlaps with depressive rumination to the extent that some researchers have debated whether they can be adequately differentiated, although studies have suggested that rumination and worry can be distinguished by form, function, and predictive properties (McEvoy et al. 2010; McLaughlin et al. 2007; Muris et al. 2004; Nolen-Hoeksema et al. 2008; Watkins et al. 2005). Anxiety-focused rumination may logically be even more closely associated with worry, and distinguishing the RAQ from worry measures is of obvious importance. Study 2 examines whether Study 1’s findings are better accounted for by these variables.

Method

Participants and Procedure

One hundred twelve introductory psychology undergraduates were recruited for this study through the Stony Brook

University psychology department participant pool, using identical procedures as described in Study 1. The sample was 32.1% male and 67.9% female, and was racially and ethnically diverse (43.8% Non-Latino Caucasian, 19.6% Southeast Asian, 11.6% Latino, 8.0% African-American, 4.5% Pacific Islander, 3.6% other or mixed ethnicity [4.5% declined to respond]). Mean age was 19.96 (SD = 1.91). Procedures were identical to those in Study 1. On the DASS, 17% of participants scored above the recommended clinical cut-off of 7 for anxiety and 17% scored above the cut-off of 9 for depression (Lovibond and Lovibond 1995). The Stony Brook University Committee on Research Involving Human Subjects and the UCLA Institutional Review Board approved this research.

Measures

As described in Study 1, anxiety response styles were assessed using the RAQ and anxiety and depressive symptoms were measured using the DASS anxiety and depression subscales.³ In addition, the following measures were included:

The Anxiety Sensitivity Index-3 (ASI; Taylor et al. 2007) is a widely used 18-item scale measuring fear of anxiety/arousal symptoms, including physical, cognitive, and social concerns. The ASI has excellent psychometric properties (Taylor et al. 2007; here, Cronbach’s alpha = .92).

The Distress Tolerance Questionnaire (DTS; Simons and Gaher 2005) is a 16-item scale measuring tolerance, regulation, absorption, and appraisal of distress (higher scores indicate greater distress tolerance) with adequate psychometric properties, including strong criterion validity and stability over time (Simons and Gaher 2005). Cronbach’s alpha was .92.

The Penn State Worry Questionnaire (PSWQ; Meyer et al. 1990) is a widely-used 16-item measure of worry. The PSWQ has demonstrated strong psychometric properties, including internal consistency, test–retest reliability, and convergent and discriminant validity (Meyer et al. 1990). Cronbach’s alpha was .93.

The Cognitive Styles Questionnaire (CSQ; Alloy et al. 2000), a revision of the widely used Attributional Style Questionnaire (ASQ; Peterson et al. 1982), assesses cognitive attributions associated with depression. The CSQ

³ The MASQ was also administered, but results are omitted here because of space limitations. MASQ results were mostly identical, with a few important exceptions. Anxious arousal was no longer associated with the RAQ when controlling for the ASI ($pr = .09$, $P > .05$), perhaps explained by the significant content overlap between the ASI and anxious arousal scales. As a result, the RAQ could not account for the association between anxious arousal and anhedonic depression when controlling for the ASI. In addition, moderation results were not replicated using the MASQ subscales.

lists 12 positive and 12 negative interpersonal and achievement-related scenarios and asks participants to estimate the probable causes and consequences. Here, we scored responses to the CSQ's negative event items according to the instructions of the similar ASQ, yielding a composite score representing tendency to infer stable, global, and internal attributions to negative events. Both the CSQ and ASQ show good psychometric properties (Alloy et al. 2000; Peterson 1991), and here Cronbach's alpha was .92.

Results and Discussion

Bivariate and Partial Correlations

As shown in Table 1, as expected the RAQ showed significant correlations with the ASI, PSWQ, DTS, and CSQ. Correlation magnitudes were moderate (ranging from .43 to .60), suggesting these constructs are conceptually related but likely not redundant. Furthermore, the RAQ retained its association to anxiety and depression when controlling (individually) for distress tolerance (DASS-A $pr = .50$, DASS-D $pr = .56$), anxiety sensitivity (DASS-A $pr = .48$, DASS-D $pr = .58$), negative attributional style (DASS-A $pr = .53$, DASS-D $pr = .60$), and worry (DASS-A $pr = .44$, DASS-D $pr = .51$), all $Ps < .001$.

