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Cognitive vulnerability to comorbidity: Looming cognitive style and depressive cognitive style as synergistic Predictors of anxiety and depression symptoms

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Running head: Cognitive Vulnerability to Comorbidity

**Cognitive Vulnerability to Comorbidity: Looming Cognitive Style and Depressive  
Cognitive Style as Synergistic Predictors of Anxiety and Depression Symptoms**

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### Abstract

**Background and objectives:** Because anxiety and depression are highly comorbid, it is likely that individuals with co-occurring cognitive vulnerabilities to depression and anxiety will experience more severe symptoms of anxiety and depression. However, no study to date has examined the effects of co-occurring (simultaneous) cognitive vulnerabilities to depression and anxiety on the severity of symptoms.

**Method:** The present study examines the co-occurring effects of Alloy & Abramson's (1999) Negative Cognitive Style, a vulnerability to depression, and Riskind's (2000) Looming Cognitive Style, a vulnerability to anxiety.

**Results:** Results indicated that those with co-occurring vulnerabilities experience a more severe level of anxiety and depression symptoms

**Limitations:** The present study used a measure of symptoms rather than actual clinical diagnoses.

**Conclusion:** These findings address the previously ignored area of cognitive vulnerability to comorbidity. Co-occurring cognitive vulnerabilities to anxiety and depression synergistically confer risk for more severe anxiety and depression symptoms than the individual or additive effects of either vulnerability do alone.

## 1. Introduction

### 1.1 Anxiety and Depression as Comorbid Disorders

Anxiety and depression are highly comorbid disorders (Kessler, Chiu, Demler, & Walters, 2005; Kessler et al., 1994). Many studies report that more than half of patients with depression also have an anxiety disorder (Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Mineka, Watson, & Clark, 1998). Additionally, self-report measures of anxiety and depression symptoms are generally found to strongly correlate (Clark & Watson, 1991).

Individuals with comorbid anxiety and depression use more medical resources, have more somatic symptoms, take longer to recover, relapse more often, require more psychiatric hospitalizations, and are more impaired in work and psychosocial functioning than people with either anxiety or depression alone (Hirschfeld, 2001). The negative effects of comorbid anxiety and depression are not just simply additive of the effects that each has separately. Instead, it appears that they are multiplicative and synergistic. To illustrate, the negative effects of comorbid anxiety and depression lead to more severe symptoms of both disorders, more difficulty in treatment, and poorer treatment outcomes (Lydiard & Brawman-Mintzer, 1998).

As if the increased negative outcomes are not bad enough, several studies find that individuals with comorbid anxiety and depression are at far higher risk for suicide than those with only one disorder (Goodwin et al., 2001; Lydiard & Brawman-Mintzer, 1998; Henriksson et al., 1993). For example, Goodwin et al. (2001) finds that those with Major Depressive Disorder are 5.3 times more likely than healthy controls to have suicidal ideation over a two week period, while those with Panic Disorder are 3.2 times more likely to have suicidal ideation. However,

those with co-occurring Major Depressive Disorder and Panic Disorder were 15.4 times more likely than healthy controls to exhibit suicidal ideation.

Despite the increased severity of symptoms and outcomes associated with the high rate of comorbidity between depression and anxiety, much remains to be learned about the factors that can help to explain comorbidity and its synergistic effects. Although a variety of explanatory factors may contribute, including genetic factors (Kendler, 1996; Kendler, Neale, Kessler, & Heath, 1992), attachment relationships (Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001), and stressful or traumatic events (Hovens et al., 2010; de Graaf, Bijl, ten Have, Beekman, & Vollebergh, 2004), cognitive factors may also be important. However, there has been little research on the role that cognitive factors can play in comorbidity and such research is sorely needed.

## **1.2 Cognitive Vulnerabilities and Comorbidity**

Current theories of cognitive vulnerability primarily conceptualize risk for single disorders and ignore the need to address the risk to comorbid symptoms and diagnoses. For example, there is extensive research on cognitive vulnerability to as depression (Alloy et al., 2000; Abramson, Metalsky, & Alloy, 1989), and a growing body of research on cognitive vulnerabilities to anxiety (Riskind et al., 2000). However, such disorder-specific cognitive models have been advanced to only understand depression and anxiety individually, as separate disorders.

