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Cognitive Vulnerability, Lifetime Risk, and the Recurrence of Major Depression in Graduate Students

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The main purpose of this study was to determine the contribution of cognitive risk variables for previous episodes of major depression and for the recurrence of the disorder in a sample of university graduate students (n = *97*). *Participants were diagnosed with at least one prior episode of major depression and were assessed again 16 months later* (n = *77*). *Consistent with previous findings (Alloy et al., 2000.* Journal of Abnormal Psychology, 109, *403–418), cognitive measures including dysfunctional attitudes and a negative attributional style were associated with a greater number of previous episodes of depression, controlling for mood, neuroticism, rumination, sociotropy, and autonomy. Cognitive vulnerability in the achievement domain as well as neuroticism and sociotropy were uniquely related to a greater number of previous episodes of depression. Negative attributions and autonomy predicted the recurrence of the disorder, controlling for past history of depression and all other variables. These findings suggest that the autonomous personality style and negative attributions are particularly pernicious for the recurrence of depression in graduate students. The cognitive variables were not related to anxiety diagnoses, but did predict Axis 2 disorders.*

KEY WORDS: depression; attributions; dysfunctional attitudes; rumination; sociotropy; autonomy; personality disorders.

The cognitive model has been a central focus of psychological research on depression for the past two decades (see Abramson, Alloy, Hankin, Haeffel, MacCoon et al., 2002). This model posits that individuals with maladaptive cognitive patterns will be at an increased risk for depression when presented with a negative stressor (see Beck, 1967, 1987; Abramson, Metalsky, & Alloy, 1989; Abramson, Seligman, & Teasdale, 1978). Many variants of the cognitive model have been proposed and reworked in an attempt to isolate those factors that contribute to the onset, maintenance, remittance, and relapse of major depression (see Ingram, Miranda, & Segal, 1998). Beck's (1967, 1987) and the hopelessness theory of depression (Abramson

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et al., 1989) have probably generated the most research, with recent findings offering the most compelling evidence yet for the contribution of negative cognitive style to major depressive episodes (see Alloy, Abramson, Whitehouse, Hogan, Tashman et al., 1999; Alloy, Whitehouse, Lapkin, Abramson, Hogan et al., 2000). The current study represents an additional effort to substantiate the role of dysfunctional attitudes and a negative inferential style in the prediction of major depression and other forms of psychopathology in a sample of graduate students.

Beck's (1963, 1967, 1987) cognitive theory postulates that a negative self-schema involving dysfunctional beliefs underlies vulnerability to depression. These maladaptive beliefs involve external contingencies for one's worth (e.g., success or approval from others) and are typically assessed with the Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978). Examples of dysfunctional attitudes include "My value as a person depends greatly on what others think of me" or "If I don't set the highest standards for myself, I am likely to end up a second-rate person." These beliefs will influence the perception of circumstances in one's life, leading to biased interpretations and exaggerated emotional responses in the face of stress (Beck, 1987).

Two depressive themes, one revolving around interpersonal needs for acceptance and nurturance (sociotropy) and the other revolving around needs for achievement and independence (autonomy) have also been suggested by Beck (1983). These two "modes" of functioning represent separate values and goals that constitute distinct vulnerabilities to depression in situations specific to that domain. For example, experiences involving rejection or loss should be particularly difficult for someone characterized by sociotropic concerns, while constraints leading to loss of freedom should lead to problematic reactions for the autonomous individual (Beck, 1983).

Martin Seligman's research on learned helplessness (1975) precipitated the growth of theories that emphasize cognitive errors as causal factors in major depression. Seligman hypothesized that negative inferences in the form of insidious expectancies surrounding a lack of control over the outcome of events, could precipitate depressive symptomatology (Abramson et al., 1978). Abramson et al.'s (1978) reformulation focused on inferred causes for negative events that are stable, global and internal, generating feelings of helplessness and depression.

Although the reformulated attribution theory generated a sizeable amount of empirical research, it was unable to produce a well-articulated theory of depression (Abramson et al., 1989). Thus, building on both prior models, Abramson et al. (1989) proposed the hopelessness theory of depression, characterized by symptoms including retarded initiation of voluntary responses, apathy, lack of energy, and psychomotor retardation. A proximal sufficient cause for hopelessness depression is an expectation that positive events will not happen or that negative events will happen, in combination with the expectation that nothing the individual can do will change the outcome of these events. The negative inferential style leading to hopelessness depression involves stable and global attributions for negative events, along with the expectation that wide-ranging negative consequences will follow, and the conclusion that one must be flawed or worthless. These last two components (consequences and

implications for the self) are new aspects of the attributional diathesis articulated in the hopelessness theory (Abramson et al., 1989), although they are not always operationalized (see Lewinsohn, Joiner, & Rhode, 2001; Reilly-Harrington, Alloy, Fresco, & Whitehouse, 1999). In summary, the type of inference one makes for negative events, in addition to the degree of importance attached to these events are significant factors that mitigate whether hopelessness with corresponding symptoms of depression will develop. For example, generalized hopelessness and depressive symptoms are more likely to occur when negative life events are attributed to causes apt to continue over the long term (stable) and liable to pervade many aspects of life (global), in addition to being perceived as entailing dire consequences for the self.