Do Anxiety Response Styles Account for the Association Between Anxiety and Depressive Symptoms, Controlling for Related Variables?

For these analyses, we followed the same Baron and Kenny (1986) steps outlined in Study 1, controlling for distress tolerance, worry, negative attributional style, and anxiety sensitivity. For Step 1 (anxiety predicting the RAQ), control variables were entered first in a hierarchical analysis followed by anxiety next. In Step 2 (anxiety predicting depression), again control variables were entered first and anxiety was entered second. For Step 3 (anxiety and the RAQ simultaneously predicting depressive symptoms), control variables were entered first, followed by anxiety second, and the RAQ third.

Results are displayed in Table 4. Anxiety was a significant predictor of both the RAQ and depression over and above the control variables, satisfying Steps 1 and 2. In Step 3, the inclusion of the RAQ reduced anxiety's beta, and the significance of this reduction was confirmed by a Sobel's Test (Sobel's test statistic = 2.52, $P = .01$). Furthermore, none of the control variables significantly predicted anxiety when controlling for the RAQ. Thus, the RAQ partially accounted for the association between anxiety and depression, above and beyond the effects of

Table 4 Study 2 results of Baron and Kenny (1986) steps of anxiety response styles as a mechanism of anxiety and depressive symptom co-occurrence, controlling for related constructs

Predictors	β at step	Final β
Baron and Kenny (1986) step 1 (outcome = RAQ)		
<i>Regression step 1</i> (control variables, $\Delta R^2 = .51^{***}$)		
DTS	-.14	-.10
ASI	.25 ^{***}	.16*
CSQ Neg	.21 ^{**}	.19 ^{**}
PSWQ	.42 ^{***}	.24 ^{***}
<i>Regression step 2</i> , $\Delta R^2 = .04^{**}$		
DASS-A		.26 ^{**}
Baron and Kenny (1986) step 2 (outcome = DASS-D)		
<i>Regression step 1</i> (control variables, $\Delta R^2 = .37^{***}$)		
DTS	-.20*	-.13
ASI	.24 ^{**}	.07
CSQ Neg	.11	.07
PSWQ	.32*	.18*
<i>Regression step 2</i> ($\Delta R^2 = .15$)		
DASS-A		.48 ^{***}
Baron and Kenny (1986) step 3 (outcome = DASS-D)		
<i>Regression step 1</i> (control variables, $\Delta R^2 = .37^{***}$)		
DTS	-.20*	-.10
ASI	.24 ^{**}	.02
CSQ Neg	.11	.01
PSWQ	.32*	.08
<i>Regression step 2</i> ($\Delta R^2 = .15^{***}$)		
DASS-A	.48 ^{***}	.41 ^{***}
<i>Regression step 3</i> ($\Delta R^2 = .04^{**}$)		
RAQ		.31 ^{**}

$N = 112$. RAQ Response to Anxiety Questionnaire, DASS-A and DASS-D Depression Anxiety Stress Scales-21, anxiety and depression subscales respectively; DTS Distress Tolerance Scale, ASI anxiety sensitivity index-3, CSQ Neg negative attribution subscale from the Cognitive Styles Questionnaire

* $P < .05$; ** $P < .01$; *** $P < .001$

distress tolerance, worry, negative attributional style, and anxiety sensitivity.

Does the RAQ Moderate the Relationship Between Anxiety and Depressive Symptoms, Controlling for Related Variables?

For all moderation analyses, identical procedures were followed as in Study 1. Interestingly, unlike in Study 1, in this sample the RAQ emerged as a significant moderator of the association between anxiety and depression ($Beta = .22$, $t(108) = 3.33$, $P = .001$). Decomposition revealed stronger associations between anxiety and depression at high levels of the RAQ ($Beta = .56$,

$t(108) = 6.65, P < .001$) compared to low levels ($Beta = .15, t(108) = 1.32, P = .189$). Significance of this interaction was not impacted if the DTS, ASI, CSQ and PSWQ were included as controls.