Notwithstanding the lack of attention by disorder-specific models to comorbidity, it is possible that combinations of disorder-specific cognitive vulnerabilities to depression and anxiety could partly explain the synergistic effects of comorbid depression and anxiety. Although such factors could include “shared” or common vulnerabilities (e.g., lack of

controllability), disorder-specific vulnerabilities may play a role. But surprisingly, there is a paucity of research that has examined the separate and combined effects of cognitive vulnerability factors for anxiety and depression (Riskind & Alloy, 2006). The major aim of the present study is to examine the effects of two such vulnerabilities, Alloy & Abramson's (1999) negative cognitive style, a vulnerability to depression and Riskind et al.'s (2000) looming cognitive style, a vulnerability to anxiety.

### **1.3 Negative Cognitive Style**

According to the Hopelessness Theory of Depression (Abramson, Metalsky, & Alloy, 1989), individuals with maladaptive, or negative, cognitive styles are vulnerable to depression when they encounter negative life events because they assign a negative meaning or consequences to the negative event. Specifically, those who make global and stable attributions, make negative self-inferences, and expect negative consequences following the occurrence of a negative life event are more likely to become depressed. More contemporary versions of this theory (Alloy, Abramson, Safford, & Gibb, 2006; Alloy et al., 2000) have focused primarily on the tendency to make stable and global attributions, called a negative cognitive style. Individuals with the negative cognitive style (NCS) have been found to be at greater risk for depression (Fresco, Alloy, & Reilly-Harrington, 2006; Iacoviello, Alloy, Abramson, Whitehouse, & Hogan, 2006; Alloy et al., 2000; Alloy & Clements, 1998) and suicide (Abramson et al., 1998) across a variety of samples. The NCS has been found to be less related to anxiety, suggesting that it is primarily a vulnerability to depression (Hankin, Abramson, Miller, & Haefffel, 2004).

### **1.4 Looming Cognitive Style**

According to the Looming Vulnerability Model of anxiety, individuals who are cognitively vulnerable to anxiety have a looming cognitive style (LCS; Riskind, Black, &

Shahar, 2010; Riskind & Williams, 2005; Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). LCS is a type of cognitive threat overestimation bias that specifies individuals who are cognitively vulnerable to anxiety imagine real or perceived threat stimuli as rapidly and dynamically approaching and increasing in threat. Looming cognitive style has been found to be a prospective predictor of general anxiety symptoms (Adler & Strunk, 2009; Williams, Shahar, Riskind, & Joiner, 2005) and symptoms of specific anxiety disorder symptoms such as OCD (Elwood, Riskind, & Olatunji, 2011; Riskind, Tzur, Williams, Mann, & Shahar, 2007), social anxiety (Brown & Stopa, 2008), and GAD (Riskind & Williams, 2005). In addition to prospective studies, LCS has been found to predict retrospective anxiety diagnoses (Black, Riskind, & Kleiman, 2010). Looming cognitive style predicts anxiety independently of other vulnerabilities to anxiety such as anxiety sensitivity (Elwood, Riskind, & Olatunji, 2011; Reardon & Williams, 2007) and intolerance of uncertainty (Riskind, Tzur, Williams, Mann, & Shahar, 2007). Looming cognitive style is less related to depression (Reardon & Williams, 2007; Riskind, et al, 2000), so, like NCS, LCS is strongly associated with one disorder.

### **1.5 NCS and LCS as Co-occurring Vulnerabilities**

What happens when individuals have two disorder-specific cognitive vulnerabilities? More specifically, what are the consequences of co-occurring NCS and LCS, which are only moderately correlated cognitive liabilities ( $r = .18$ ; Reardon & Williams, 2007)? Accordingly, individuals who have both disorder-specific vulnerabilities could be said to have a “double” or compounded vulnerability to both depression and anxiety simultaneously. We hypothesized that negative cognitive style and looming cognitive style would have synergistic effects. Namely, controlling for the main effects of NCS and LCS, we expected that the NCS X LCS interaction effect would incrementally predict depression and anxiety symptoms. We predicated this

synergism hypothesis on the assumption that each vulnerability factor augments the effect of the other in creating stress and depleting coping resources. This could make it more difficult for individuals to cope with or recover from problems, manage their emotions, or prevent themselves from generating further stressful events (Riskind, Black, & Shahar, 2009). As a result, we expected that the ability of individuals to cope would be synergistically impaired when they have compounded vulnerabilities, which could result in increased generation of symptoms.