Both Beck's model and the hopelessness model have provided a solid framework for further investigation. Consequently, these models have generated extensive research, mostly with college students using self-report questionnaires (e.g., Brown, Hammen, Craske, & Wickens, 1995; Metalsky & Joiner, 1992; Metalsky, Joiner, Hardin, & Abramson, 1993). There have been fewer studies investigating the contribution of a negative cognitive style to major depression, although some preliminary studies have provided encouraging evidence (e.g., Alloy, Lipman, & Abramson, 1992). More recently, The Temple-Wisconsin Cognitive Vulnerability to Depression (CVD) Project (Alloy et al., 1999, 2000) has proven to be one of the most ambitious tests of Beck's model and the hopelessness theory of depression. Over 8,000 University freshmen from Temple and Wisconsin were screened, and those without any current DSM-III-R Axis 1 disorder were categorized as being either high or low-risk for depression based on their attributional style and dysfunctional beliefs. More specifically, those scoring in the lower or upper quartile of both the cognitive style questionnaire (CSQ) and dysfunctional attitudes scale (DAS) were selected for the study. The retrospective findings confirmed that, after controlling for age and current depressive symptomatology, those cognitively at risk had a greater lifetime rate of major depressive disorders and the hypothesized subtype of hopelessness depression. The high-risk group did not have a higher incidence rate for any other category of Axis 1 disorders, supporting the specificity of the cognitive vulnerability for depressive disorders (Alloy et al., 2000).

The participants in the CVD project were followed over time, and the prospective results are also very encouraging. Alloy et al. (1999) reported that the high-risk participants were significantly more likely to develop a first episode of major depression over the 2.5-year follow-up. Those cognitively at risk with a prior history of depression were also more likely than low-risk participants to have a recurrence of the disorder. These findings provide compelling evidence for the contribution of a negative inferential style and dysfunctional attitudes to first onsets and recurrences of clinical depression.

Since the publication of these results, another study using participants from the same sample reported that rumination mediated the effect of cognitive vulnerability on future episodes of depression (Spasojevic & Alloy, 2001). Cognitive risk was significantly related to a ruminative response style, which in turn accounted for the prospective relationship to future episodes of depression. These authors

suggested that rumination might act as a "general proximal mechanism through which vulnerability markers may affect depression" (Spasojevic & Alloy, 2001, p. 25).

Although the CVD Project obtained support for the vulnerability status of negative cognitive styles, Alloy et al. (2000) suggested that there is a need for replication and for further exploration in this domain. Along these lines, a recent study unpacked the generic cognitive risk factors in the CVD project and examined the contribution of attributions and dysfunctional attitudes separately in the postdiction of lifetime incidence of major depression in an undergraduate sample (Haeffel et al., 2003). Negative attributions as defined by the hopelessness theory of depression (Abramson et al., 1989) were found to significantly postdict a history of depression, while dysfunctional attitudes did not (Haeffel et al., 2003). These authors concluded that a negative inferential style, as measured by the cognitive style questionnaire (CSQ; Alloy et al., 2000) is a more potent contributor to depression than dysfunctional attitudes, and may have accounted for the effects of cognitive risk as reported by Alloy et al. (2000).

In contrast, other researchers have found dysfunctional attitudes to be better predictors of major depression than attributional style. Lewinsohn, Joiner and Rhode (2001) reported that dysfunctional attitudes interacted with negative life events to predict the onset of adolescent major depression. In this study, the findings with the negative attributional style measure were more difficult to interpret and predicted major depression only at low levels of stress (Lewinsohn et al., 2001). More work is needed to clarify the contribution of various cognitive markers for major depression.

Finally, research has attempted to determine the specificity of the cognitive model and has examined the relationship between cognitive vulnerability and diagnoses other than depression. Some have found a relationship between a negative inferential style and anxiety disorders (Haeffel et al., 2003), while others reported no relationship between cognitive risk and lifetime incidence rates of anxiety, and other Axis 1 disorders except for depression (see Alloy et al., 2000). More consistent findings have been obtained for the relationship between depressogenic cognitions and personality disorders. From the CVD project, Alloy et al. (1999) reported a significant relationship between cognitive risk and personality disturbance. Another study also found a link between cognitive variables and personality disorders in patients with a prior history of depression (Ilardi & Craighead, 1999). In the current study, we examined the contribution of cognitive risk variables for past and future episodes of depression. We also tested the relationship between cognitive vulnerability and diagnoses of anxiety and personality disorders to see if depressogenic cognitions may also apply to other forms of psychopathology.

Overview of the Current Study

We hoped to replicate the retrospective and prospective findings from Alloy et al. (1999, 2000) in an older group of graduate students. In addition, we used more stringent controls in our analyses and included the number of past episodes

of depression in the prediction of future onsets. This a very conservative test, but a crucial one since the best predictor of future depression often has been found to be a past history of the disorder, and the role of psychological variables in explaining future onsets remains to be demonstrated (see Coyne, Thompson, & Whiffen, 2004). Furthermore, our sample was unselected with respect to cognitive vulnerability which seemed important given that the extreme groups utilized in Alloy et al. (2000) may have inflated the effects obtained for the high risk group. We also sought to expand on the findings from the CVD project by controlling for neuroticism as this variable could also potentially account for the effect of a negative cognitive style on major depressive episodes (MDEs).

Our sample was comprised of a highly functioning group of graduate students from two major universities in Toronto, diagnosed with at least one prior episode of major depression and followed for the next 16 months. We used a retrospective and prospective design to test the attributional diathesis of the hopelessness model (including stable and global attributions for negative events; Alloy, Abramson, Metalsky, & Hartlage, 1988) and Beck's (1987) theory using dysfunctional attitudes representing the interpersonal and achievement domains (Mongrain & Zuroff, 1989). We tested whether these cognitive variables were uniquely related to the lifetime incidence of MDEs and whether they could predict future onsets. The main hypothesis was that individuals who have a negative inferential style and dysfunctional attitudes would be diagnosed with a greater number of previous episodes of major depression and would be at higher risk for the recurrence of the disorder. A strict test of the model was conducted by controlling for depressed mood, rumination, neuroticism, and other personality variables including sociotropy and autonomy, to determine if the effect of cognitive risk is attributable to other constructs also related to depression. This study also distinguishes itself by the attention paid to the context of our particular sample, and the delineation of cognitive vulnerability in the interpersonal and achievement domain. We expected our participants to be in a highly achievement-oriented phase of their lives, given the demands of graduate school, and that cognitive vulnerability in the achievement domain may be particularly pernicious in this sample. Finally, cognitive variables were tested in relationship to anxiety and personality disorders to test the specificity of the model for depression and determine whether depressogenic cognitions may constitute vulnerability to other forms of psychopathology.