Discussion

Study 2 bolstered previous findings by differentiating anxiety response styles from several conceptually related constructs and demonstrating that Study 1's results could be replicated even when controlling for these variables.

In contrast to Study 1, in this sample anxiety response styles functioned as a significant moderator of anxiety and depressive symptoms (using the DASS scales), with higher associations for people with more negative anxiety response styles. It is unclear why these results would be significant here and not in the larger sample of Study 1. Clearly, this finding needs further replication; however, it reopens the notion that anxiety response styles may be better conceptualized as a trait-like risk factor that interacts with the “stress” of anxiety to predict depressive symptoms.

Taken together, Studies 1 and 2 support the validity of the RAQ and offer preliminary evidence for several of the basic tenets of the underlying model. However, Studies 1 and 2 share several important limitations. First, their cross-sectional designs prevented us from testing several hypotheses in our model (i.e., those that suggest the unfolding of processes over time). Second, college student samples, although frequently utilized to study psychopathological processes, have been criticized as inappropriate analogues for studying clinical depression (Coyne 1994; but also see Vredenburg et al. 1993). Although reasonable percentages of these samples (15–17%) experienced clinically significant anxiety and depressive symptoms according to self-report measures, replication of these results in samples with diagnosed anxiety disorders is a critical next step.

Study 3

Study 3 addressed the previous studies' limitations by testing model predictions using a longitudinal design and an anxiety disorder sample. Here, we hypothesized that anxiety would predict increases in depression over time, and tested two alternative (not mutually exclusive) prospective hypotheses: (a) that anxiety response styles would mediate the association between anxiety and later depression, and (b) that anxiety would be more predictive of later depression among those with more depressogenic anxiety response styles. In addition, we predicted elevated RAQ scores among anxiety disorder participants with comorbid depression.

Method

Participants

Fifty-five individuals with generalized anxiety disorder (GAD) participated as part of a larger study on anxious and depressed mood. Participants were recruited from a variety of sources, including (a) through advertisements posted on campus and online ($n = 31$), (b) through graduate training clinics in the Department of Psychology at Stony Brook University ($n = 6$), (c) from other research studies ($n = 4$), (d) through undergraduate psychology courses ($n = 14$). Participants did not differ by recruitment source on study variables or demographic variables, except that participants recruited from undergraduate courses were younger (M age = 18.64, $SD = 1.15$) than participants recruited from other sources (advertisements $M = 31.52, SD = 13.59$; clinics $M = 33.17, SD = 11.53$, studies $M = 36.25, SD = 6.34$; $F(3, 51) = 5.39, P = .003$).

Inclusion criteria were (a) meeting full *Diagnostic and Statistical Manual, Fourth Edition* (DSM-IV; American Psychiatric Association 1994) criteria for current GAD, (b) reporting at least one past or present clinically-significant cardinal symptom (i.e., sad mood or anhedonia) of major depressive disorder (MDD) or dysthymia (based on requirements of the larger study), and c) falling in age range of 18–65. In addition, participants were excluded if they reported bipolar or psychotic disorders or difficulties with reading English that would impair questionnaire comprehension. Participants were predominantly (89%) women and were 71% Caucasian. Mean age was 28.76 years ($SD = 12.43$). This research was approved by the Stony Brook University on Research Involving Human Subjects and the UCLA Institutional Review Board. For greater detail on sample characteristics and recruitment, see Starr 2010.

Measures and Procedure

Screening To screen for eligibility, participants completed GAD and MDD modules of the Mini-International Neuropsychiatric Interview (MINI; Sheehan 1998), a brief structured interview designed to generate DSM-IV diagnoses. For logistical reasons, students recruited from undergraduate courses instead completed self-report screening measures, including a modified self-report version of the MINI, the PSWQ, and the DASS. All potentially eligible participants completed a clinical interview at baseline to confirm diagnosis.