## 2. Method

### 2.1 Participants

Three hundred and twenty five college students (88% female) participated in the study for course credit. Their ages ranged from 18 to 48 years ( $M = 21.65$ ,  $SD = 5.66$ ). Approximately 58% of the sample described themselves as Caucasian, 19% Asian, 10% African American, 1% American Indian, and 1% Native Hawaiian. The rest described themselves as another ethnicity.

### 2.2 Procedure

Participants completed online-administered questionnaires at two time points. The first time point contained a demographics screener and a set of measures that included the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995), Cognitive Style Questionnaire (CSQ; Haefel et al., 2008), and the Looming Maladaptive Style Questionnaire (Riskind et al., 2000). Six weeks after participants completed the first time point, they received an email with a link to complete the second time point, which included the DASS and other related measures.

### 2.3 Materials

Levels of anxiety and depression symptoms were measured using the anxiety and depression subscales from the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995) at both time points. The DASS a 42-item self-report instrument that measures of

depression, anxiety and stress. The DASS has been found to be a valid and reliable measure that correlates high with other measures of psychopathology such as the BDI and BAI and demonstrates high internal consistency (Horton, 2007). Adequate internal consistency was found for both psychopathology measures at both time points: anxiety ( $\alpha = .85$  and  $.93$  at Times 1 and 2, respectively), depression ( $\alpha = .89, .95$ ).

Vulnerability to depression, the Negative Cognitive Style, was measured using the Cognitive Style Questionnaire (CSQ; Haefel et al., 2008). The CSQ is a self-report measure that measures one's tendency to make global and stable attributions following the occurrence of a negative life event. The CSQ ask participants to indicate a potential cause and consequence of 12 negative events (such as "you want to be in a relationship but aren't"). A composite was created of stable and global responses from the 12 items to create an overall index of negative cognitive style. Adequate internal consistency was found for the CSQ ( $\alpha = .89$ ).

Vulnerability to anxiety, the Looming Cognitive Style, was measured using the Looming Maladaptive Style Questionnaire (LMSQ; Riskind et al., 2000). The LMSQ is an 18-item measure of an individual's tendency to appraise threats as rapidly rising in risk and urgency, progressively worsening, or actively accelerating or speeding up. Participants respond to six vignettes describing a range of potentially stressful situations including physical illness, financial problems, social rejection, and being trapped or hurt. Participants answer three questions about each vignette on a 5-point Likert-type scale. Individual item scores are aggregated such that higher scores indicate higher levels of looming vulnerability. The LMSQ has been found to be a valid and reliable measure (Riskind et al., 2000). In the present study, adequate internal consistency was found for the LMSQ ( $\alpha = .86$ ).

### 3. Results

Means, standard deviations, and intercorrelations among study variables are presented in Table 1. CSQ correlated with LMSQ and Time 2 DASS scales. LMSQ correlated with all time 1 and time 2 DASS scales. Time 1 DASS anxiety scores correlated with time 2 DASS anxiety and time 2 DASS depression scores.

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Table 1 About Here

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### **3.1 Hierarchical Regression Analyses of Co-occurring vulnerabilities as predictors of anxiety and depression symptoms.**

#### **3.1.1 Co-occurring vulnerabilities as predictors of anxiety.**

Table 2 presents the results of a hierarchical multiple regression analysis in which T2 DASS Anxiety was regressed onto the T1 DASS Anxiety (block 1), LMSQ and CSQ as main effects (block 2) and the interaction between LMSQ and CSQ (Block 3). LMSQ and CSQ scores were centered prior to calculating the interaction term to facilitate the interpretation of the interaction according to the recommendations of Aiken & West (1991). Time 1 anxiety symptoms were a significant predictor in block 1. In block 2, negative cognitive style was a significant predictor and looming cognitive style was trending towards significance. In block 3, the interaction between negative cognitive style and looming cognitive style was significant. Furthermore, the interaction in block 3 predicted a statistically significant amount of variance above and beyond their main effects of negative cognitive style and looming cognitive style.