METHOD

Participants and Procedure

The data were obtained from two main universities in Toronto (York University and University of Toronto). Packages were distributed in graduate student mailboxes and common areas in graduate departments at both universities. A brief description of the study, an informed consent form, demographic questions, and the Inventory to Diagnose Depression questionnaire (IDD-L; Zimmerman & Coryell, 1987) were enclosed in these packages. In order to encourage participation, those

who completed and returned a package were given one opportunity to win $1000 in a draw (one per university).

There were 835 returned packages, 307 from York University and 528 from the University of Toronto with 67% of respondents being female and 33% male. Based on the self-report measure (IDD-L), 412 of the students (49%) had experienced a previous episode of depression. Students who met criteria for depression on the IDD-L were contacted by telephone and underwent a phone screen using criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (4th Ed.; *DSM-IV*; American Psychiatric Association, 2000). The phone screen established the presence of a previous episode of major depression, and eliminated participants who were currently suffering from a current substance abuse or eating disorder since these conditions could seriously affect mood. The remaining participants were invited to our lab and were administered a Structured Clinical Interview for DSM-IV Axis I and Axis II disorders (SCID I and II; First, Spitzer, Gibbon, Williams, & Benjamin, 1994) to confirm the presence of a previous episode of depression, and to diagnose any other psychopathology. Exclusionary criteria included bipolar disorders, current substance/alcohol abuse; current eating disorder; borderline, paranoid, schizoid, or schizotypal personality disorders, psychotic features, or concomitant suicidality.[3]

The final sample was comprised of 190 graduate students (74% female, 26% male). The full set of measures reported in this study was mailed to participants after the initial interview, and were completed and returned by a subset of individuals ($n = 97$; 79% female, 21% male). The group who completed the measures was not significantly different from the final sample in terms of gender, age, ethnicity, severity of depressive symptomatology, number of previous episodes of depression, anxiety, or Axis 2 diagnoses at the time of the interview. Those who completed the questionnaires for the current study were therefore considered comparable to the larger sample of eligible participants in terms of demographics and psychopathology.

The median age for the current sample was 28 years (ranging from 22 to 54 years, $X = 30$ years). The majority of participants were Caucasian (81%), followed by Asian (7%), Other (7%), Hispanic (1%) and Black (1%), while 1% did not say. The mean number of previous episodes of depression was 1.9 with the last episode occurring on average 34 months (or 2.8 years) before the time of the interview. The mean age for the first depressive onset was 22 years.

The follow-up assessments were conducted by phone approximately 16 months (range 11-19 months) after the initial interview. The phone interview was comprised of diagnostic questions assessing the recurrence of a major depressive episode since the time of the initial assessment, as well as the onset of new Axis 1 disorders. Of the sample who completed the entire battery of tests for the current study, 78% ($n = 77$) could be reached and agreed to participate in the follow-up assessment.

[3]Borderline personality disorders were excluded since we intended to follow our participants over a number or years and were concerned by the ethical issues raised by the suicidal gestures often manifested by these individuals. Schizoid and schizotypal personality disorders were excluded because the more extreme ideational pattern displayed by these individuals may have skewed the responses on the cognitive measures. However, very few participants were excluded based on these criteria.

Those lost at follow-up were not different from those who were contacted in terms of cognitive vulnerability, depressive symptomatology, number of previous episodes of depression, or other Axis 1 diagnoses established at the time of the initial interview. From the group assessed, 32% ($n = 24$) experienced a new depressive episode over the following 16 months.

Measures

Inventory to Diagnose Depression-Lifetime Scale (IDD-L; Zimmerman & Coryell, 1987)

This 22 item self-report questionnaire was used as a preliminary screen for the presence of a previous episode of major depression. The IDD-L is based on *DSM-IV* criteria and assessed both symptom severity and duration (i.e., whether the subject experienced each symptom for a 2-week period or more). The internal consistency of this measure has been found to be .9 or higher, and very good agreement with the SCID has been reported (.75 or higher; Sato, Uehara, Sakado, Sato, Nishioka et al., 1996). It has demonstrated good sensitivity (70%) and specificity (95%) in a college sample (Goldston, O'Hara, & Schartz, 1990), and some have argued that the IDD-L is as valid as interviews for diagnosing depression (see Anderson & Limpert, 2001). The internal consistency in the current sample was .90.

The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I, Version 2.0; First, Spitzer, Gibbon, & Williams, 1995*) and Axis II Personality Disorders (SCID II, Version 2.0; First,* Spitzer, Gibbon, Williams, & Benjamin, 1994*)*

This standardized interview for the diagnosis of clinical and personality disorders was administered by trained graduate students in clinical psychology. Each interviewer underwent extensive training before the beginning of the study and continued to receive supervision as necessary. An expert rater listened to one third of the taped interviews and a 98% agreement was achieved for Axis I diagnoses ($\kappa = .96$), and 93% agreement for Axis II diagnoses ($\kappa = .63$ for particular personality disorders). A 95% agreement was obtained for the diagnosis of a previous episode of depression ($\kappa = .97$).

Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977*).*

This 20-item measure assesses depressive symptoms over the previous week, with an emphasis placed on the affective component of depression (Gotlib & Cane, 1990). The scale has good internal consistency with alphas of .84 for the general population, and split-half reliability coefficients ranging from .77 to .92 (Corcoran & Fisher, 1987). The CES-D also has good convergent validity and sensitivity (Gotlib & Cane, 1990), and has been shown to be more discriminating than the beck depression inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) in detecting difference in depressive severity (Santor, Zuroff, Ramsay, Cervantes, & Palacios, 1995).