Baseline Participants completed anxiety and mood disorder modules of the Structured Clinical Interview for the

Table 5 Bivariate correlations among study 3 baseline and follow-up variables

<i>N</i> = 53–55	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. BL RAQ	–													
2. BL DASS-A	.61**	–												
3. BL DASS-D	.51**	.69**	–											
4. BL MASQ-AA	.54**	.69**	.48**	–										
5. BL MASQ-GDA	.59**	.66**	.45**	.77**	–									
6. BL MASQ-AD	.32*	.27*	.56**	.39*	.37*	–								
7. BL MASQ-GDD	.62**	.60**	.80**	.51**	.64**	.57**	–							
8. FU RAQ	.71**	.63**	.58**	.55**	.52**	.37*	.58**	–						
9. FU DASS-A	.62**	.71**	.47**	.69**	.62**	.08	.50**	.64**	–					
10. FU DASS-D	.52**	.58**	.76**	.43**	.44**	.40*	.71**	.71**	.58**	–				
11. FU MASQ-AA	.64**	.62**	.52**	.74**	.61**	.24	.53**	.66**	.86**	.66**	–			
12. FU MASQ-GDA	.62**	.59**	.41*	.69**	.75**	.22	.55**	.63**	.75**	.60**	.82**	–		
13. FU MASQ-AD	.20	.23	.44**	.33*	.29*	.65**	.38*	.40*	.17	.57**	.32*	.41*	–	
14. FU MASQ-GDD	.61**	.51**	.63**	.46**	.54**	.29*	.79**	.69**	.57**	.86**	.67**	.70**	.54**	–
<i>M</i>	90.29	7.80	9.80	29.71	27.40	47.07	34.20	86.66	7.68	9.25	30.32	26.96	48.00	33.36
<i>SD</i>	17.98	4.90	5.74	10.06	8.76	13.55	11.89	20.58	5.90	5.85	12.29	8.58	14.46	11.91

BL baseline, *FU* follow-up. *RAQ* Response to Anxiety Questionnaire, *DASS-A* and *DASS-D* Depression Anxiety Stress Scales-21, anxiety and depression subscales respectively; *MASQ-AA*, *MASQ-AD*, *MASQ-GDA*, and *MASQ-GDD* Mood and Anxiety Symptom Questionnaire, anxious arousal, anhedonic depression, general distress anxiety, and general distress depression subscales respectively

* $P < .05$; ** $P < .001$

DSM-IV (SCID-IV; Spitzer et al. 1995), administered by an advanced clinical psychology graduate student. Audiotapes of 22% of interviews were recoded by a second rater, and reliability was adequate to excellent for all disorder modules (relevant to eligibility, intraclass correlation coefficients were 1.00 for GAD, .90 for MDD, and .77 for dysthymia). Following completion of their interview, participants completed a battery of self-report questionnaires, including the RAQ, DASS, and the MASQ. Participants then participated in other aspects of data collection unrelated to the current analyses.

Follow-Up Four weeks after their baseline participation, participants completed a follow-up battery of questionnaires (identical to that at baseline), and 96% of the sample participated.

Participants were paid \$150 for completing all study procedures. Students participating through psychology courses were instead compensated with commensurate course credit.

Results and Discussion

Bivariate Correlations

As shown in Table 5 along with descriptive data, anxiety response styles were again correlated with anxiety and depression measures in this sample. Baseline and follow-up RAQ correlated highly, suggesting temporal stability.