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Table 2 About Here

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Given that the interaction term was significant, the pattern of the interaction was probed based on Aiken & West's (1991) recommendation. When the interaction was probed, it was found that LMSQ augmented the effect of CSQ, such that individuals with higher levels of CSQ reported more anxiety symptoms if they had high levels of LMSQ. In figure 1, the association between CSQ and anxiety symptoms, controlling for T1 DASS Anxiety is presented as a function of high vs. low levels of LMSQ.

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Figure 1 about here  
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As shown in Figure 1, under high levels of LMSQ (1SD above the mean), CSQ was positively associated with T2 anxiety symptoms (standardized simple slope = 2.63,  $p < .001$ ). Under low levels of LMSQ (1SD below the mean), however, the association between CSQ and T2 anxiety symptoms was non-significant (standardized simple slope = 0.36,  $p = .55$ ). Thus as predicted, NCS and LCS augmented each other's effects and individuals with both vulnerabilities reported higher levels of anxiety symptoms than the rest of the sample.

### **3.1.2 Co-occurring vulnerabilities as predictors of depression.**

Next, a hierarchical multiple regression analysis was conducted that was similar to the analysis conducted for anxiety, but with T1/T2 DASS Depression as control and outcome variables, respectively. Again, LMSQ and CSQ scores were centered prior to calculating the interaction term. The results of this analysis are displayed in table 3. As can be seen from the table, in block 1 Time 1 DASS depression was significant predictor of depression symptoms. In block 2, negative cognitive style was a significant predictor. In block 3, the interaction between negative cognitive style and looming cognitive style was significant. Furthermore, the interaction

in block 3 predicted a statistically significant amount of variance above and beyond their main effects of negative cognitive style and looming cognitive style.

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Table 3 About Here  
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Also similar to the anxiety results, when the interaction was probed, it was found that LMSQ augmented the effect of CSQ, such that individuals with higher levels of CSQ reported more depression symptoms if they had high levels of LMSQ. In figure 2, the association between CSQ and depression symptoms, controlling for T1 DASS depression symptoms is presented as a function of high vs. low levels of LMSQ.

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Figure 2 about here  
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As shown in Figure 2, under high levels of LMSQ (1SD above the mean), CSQ was positively associated with T2 depression symptoms (standardized simple slope = 2.55,  $p < .001$ ). Under low levels of LMSQ (1SD below the mean), the association between CSQ and T2 depression symptoms was non-significant (standardized simple slope = -0.10,  $p = .87$ ). Again, as predicted, individuals with both vulnerabilities reported higher levels of depression symptoms than the rest of the sample.

#### 4. Discussion

The present study expanded upon previous research on cognitive vulnerabilities by investigating the separate and combined effects two disorder-specific cognitive vulnerabilities —

the negative cognitive style (NCS) and the Looming Cognitive Style (LCS). This is important to examine because comorbidity is the most common presentation of anxiety and depression, is linked to more severe symptoms and outcomes, and because disorder-specific vulnerabilities could have synergistic effects. Notably, the assumption that negative cognitive style and looming cognitive style are largely separate and independent factors was supported in this study in that their correlation ( $r = .23$ ) was highly comparable to that found by Reardon & Williams ( $r = .18$ ). The primary current hypothesis was that these two vulnerabilities would synergistically interact to predict greater levels of anxiety and depression symptoms.

#### **4.1 Continuous Symptom Variables**

Consistent with the synergy hypothesis, controlling for the main effects of negative cognitive style and looming cognitive style, as well as initial symptoms, the interaction effect between negative cognitive style and looming cognitive style predicted incremental variance in depression and anxiety symptoms. Thus, when both cognitive vulnerabilities are present, each vulnerability factor appears to augment the effects of the other. These findings are in keeping with the hypothesis that cognitive vulnerability factors can synergistically interact to account for increased anxiety and depression symptoms. Moreover, the synergy between vulnerability factors applied to prediction of both depression and anxiety. For example, even though looming cognitive style is not directly associated with depression, it amplified the effect of negative cognitive style to predict higher levels of depression. Much the same synergy was found for negative cognitive style that amplified the effect of LCS to predict higher anxiety.