Need for Approval- Perfectionistic Dysfunctional Attitudes
(A/IDAS; Mongrain & Zuroff, 1989*)*

This 14-item scale is comprised of DAS items (Form A Weissman & Beck, 1978) selected by expert judges according to interpersonal and achievement related themes. It is comprised of 7 attitudes reflecting an intense need for approval and love (e.g., "I am nothing if a person I love doesn't love me; My value as a person depends greatly on what others think of me") and 7 attitudes reflecting needs for perfection (e.g., "If I do not do well all the time, people will not respect me; If I fail partly at my work, then I am a failure as a person."). These subscales were named "Anaclitic and Introjective Dysfunctional Attitude Scales (A/IDAS)" in the original paper, and represent abbreviated versions of the Need for Approval and Perfectionism factors identified in previous research with the DAS (Cane, Olinger, Gotlib, & Kuiper, 1986; Imber et al. 1990). Both subscales have been related in theoretically meaningful ways to Dependency and Self-Criticism, as well as to perceived stress for corresponding interpersonal and achievement related events (Mongrain & Zuroff, 1989). The scale achieved a Cronbach alpha of .88 in the current sample.

Extended Attributional Style Questionnaire
(EASQ; Metalsky, Halberstadt, & Abramson, 1987*)*

The EASQ is comprised of 12 negative hypothetical events, and requires participants to imagine the event happening to them. Participants first write down the most likely cause of this event in an open-ended format and then rate this cause on three subscales assessing the degree of internality, stability, and globality. For this study, the EASQ was modified by removing positive events and scenarios that were inapplicable to graduate students (e.g., "During the first year of working in the career of your choice, you receive a negative evaluation of your job performance"). The remaining three negative interpersonal events were: "You really want to be in an intimate romantic relationship, but aren't;" "You go to a party with some friends and throughout the whole party, people don't act interested in you;" "An important romantic relationship you are involved in breaks up because the other person no longer wants a relationship with you." The three negative achievement events were: "As an assignment, you give an important talk in class, and the class reacts negatively;" "You take an exam and receive a low grade on it;" "You write a paper for a course and get a low grade on it." The stability dimension was assessed with questions such as: "Will the cause of your receiving a low grade now as described above again cause you to receive low grades on other papers in the future?" The globality dimension was assessed with questions such as: "Think about the cause of the person not wanting a romantic relationship with you. Is this cause something that leads to problems just in your romantic relationship in that instance or does this cause also lead to problems in other areas of your life?" Consistent with previous recommendations (Abramson et al., 1989; Metalsky & Joiner, 1992) we used the generality subscale (average of stability and globality) to test our predictions. The internal consistency of the generality subscale in this sample was adequate (Cronbach alpha of .77).

Rumination

This cognitive style was assessed with the 33-item response style questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991). The RSQ asks respondents to indicate what they generally do when feeling down, sad, or depressed. Rumination items involve focusing on a negative emotional state and thinking repetitively about the causes and consequences of that state. For example, items include "analyze recent events to try to understand why you are depressed," "go away by yourself and think about why you feel this way." Very high coefficient alphas and good test-retest reliabilities over a 5-month interval have been reported for the scale (Nolen-Hoeksema, 2000). The Cronbach alpha in the current sample was .88.

Neuroticism

The big five inventory (BFI; John, Donahue, & Kentle, 1991) is a 44-item questionnaire measuring the Five Factor Model of personality (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism; McCrae & Costa, 1989) and was utilized to assess neuroticism. The BFI has shown excellent convergent validity with other Big Five instruments, making it a viable alternative to the widely used but more lengthy NEO-PI (John & Srivastava, 1991). The internal consistency of the neuroticism scale in the current sample was moderate (Cronbach alpha of .72). However, the reliabilities for all five factors in U.S. and Canadian samples have been reported to be above .80, and very good test-retest reliabilities have also been obtained (John & Srivastava, 1991).

Sociotropy and Autonomy

These depressive personality styles were assessed with the personal style inventory (PSI; Robins, Ladd, Welkowitz, Blaney, Diaz, & Kutcher, 1994). Sociotropy involves concerns about what others think, dependency, and an inordinate need to please others. Items include: "I find it hard to be separated from people I love;" and "I try to please other people too much." Autonomy involves perfectionistic strivings, need for control, and defensive separation. Items include "I don't like relying on others for help" and "I resent it when other people try to direct my behavior or activities." The sociotropy and autonomy scales have been found to have good internal consistency, test-retest stability, as well as good convergent and discriminant validity (Robins et al., 1994; Sato & McCann, 1997). In the current sample, the Cronbach alphas were .89 for Sociotropy and .86 for Autonomy.

RESULTS

Descriptive statistics, including the correlations among the measures in this study are presented in Table I. Gender correlated with the cognitive measures (women: 0; men: 1), with men scoring higher on both the attribution and dysfunctional attitude measures (see Table I). Dysphoric mood (CES-D) was also correlated with the cognitive measures. Consequently, both gender and the CES-D were

Table I. Correlations Among Cognitive Risk, Personality and DSM-IV Diagnoses (N=97)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Attribution[a]												
2. DAS[b]	.40***											
3. Rumination[c]	.43***	.35***										
4. Gender	.20*	.20*	.02									
5. CES-D[d]	.45***	.40***	.26*	.17								
6. Sociotropy[e]	.40***	.49***	.36***	−.01	.25*							
7. Autonomy[e]	.34***	.21*	.25*	.21*	.27**	.37***						
8. Neuroticism[f]	.38***	.33**	.24*	.13	.31**	.22*	.32**					
9. Previous depressive episodes[g]	.39***	.33**	.07	−.06	.20*	.35***	.18	.35***				
10. Lifetime anxiety[h]	.03	−.13	−.24*	.07	−.03	−.01	.04	.02	.02			
11. Axis 2[i]	.42***	.37***	.19[k]	.20[k]	.28**	.25*	.20*	.30**	.10	.03		
12. Recurrence of depression[j]	.49***	.19	.29*	.14	.27*	.31**	.47***	.17	.22[k]	.09	.20	
Means, standard deviations, frequency	15.4, 3.9	3.1, 1.1	2.4, .52	79% F	35.5, 11.2	3.9, .7	3.6, .6	2.9, .5	1.9, 1.3	28% yes	24% yes	32% yes