Association with Comorbid Status

Baseline RAQ scores were significantly higher among participants who met diagnostic criteria for current comorbid MDD ($n = 23$, $M = 95.74$, $SD = 17.79$) compared to those who did not ($n = 32$, $M = 86.38$, $SD = 2.49$), $t(52) = -2.18$, $P = .034$.⁴

Mediation

In this sample, baseline anxiety did not significantly predict increases in depression at follow-up (the reverse direction analysis, with depression predicting changes in anxiety, was also non-significant). Therefore, we were unable to test mediation models. Increases in the RAQ at follow-up (controlling for baseline RAQ) were predicted by anxiety (as assessed by the DASS-A, $Beta = .32$, $t(50) = 2.72$, $P = .009$, and MASQ anxious arousal, $Beta = .23$, $t(50) = 2.07$, $P = .044$ [see Footnote 4], but not MASQ general distress anxiety). The RAQ did not predict significant increases in self-reported depressive symptoms at follow-up (controlling for baseline symptoms), although it predicted marginally significant increases in MASQ General Distress Depression ($Beta = .19$, $t(52) = 1.82$, $P = .073$) and DASS-D ($Beta = .20$, $t(50) = 1.93$, $P = .060$).

⁴ Significance levels were not subject to statistical corrections because all analyses were planned a priori. For results where p levels approach .05, please interpret with caution.

Moderation

Anxiety Response Styles We tested anxiety response styles as a moderator of the association between baseline anxiety and prospective changes in depressive symptoms at follow-up. We used hierarchical linear regression, with follow-up depressive symptoms as the outcome, and entered baseline depressive symptoms as the first step, the main effects of anxiety and the RAQ (both centered) as the second step, and the interaction between anxiety and the RAQ as the third step. Separate models were run for each set of depression and anxiety measures. For MASQ general distress depression and anxiety subscales, the interaction term was significant ($Beta = .25$, $t(48) = 2.31$, $P = .037$ [see Footnote 4]), and decomposition revealed that anxiety predicted small, non-significant *decreases* in depression for those low on the RAQ ($Beta = -.37$, $t(48) = -1.62$, $P = .085$) and small, non-significant *increases* for those high on the RAQ ($Beta = .01$, $t(48) = 1.31$, $P = .920$). Similarly, when we substituted MASQ anhedonic depression as the outcome and anxious arousal as the predictor, anxious arousal interacted with the RAQ to predict changes in depression ($Beta = .43$, $t(48) = 2.25$, $P = .033$ [see Footnote 4]), with anxious arousal also predicting decreases in depression among low RAQ scorers ($Beta = -.63$, $t(48) = -1.57$, $P = .086$) but not among high scorers ($Beta = .01$, $t(48) = 1.44$, $P = .951$). The RAQ did not significantly interact with DASS-A to predict changes in DASS-D ($Beta = .15$, $t(48) = 1.79$, $P = .080$).

Discussion

Study 3 added important evidence to our theoretical model. First, it replicated the RAQ's associations with anxiety and depression in a sample with clinically significant GAD, suggesting that maladaptive anxiety response styles are associated with not only subclinical distress but also impairing disorders. Importantly, the RAQ distinguished between participants with and without a comorbid diagnosis of major depression, in line with the notion that anxiety response styles may play a role in anxiety-depression comorbidity.

Mediation could not be tested here, because anxiety did not predict changes in later depression. Although this finding is surprising given previous research showing that anxiety temporally precedes depression (e.g., Lewinsohn et al. 1997; Wittchen et al. 2000), it may be that 4 weeks may not be an appropriate time lag for the hypothesized processes to occur. Mediation models may be more effectively tested over different time frames. Moderation analyses, on the other hand, yielded interesting results. For people with *less* maladaptive anxiety response styles, anxiety predicted *decreases* in depression, perhaps

suggesting that maladaptive anxiety response styles impair naturalistic remediation of symptoms over time, or perhaps conversely that having a more adaptive anxiety response style plays a role in recovery from symptoms. These longitudinal findings will need to be replicated and extended in future work; for example, it will be important in future prospective studies to control for variables related to anxiety response styles, such as worry, distress tolerance, and anxiety sensitivity.

Study 3 is limited by its smaller sample size, although the sample was selected for GAD and thus showed adequate variance on constructs of interest. Still, results should be replicated in larger clinical samples with prospective designs, and the current results should be interpreted with caution and in conjunction with the larger samples in Studies 1 and 2. Furthermore, as the current sample size is insufficient for exploratory factor analysis, future research should replicate the RAQ's factor structure in clinical samples.