#### **4.2 Co-occurring Vulnerabilities as Stronger Predictors than Individual Vulnerabilities**

In general, the current findings corroborated the hypothesis that interaction between co-occurring vulnerabilities predict more variance in symptom measures than individual

vulnerabilities do. Together with findings indicating increased symptoms and negative outcomes of comorbid anxiety and depression (Lydiard & Brawman-Mintzer, 1998), the present findings suggest the possibility that those who have co-occurring cognitive vulnerabilities may be at increased risk for more severe symptoms that have poorer treatment outcomes and prognosis. It seems remarkable that the possible synergistic effects between co-occurring vulnerabilities have been largely ignored area in cognitive vulnerability research. This may be because current theories of cognitive vulnerability primarily conceptualize risk for single disorders and ignore the need to address the risk to comorbid symptoms and diagnoses. Thus, the present study provides a way to use cognitive vulnerability models specific to depression or anxiety to understand aspects of symptom comorbidity.

#### **4.3 Potential Mechanisms of Synergistic Vulnerabilities**

We predicted synergistic effects based on the assumption that each vulnerability factor could augment the other in creating difficulties coping with life stress. As a result, we expected that the ability of individuals to cope would be disproportionately impaired when they have compounded vulnerability relative to the effects of each vulnerability factor alone or their additive effects. Such theoretical logic is consistent with the possibility that having multiple cognitive vulnerabilities to individual disorders may work by augmenting a depleting effect that each one separately has on self-control coping resources (Riskind, Black, & Shahar, 2010). Thus, stressful experiences and the necessity to cope with them can deplete self-regulatory resources needed for further control (Schmeichel & Baumeister, 2004). As a result, having compounded vulnerabilities may lead to a faster overall depletion of coping resources that could act as a non-specific risk factor for psychopathology, including anxiety and depression. This reasoning could also be extended to suggest the possibility that individuals with double

vulnerabilities could be prone to other psychopathology such as alcohol use, drug use, or eating disorders.

The present findings and logic also raise the further question of whether other combinations of shared or disorder-specific cognitive vulnerabilities create the same interaction or if only some cognitive vulnerabilities have these effects. For example, future studies could examine whether interactions between other cognitive vulnerabilities to anxiety (e.g. intolerance of uncertainty or anxiety sensitivity) and other cognitive vulnerabilities to depression (e.g. dysfunctional attitudes or rumination), and shared factors (e.g., perceived uncontrollability, negative affect), predict greater comorbidity and symptom severity. Moreover, the cumulative effects of disorder-specific vulnerabilities of the same disorder may predict comorbidity under certain conditions. Such a possibility is suggested by a recent study that demonstrated that LCS and anxiety sensitivity synergistically interacted in predicting stress generation (Riskind, Black, & Shahrar, 2010).

#### **4.4 Strengths and Limitations**

Notable strengths of this study include a large, diverse sample and its use of a short-term prospective design. Nevertheless, there were several limitations that should be noted. First, the present study only used symptom measures instead of actual diagnoses and cannot be generalized to actual DSM diagnoses. Thus, future studies could use a structured clinical interview to establish more accurate diagnostic criteria or clinical patients with present diagnoses. Second, the present study did not include a measure of negative life events and was thus unable to test a diathesis stress model of cognitive vulnerability to comorbidity. Future studies could examine the role of negative life events as a moderator to the negative cognitive style by looming cognitive style interaction. Third, although there were significant interactions

between negative cognitive style and looming cognitive style in predicting anxiety and depression symptoms, there the magnitudes of the interactions were relatively small.

Notwithstanding these limitations, the present study contributes to the literature on cognitive vulnerability to anxiety and depression by showing that current models of specific vulnerability can help shed light on comorbid conditions. Moreover, the study demonstrates that the effects of double cognitive vulnerabilities are not just additive. Instead, under some conditions, such disorder-specific vulnerability factors can synergistically interact to predict that individuals with double vulnerabilities will have higher rates of anxiety and depression symptoms.

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Table 1.