[a]Generality score (stable and global attributions) from EASQ (Metalsky, Halkerstadt, & Abramson, 1987).
[b]From the A/IDAS (Mongrain & Zuroff, 1989).
[c]From the RSQ (Nolen-Hoeksema & Morrow, 1991).
[d]Center for Epidemiological Studies Depression Scale (Radloff, 1977).
[e]Sociotropy and Autonomy from the PSI (Robins et al., 1994).
[f] From the BFI (John & Srivastava, 1991), $n = 91$.
[g]Number of major depressive episodes.
[h]Anxiety disorder, current or past.
[i]Personality disorder (current).
[j]Recurrence of major depression, $n = 77$.
[k]$p = .06$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table II. Regression Results with Cognitive Risk Variables Postdicting Major Depressive Episodes, Controlling for Neuroticism, Rumination, Sociotropy, and Autonomy ($n = 91$)

Number of major depressive episodes	*B*	SE *B*	*p*	Beta
Gender	−.60	.32	.06	−.18
Mood (CES-D)[a]	−.00	.01	.82	−.03
Neuroticism[b]	.52	.27	.06	.19
Rumination[c]	**−.64**	**.27**	**.02**	**−.25**
Sociotropy[d]	.42	.24	.08	.20
Autonomy[d]	.05	.24	.85	.02
Negative attributions[e]	**.11**	**.04**	**.008**	**.31**
Dysfunctional attitudes[f]	**.28**	**.14**	**.05**	**.23**
Cognitive risk in achievement & interpersonal domains postdicting major depressive episodes				
Gender	−.56	.32	.08	−.17
Mood (CES-D)[a]	.00	.01	.95	.01
Neuroticism[b]	**.54**	**.27**	**.05**	**.20**
Rumination[c]	**−.60**	**.26**	**.03**	**−.23**
Sociotropy[d]	**.55**	**.24**	**.02**	**.26**
Autonomy[d]	.00	.24	.99	.00
Attributions—interpersonal domain[e]	.08	.07	.25	.13
Attributions—achievement domain[e]	.11	.06	.06	.20
Need for approval DAS[f]	−.17	.14	.23	−.15
Perfectionistic DAS[f]	**.37**	**.12**	**.002**	**.36**

Note. All variables were entered simultaneously, and the statistics reflect the contribution of each predictor controlling for all other variables.
[a]Center for epidemiological studies depression scale (Radloff, 1977).
[b]From the BFI (John and Srivastava, 1991), $n = 91$.
[c]From the RSQ (Nolen-Hoeksema & Morrow, 1991).
[d]From the PSI (Robins et al., 1994).
[e]Generality Score from the EASQ (Metalsky et al., 1987).
[f] From the A/IDAS (Mongrain & Zuroff, 1989).

controlled for in all subsequent models examining the predictive ability of attributions and dysfunctional attitudes.

Number of Previous Major Depressive Episodes, Controlling for Competing Constructs (Neuroticism, Rumination, Sociotropy and Autonomy)

The dependent variable in the main regression models was the number of past MDEs as determined from the clinical interview.[4] Gender, mood (CES-D), negative attributions and dysfunctional attitudes were entered simultaneously to determine the unique predictive ability of each cognitive variable. Furthermore, competing variables including neuroticism, rumination, sociotropy and autonomy were included in the model. As shown in Table II, both the attributional and dysfunctional attitudes measures uniquely contributed to a higher number of previous episodes of major depression over and above the effect of mood, gender, neuroticism, rumination, sociotropy and autonomy. Surprisingly, rumination also emerged as a significant, but negative predictor of outcome when all other variables were controlled for.

[4]The interaction between the personality styles and cognitive vulnerability were not investigated since our sample size precluded the inclusion of further predictors in the regression models.

Achievement and Interpersonal Domains

The next regression model differentiated among the interpersonal and achievement events of the attribution measure, and examined the independent contributions of the Need for Approval and Perfectionism subscales of the DAS. The model included mood, gender, neuroticism, rumination, sociotropy and autonomy as covariates, and all variables were entered simultaneously to examine unique associations with past depressive episodes. Perfectionistic attitudes were related to a greater number of previous episodes of depression, and the effect for attributions in the achievement domain was marginal ($p = .06$), indicating that cognitive vulnerability in this domain was associated with a more chronic history of depression in our graduate student sample. It is worth noting that neuroticism and sociotropy were also significantly associated with a greater number of previous episodes of depression in these fine-grained analyses.

In summary, attributional vulnerability in the achievement domain and perfectionistic attitudes were significantly associated with a greater number of past episodes of depression over and above neuroticism, rumination, sociotropy and autonomy. These findings demonstrate that these negative cognitions are not reducible other constructs also associated with depression and remain elevated in those with a more chronic history of the disorder.

The Recurrence of Major Depression

The bivariate correlations indicated that attributions, rumination, depressive symptomatology at the time of the interview (CES-D), sociotropy, and autonomy as well as number of previous episodes were all significantly related to the recurrence of major depression over the follow-up period (see Table I). To determine the unique contribution of the cognitive risk variables, a logistic regression with a number of covariates (gender, CES-D, rumination, sociotropy, autonomy, and the number of previous episodes) were entered along with the cognitive variables as predictors of new onsets, coded as +1 (major depression), or 0 (no recurrence of MDE during the follow-up). The results are shown in Table III and indicate that autonomy and a negative attributional style uniquely predicted the recurrence of depression over and above everything else.[5] The differentiation along achievement and interpersonal domains indicated a trend for the contribution of negative attributions for failure to new onsets of depression when all the other variables were controlled for. These findings suggest that negative attributions, particularly around achievement failure along with an autonomous personality style are related to a greater likelihood of experiencing a recurrence of major depression in graduate students.