General Discussion

We proposed a new model of depression-anxiety comorbidity, in which anxiety symptoms lead to depressive symptoms via maladaptive anxiety response styles, and presented the results of three pilot studies designed to introduce our model and test several of its basic tenets. First, we presented a new measure, the RAQ, which assesses negative anxiety response styles. Although the RAQ was designed to assess both ruminative and hopeless responses to anxiety, factor analysis supported its unidimensionality, perhaps suggesting that the constructs of ruminative and hopeless anxiety response styles cannot be adequately differentiated and should be considered conjointly. Alternatively, the failure of the RAQ to produce separate factors representing ruminative and hopeless cognitions could reflect psychometric limitations of the measure. Further research should more closely examine whether ruminative and hopeless reactions to anxiety have differential effects, and other measures (e.g., Rector et al. 2008) exist for researchers who wish to focus more precisely on specific aspects of anxiety response styles.

The RAQ demonstrated adequate reliability, stability over time, and divergent and convergent validity, supporting the construct validity of anxiety response styles and suggesting that individual differences can be reliably and validly measured (converging with other emerging evidence; Rector et al. 2008). Consistent with the idea that depressogenic anxiety response styles are prompted by anxiety and lead to depressive symptoms, the RAQ was associated with both anxiety and depressive symptoms, even when controlling for related constructs. Indeed, when

controlling for the RAQ, traditional measures of depressive rumination and hopelessness were related only to depressive symptoms, supporting the discriminant validity of the RAQ as a unique measure of anxiety response styles.

Next, we proposed that anxiety response styles play a role in the co-occurrence of anxiety and depressive symptoms. This could occur through two plausible pathways. First, anxiety may prompt ruminative and hopeless reactions, which in turn lead to depressive symptoms (a mediation model). Second, the tendency to ruminate or feel hopeless when anxious could interact with current anxiety symptoms to lead to depressive symptoms (a moderation model). Note that these models are not mutually exclusive, and aspects of our data were consistent with each. Studies 1 and 2, although cross-sectional and thus not fully appropriate to test mediation, showed tentative support for a partial mediation model, as controlling for anxiety response styles significantly reduced the association between anxiety and depressive symptoms. In the prospective Study 3, mediation could not be tested because anxiety did not predict later depression. Given that anxiety predicts later depression in a variety of other studies (e.g., Cole et al. 1998; Wittchen et al. 2003), this could be the result of a potentially inappropriate follow-up period, and future research should test this mediation model in larger samples over different time lags. In addition, Studies 2 and 3 also supported a moderation model, wherein maladaptive anxiety response styles are better construed as risk factors that interact with the “stress” of anxiety to predict elevated depressive symptoms. This is consistent with the limited existing research; for example, in an adolescent sample, Hankin (2008) found that baseline rumination interacted with prospective fluctuations in anxious arousal to predict higher levels of depression. Little research has explored moderators of the association between anxiety and depression, and doing so yields important data.

Although we do not view our model as contradictory to existing comorbidity theories, it is important to view it within the context of existing models. For example, anxiety response styles, as assessed by the RAQ, may tap aspects of anxiety and depressive symptoms that most highly overlap, such as negative affectivity. Along these lines, general distress anxiety and depression (which represent aspects of negative affectivity) were more closely related to the RAQ than were subscales designed to measure non-overlapping aspects of anxiety and depression (i.e., anxious arousal and anhedonia respectively). Note, however, that the content of the RAQ has little conceptually in common with negative affectivity and that the RAQ was also significantly associated with anxious arousal and anhedonia. Therefore, it is unlikely that structural models of comorbidity better account for our results, but at the same time, our results are not at all inconsistent with these models.