*Means, Standard Deviations, and Intercorrelations Between the Study Variables*

	1	2	3	4	5	6
1. CSQ	-					
2. LMSQ	.23 <sup>***</sup>	-				
3. T1 DASS Anxiety	.07	.17 <sup>***</sup>	-			
4. T1 DASS Depression	.09	.19 <sup>***</sup>	.78 <sup>***</sup>	-		
5. T2 DASS Anxiety	.20 <sup>***</sup>	.20 <sup>***</sup>	.47 <sup>***</sup>	.41 <sup>***</sup>	-	
6. T2 DASS Depression	.15 <sup>***</sup>	.14 <sup>**</sup>	.39 <sup>***</sup>	.52 <sup>***</sup>	.71 <sup>***</sup>	-
Mean	3.99	19.58	10.46	11.46	9.69	11.24
SD	0.63	3.37	6.70	7.48	9.04	9.70

Note. CSQ = Cognitive Style Questionnaire, LMSQ = Looming Maladaptive Style Questionnaire, DASS Anxiety= DASS Anxiety subscale, DASS Anxiety= DASS Depression subscale; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Table 2.

*Results of Linear Regression Analyses Predicting Time 2 Anxiety Symptoms*

	B	SE B	$\beta$	<i>t</i>
Block 1				
T1 DASS Anxiety	0.63	0.07	0.47	9.32***
Block 2				
LMSQ	0.78	0.46	0.09	1.70 <sup>+</sup>
CSQ	1.35	0.45	0.15	2.96**
Block 3				
LMSQxCSQ	1.14	0.44	0.13	2.59**

Note. DASS = Depression, Anxiety, and Stress Scales, LMSQ = Looming Maladaptive Style Questionnaire, CSQ = Cognitive Style Questionnaire; <sup>+</sup> $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Step 1  $R^2 = .22$ ; Step 2  $R^2 \Delta = .04$ ,  $p < .001$ , Step 3  $R^2 \Delta = .02$ ,  $p < .01$

Table 3.

*Results of Linear Regression Analyses Predicting Time 2 Depression Symptoms*

	B	SE B	$\beta$	<i>t</i>
Block 1				
T1 DASS Depression	0.68	0.06	0.52	10.60***
Block 2				
LMSQ	0.15	0.49	0.02	0.30
CSQ	1.05	0.49	0.11	2.16*
Block 3				
LMSQxCSQ	1.33	0.47	0.14	2.82***

Note. DASS = Depression, Anxiety, and Stress Scales, LMSQ = Looming Maladaptive Style Questionnaire, CSQ = Cognitive Style Questionnaire; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Step 1  $R^2 = .27$ ; Step 2  $R^2 \Delta = .01$ ,  $p < .10$ , Step 3  $R^2 \Delta = .02$ ,  $p < .01$ .

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Figure 1.

Plot of the interaction between CSQ and LMSQ predicting Time 2 DASS Anxiety as a function of high vs. low levels of LMSQ, controlling for Time 1 DASS Anxiety