Anxiety Disorders

To assess the specificity of the cognitive model, the relationship between the cognitive variables and anxiety disorders was tested. Anxiety disorders were coded

[5] Autonomy continued to predict the recurrence of depression when neuroticism was added to the equation along with the other variables presented in Table III ($B = 2.08$, Beta = .69, Wald chi-square = 7.1, $p < .01$).

Table III. Regression Results with Cognitive Risk Variables Predicting the Recurrence of Depression Controlling for Past Episodes, Rumination, Sociotropy, and Autonomy ($n = 77$)

Recurrence of major depression	*B*	SE *B*	Beta	Wald chi-square	Odds ratio
Gender	−.24	.87	−.05	.07	.79
Mood (CES-D)[a]	.02	.03	.11	.33	1.02
Number of previous MDEs[b]	.18	.28	.14	.42	1.19
Rumination[c]	.93	.83	.26	1.25	2.53
Sociotropy[d]	.09	.59	.03	.02	1.09
Autonomy[d]	1.92	.71	.64	7.28**	6.80
Negative attributions[e]	.28	.14	.59	4.32*	1.32
Dysfunctional attitudes[f]	−.34	.35	−.22	.94	.71
Cognitive risk in achievement & interpersonal domains predicting the recurrence of major depression					
Gender	−.18	.87	−.04	.05	.83
Mood (CES-D)[a]	.02	.03	.12	.36	1.02
Number of previous MDEs[b]	.13	.29	.10	.20	1.14
Rumination[c]	.88	.83	.24	1.11	2.40
Sociotropy[d]	.16	.60	.06	.07	1.17
Autonomy[d]	1.95	.79	.65	6.13*	7.00
Attributions—achievement domain[e]	.31	.17	.43	3.24[e]	1.36
Attributions—interpersonal domain[e]	.25	.21	.29	1.42	1.29
Need for approval DAS[f]	−.41	.36	−.27	1.26	.67
Perfectionistic DAS[f]	.02	.30	.02	.01	1.02

Note. All variables were entered simultaneously, and the statistics represent the contribution of each predictor controlling for all other variables.
[a]The center for epidemiological studies depression scale (Radloff, 1977).
[b]Number of previous major depressive episodes.
[c]From the RSQ (Nolen-Hoeksema & Morrow, 1991).
[d]From the PSI (Robins et al., 1994).
[e]Generality Score from the EASQ (Metalsky et al., 1987).
[f] From the A/IDAS (Mongrain & Zuroff, 1989).
[e]$p = .07$.
*$p < .05$. **$p < .01$.

as +1 (anxiety disorder current or past) or 0 (no diagnosis) and constituted the outcome variable in the logistic regressions. All models controlled for gender and mood (CES-D). No significant effects were obtained for the attribution and dysfunctional attitude measures. Cognitive vulnerability was therefore unrelated to anxiety disorders in the current sample.

Personality Disorders

The contribution of the cognitive variable to Axis 2 diagnoses was examined next. Logistic regressions were utilized with personality disorders were coded as +1 (current diagnosis) or 0 (no diagnosis). As shown in Table IV, attributions were significantly and uniquely related to the presence of a personality disorder controlling for the effect of mood and gender. When the achievement and interpersonal domains were entered separately, significant effects were obtained for negative attributions in the achievement domain, and for dysfunctional attitudes involving a high need for approval (see Table IV).

Table IV. Cognitive Risk Variables Predicting Personality Disorders ($N = 97$)

Personality disorders	*B*	SE *B*	Beta	Wald chi-square	Odds ratio
Gender	.53	.63	.12	.72	1.71
Mood (CES-D)[a]	.01	.03	.08	.23	1.01
Rumination[b]	−.19	.64	.06	.09	.82
Negative attributions[c]	.27	.10	.56	7.11**	1.31
Dysfunctional attitudes[d]	.52	.29	.32	3.17[e]	1.69
Cognitive risk in achievement & interpersonal domains predicting personality disorders					
Gender	.66	.66	.15	1.01	1.94
Mood (CESD)[a]	.00	.03	.02	.01	1.00
Rumination[b]	−.39	.66	−.11	.34	.68
Attributions—achievement domain[c]	.40	.16	.53	6.55*	1.49
Attributions—interpersonal domain[c]	.17	.16	.20	1.17	1.19
Need for approval DAS[d]	.81	.36	.51	4.98*	2.24
Perfectionistic DAS[d]	−.08	.26	−.06	.09	.93

Note. All variables were entered simultaneously, and the statistics represent the unique contribution of each predictor controlling for all other variables.
[a]The center for epidemiological studies depression scale (Radloff, 1977).
[b]From the RSQ (Nolen-Hoeksema & Morrow, 1991).
[c]Generality score from the EASQ (Metalsky et al., 1987).
[d]From the A/IDAS (Mongrain & Zuroff, 1989).
[e]$p = .08$.
*$p < .05$. **$p < .01$.

Summary

In this graduate student sample, sociotropy, perfectionistic beliefs, and a negative inferential style around academic failure were associated with a more chronic history of depression. A negative inferential style along with autonomy uniquely predicted the recurrence of the disorder, over and above the influence of past history of depression. Cognitive vulnerability was not related to the diagnosis of an anxiety disorder but was related to Axis 2 pathology. A high need for approval and attributional vulnerability in the achievement domain were related to personality disorders. The implications of these findings are discussed in the next section.

DISCUSSION

A retrospective and prospective design was used to test two prominent cognitive models of depression. Based on Beck's (1967; 1987) and the hopelessness theory of depression (Abramson et al., 1989), it was hypothesized that individuals who possess dysfunctional beliefs and a negative inferential style would be vulnerable to a greater number of depressive episodes. Results largely supported this hypothesis and indicated that both negative attributions and dysfunctional attitudes were associated with a greater number of previous episodes of depression. Moreover, a negative inferential style predicted the recurrence of the disorder when controlling for the number of previous episodes of depression. While our data cannot speak to the contribution of psychological variables for first onsets, the results indicate that the recurrence of depression can be predicted from one's cognitive style, and that the effect is not reducible to neuroticism, rumination, or the effect of

sociotropy and autonomy. Some specificity was also obtained, with a negative inferential style and dysfunctional attitudes predicting depression but not anxiety disorders. Finally, the cognitive variables were related to personality disorder diagnoses. Each finding is discussed next.