Study limitations prevented us from refining several essential elements and applications of our model, and future research should do so. For example, in our clinical sample we recruited only for GAD, and it remains unclear whether our model would apply to other anxiety disorders. The structure of depression co-occurrence differs by anxiety disorder (Anderson and Hope 2008), and thus comorbidity mechanisms may differ by anxiety disorder as well. For instance, social phobia may trigger depression through interpersonal dysfunction, as social anxiety has a clearer interpersonal component (Grant et al. 2007; Starr and Davila 2008). Furthermore, given that the RAQ was based largely on existing hopelessness and rumination measures, it may be somewhat limited in scope, and may not reflect the full spectrum of potentially depressogenic anxiety response styles. Future work should more fully explore anxiety response styles and their associations with comorbid depressive symptoms.

In addition, further work is needed to fully differentiate depressive response styles and anxiety response styles, both as traits (i.e., do people who tend respond to anxiety in particular ways also tend to respond in similar manners to depressive symptoms?) and as actual cognitions (do thoughts about anxiety symptoms differ markedly from thoughts about depressive symptoms, in both form and consequences?). Although emerging evidence suggests that responses to anxiety are conceptually distinct from depressive response styles (Rector et al. 2008), they may ultimately prove difficult to differentiate. In fact, the high correlation between the two constructs may indicate that they represent shared underlying substrates that contribute to the development of co-occurring anxiety and depression. Clearly, greater research is needed to fully explore alternative hypotheses and elucidate specific processes.

A larger question is whether anxiety response styles can be truly conceptualized as discrete causes and/or consequences of anxiety and depression, when some argue that they are in fact the essence of anxiety and depression (Barlow 2002; Lang 1968). In our view, this distinction does not dilute the importance of our analyses. If particular essential components of anxiety play a causal role in generating depressive symptoms, identifying them is important both for advancing theoretical knowledge and for devising effective interventions.

Should our findings be replicated, they may have important clinical implications. Comorbid depressive symptoms can negatively impact anxiety treatments (Ledley et al. 2005; Young et al. 2006). If psychotherapists target depressogenic responses to anxiety symptoms in addition to the symptoms themselves, they may be able to, in turn, ameliorate comorbid depressive symptoms. Comorbidity has presented a challenge to the mental health

field, both in determining its origins and coping with its adverse consequences; better understanding comorbidity could help to generate solutions for a wide range of psychosocial problems.

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Appendix: Response to Anxiety Questionnaire-Scale Items

People think and do many different things when they feel *anxious, nervous, or worried*. I'm going to list several possibilities. Please mark whether you never, sometimes, often, or always think or do each one when you feel *anxious, nervous, or worried*. Please indicate what you generally do, not what you think you should do.

1	2	3	4
Almost never			Almost always

1. Think "I won't be able to do my job if I don't snap out of this."
2. Analyze recent events to try to understand why you are anxious.
3. Think "Why do I always react this way?"
4. Think about a recent situation, wishing it had gone better.
5. Think "I won't be able to concentrate if I keep feeling this way."
6. Think "Why do I have problems other people don't have?"
7. Think "Why can't I handle things better?"
8. Think about how anxious you feel.
9. Think about all your shortcomings, failings, faults, and mistakes.
10. Analyze your personality to try to think about your feelings.
11. Think about how angry you are with yourself.
12. Think about how you won't be able to sleep.
13. Think about how restless or keyed up you feel.
14. Think about how difficult it is to concentrate.

15. Go someplace alone to think about your anxiety/worries.
16. Think about how your anxiety will keep you from doing things you want to do.
17. Think about how you won't be able to go anywhere without feeling anxious or panicking.
18. Think about how difficult it is to socialize.
19. Feel stupid for feeling this way.
20. Think "I'm going crazy."
21. Think about how tense you feel.
22. Feel hopeless, like things will never get better.
23. Think you might as well give up, because you can't make things better for yourself.
24. Think that your future seems dark.
25. Think that your anxiety will keep you from getting what you want.
26. Think that the future seems vague and uncertain.
27. Think your anxiety is uncontrollable.
28. Think your anxiety is never going to stop.
29. Think your anxiety will stop you from enjoying life.
30. Think your anxiety will have negative effects on things that are important to you.
31. Feel bad about yourself for feeling anxious.
32. Think "What's wrong with me?"

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