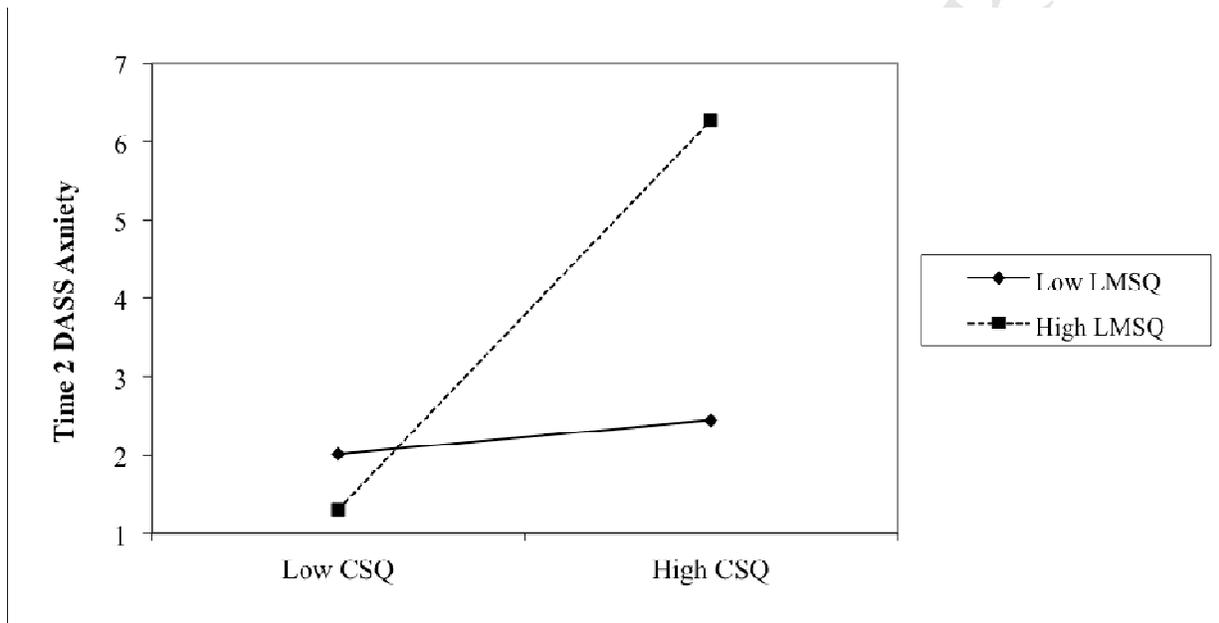
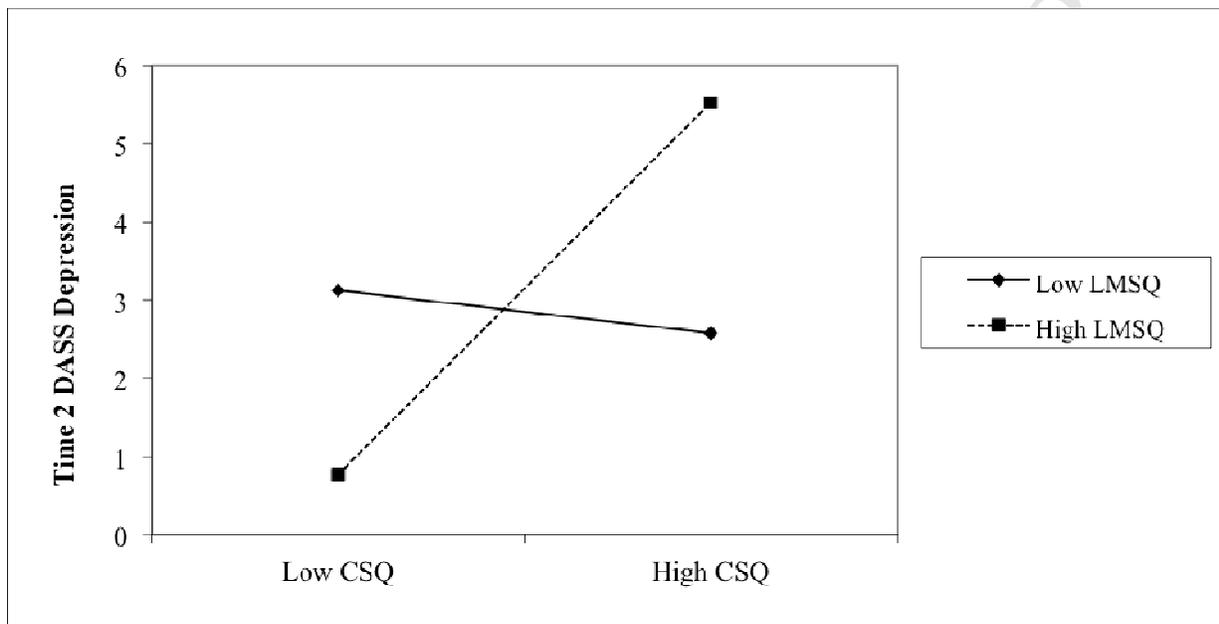


Figure 2.

*Plot of the interaction between CSQ and LMSQ predicting Time 2 DASS Depression as a function of high vs. low levels of LMSQ, controlling for Time 1 DASS Depression*



- We examined the effects of co-occurring vulnerabilities to anxiety and depression.
- These vulnerabilities predict higher anxiety and depression symptoms.
- This highlights the importance of studying vulnerabilities when they co-occur.

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