In this graduate student sample, those who ascribe widespread (global) and enduring (stable) causes to negative life events were found to be at higher lifetime risk for depression. This effect was significant when dysfunctional attitudes, neuroticism, rumination, mood and gender were controlled for, and replicates previous results with the longer Cognitive Style Questionnaire (Alloy et al., 2000) obtained in a younger undergraduate sample (Haeffel et al., 2003). In the current sample, it was also found that the attributional diathesis in the achievement domain contributed to previous episodes of depression, and to the recurrence of the disorder. It thus appears that a negative inferential style for academic failure is particularly pernicious in graduate school and significantly increases students' risk for major depression.

Perfectionistic beliefs were also uniquely related to a greater number of past episodes of depression, but failed to predict new recurrences. It is possible that perfectionistic performance beliefs (e.g., "If I do well all the time people will respect me") represent scars of depression rather than a risk factor for future episodes. It is also possible that this belief system placed students at risk in the first place because their self-worth was solely invested in the attainment of scholarly goals. These beliefs may not have contributed to future occurrences of major depression due to the conservative nature of our analyses and the large amount of variance removed from this construct when all the other variables were controlled for. Furthermore, we used an abbreviated form of Perfectionism factor of the DAS, and the longer version may have provided a more reliable assessment of this construct.

It is interesting that Haeffel et al. (2003) using a similar design comparing the CSQ with the DAS failed to find any effect for dysfunctional attitudes in postdicting previous episodes of depression. A main conclusion in this study was that the CSQ attribution measure was the main driving force for the effects of cognitive risk reported for the CVD project (Alloy et al., 2000). It is worth noting that their sample was much younger (students were disqualified if they were over 23 years of age) and may not yet have a sufficiently consolidated identity or enough insight to report dysfunctional beliefs. As noted before (see Alloy et al., 2002; Haeffel et al., 2003), making attributional judgments requires little self-awareness whereas the DAS demands greater insight into the necessary conditions for one's self-esteem (e.g., "If I do not do well as other people, it means I am an inferior human being"). Other work also supports the continued usefulness of the DAS. For example, Lewinsohn et al. (2001) found that the DAS interacted with negative life events to predict the onset of major depression in a late adolescent population. The perfectionism factor of the DAS has also been highlighted as important in depressive vulnerability. For example, Brown and colleagues (1995) found that the perfectionism factor of the DAS was related to an increase in depressive symptoms following an achievement stressor. Blatt, Zohar, Quinlan, Zuroff, and Mongrain (1995) found that the perfectionism factor from the DAS predicted a poorer outcome in the treatment of depression. Perfectionistic beliefs may be particularly refractory to change (e.g.,

Zuroff, Blatt, Sanislow, Bondi, & Pilkonis, 1999), and deserve continued attention in the depression literature.[6]

Neuroticism was included in the analyses to determine whether this broad temperamental trait may account for the effect of the cognitive variables. Often referred to as "negative affectivity" (Clark, Watson, & Mineka, 1994), neuroticism has been postulated to be part of the core vulnerability factor for distress disorders. It has also been linked to dysfunctional cognitions and could potentially provide a more parsimonious account for the vulnerability to depression (for a review, see Clark et al., 1994). The current findings demonstrated that neuroticism along with the cognitive variables made unique contributions to depression. This lends substantial credence to cognitive models that posit a specific depressogenic effect for certain beliefs and cognitive operations, beyond the role of general negativity (also see Ingram et al., 1998). The current results also highlight the significant relationship between neuroticism and past episodes of depression, with another recent prospective study documenting the predictive role for future onsets of the disorder (Kendler, Kuhn, & Prescott, 2004).

Rumination is a maladaptive emotional regulation strategy and has been understood as a mechanism through which cognitive risk factors lead to depression (see Abramson et al., 2002). A recent study has shown that rumination mediated the effect of negative attributions and dysfunctional attitudes in the prediction of future episodes of depression (Spasojevic & Alloy, 2001). These authors suggested that rumination might be a "proximal mechanism" relating cognitive risk factors to depression. An even more recent report from the CVD project found that stress-reactive rumination interacted with negative cognitive styles to predict the onset and number of depressive episodes over a 2.5-year follow-up (Robinson & Alloy, 2003). In the current study, no support was found for the positive contribution of rumination to either past or future episodes of depression. When controlling for all other variables, the relationship between rumination and past episodes of depression became negative, indicating that ruminators had fewer past episodes. It may be that rumination had little to contribute to first onsets, and other psychosocial or biological variables may have been more important (see Daley, Hammen & Rao, 2000). It was also the case that rumination had nothing to contribute to future recurrences of depression when all the other variables were controlled for, contradicting the findings reported by Spasojevic and Alloy (2001). It should be noted that our analyses, relative to many prior studies (see Alloy et al., 2000; Nolen-Hoeksema 2000; Robinson & Alloy, 2003; Spasojevic & Alloy, 2001) pitted several competing constructs against one another in the prediction of outcome. Certainly, some overlap exists between rumination, cognitive risk, and personality variables and a clearer mapping of their respective position in relation to one another would be extremely beneficial. For example, individuals with insecurities in the interpersonal or achievement domains (high on sociotropy or autonomy) may be particularly prone to rumination when their highly valued goals are threatened, creating a vicious cycle and an inability to disengage from disappointing experiences (see Abramson et al., 2002).

[6]Some believe that perfectionistic beliefs may not be depressogenic when accompanied by high self-efficacy (see Abramson et al., 2002).

In the current study, personality made unique contributions to outcome, controlling for all other variables. For example, sociotropy was associated with a greater number of previous episodes of depression. Our small sample size precluded a proper test of potential interaction effects between cognition and personality styles, however, Alloy and colleagues (2000) obtained such an interaction between sociotropy and high cognitive risk predicting a greater number of previous episodes of depression. However, sociotropy did not predict the recurrence of the disorder, and one could argue that this personality orientation represents a 'scar' of depression, leaving the individual more interpersonally dependent following an episode than they were before they got depressed. Several arguments have been raised against the scar hypothesis in the case of personality vulnerability (see Zuroff, Mongrain, & Santor, 2004), and it is at least equally possible that sociotropy played a role in previous episodes of depression occurring during other developmental phases (e.g., going away to college) and failed to have any effect in the recurrence of the disorder in the current study because the context was heavily achievement-oriented (graduate school). Sociotropy might emerge as an important risk factor for the recurrence of the disorder through other developmental phases (e.g., finding a mate, marital stress), particularly if immature levels of interpersonal dependence are considered (Blatt et al., 1995; Mongrain & Leather, in press).

The role of personality for the recurrence of depression was illustrated with a main effect obtained for autonomy in the prediction of new onsets, over and above cognitive risk, mood, and history of depression. This effect for autonomy refutes critics' suggestions that personality factors "(cannot) be expected to explain much, particularly when evaluated in the context of history of depression, a variable that serves as a proxy for the summary effects of many other variables" (Coyne et al., 2004, p. 513). The current data suggests autonomy in the context of graduate school can have etiological significance for the recurrence of depression, over and above the role of previous episodes and general negativity (neuroticism). These data support the continued usefulness of theoretical models emphasizing the role of personality vulnerability to depression (see Zuroff et al., 2004), and suggest that interpersonal distrust, a rigid emphasis on control and the achievement of lofty standards may place one at risk for emotional distress in the academic pursuit of a graduate degree.

Cognitive Vulnerability and Anxiety Disorders

It has been argued that a negative cognitive style may place individuals at risk for a broader range of distress disorders, including anxiety (for example, see Clark et al., 1994). While this does not necessarily pose a problem for cognitive models given the comorbidity of both depression and anxiety diagnoses, the specificity of the cognitive variables remains an important theoretical question. In the current study, there were no significant relationships between the cognitive risk variables and lifetime prevalence rates of anxiety disorders (current or past). Similar results were reported by Alloy et al. (2000) who found no effect for cognitive risk on the diagnosis of anxiety, substance abuse, or other Axis I disorders. This is in contrast to Haeffel et al. (2003) who found that the CSQ predicted the history of an anxiety dis-

order. The sample in this study was unusually large ($N = 887$), and it is possible that similar findings would have obtained by other researchers with more documented cases and hence more power to detect such an effect. Future work is required to elucidate which cognitive variable is specific to depression and those that carry a risk for a broader range of affective problems.

Cognitive Vulnerability and Axis II Pathology

There has been preliminary evidence demonstrating that personality disordered individuals are more likely to engage in depressogenic thinking. From the CVD project, Abramson et al. (1998, as cited in Alloy et al., 1999) found that the cognitive high-risk group had a higher rate of diagnosed personality disorders than the low risk group. Furthermore, the high-risk group was rated higher on all three clusters of personality disorders. Ilardi and Craighead (1999) also reported higher levels of dysfunctional attitudes and a negative attributional style among personality disordered individuals with a prior history of depression. A particularly strong association was obtained between dysfunctional cognitions and Cluster C diagnoses, or obsessive-compulsive, avoidant, and dependent personality disorders. In our study as well, we found that the cognitive measures uniquely predicted current personality pathology. The most frequent Axis 2 diagnoses in our sample were from Cluster C (highest frequency obtained for obsessive-compulsive and avoidant personality disorders), although no definite conclusions can be drawn since we discarded a few individuals belonging to Cluster A (e.g., schizoid) and B (e.g., borderline) at the outset of the project. It is worth noting that we controlled for current depressive symptoms such that the cognitive vulnerability of those with a personality diagnosis could not be attributed to subsyndromal depression. Furthermore, some domain specificity was obtained and negative attributions for academic stressors, as well as dysfunctional attitudes involving a high need for approval uniquely predicted personality pathology. This intrapsychic dynamic involving a negative inferential style for perceived failure and the need to please may underlie some of the personality disturbance in those with a history of depression.

Summary

Our findings demonstrated the independent contribution of personality, a negative inferential style and dysfunctional attitudes for major depression, providing further support for Beck's (1987) and Abramson et al.'s (1989) theories of depression. The effect of the cognitive variables remained when other hypothesized risk factors were used as covariates, and were specific to depressive diagnoses. Furthermore, all effects controlled for current dysphoric symptoms such that the effects were uncontaminated by a current mood disturbance. It is worth noting that some domain specificity was obtained in that students who exhibited a negative inferential style around academic failure, who endorsed perfectionistic beliefs and scored higher on sociotropy suffered from a more chronic history of depression. Those high on autonomy and with a negative inferential style for negative academic events were also more likely to suffer from a recurrence of the disorder which could not be

reduced to the cumulative effect of one's past history of depression. Finally, this study found that depressogenic cognitions also predicted Axis II pathology and suggest that cognitive models may be applicable to this population as well.

Limitations

The attribution measure used in the current study did not assess the full attributional diathesis proposed in the hopelessness theory of depression (Abramson et al., 1989). More specifically, we tested stable and global attributions, but not the consequences assumed to follow from the negative event, and negative implications about the self as suggested by the extended model (Abramson et al., 1989). Nonetheless, our approach has been adopted by other researchers with good results (see Metalsky, Joiner, Hardin, & Abramson, 1993; Swendsen, 1997). Finally, all three cognitive components of the hopelessness theory (attributional style, consequences, and self components) are fairly strongly correlated and may be redundant with one another in predicting depressive symptomatology (see Metalsky & Joiner, 1992). Therefore, the attributional measure used in this study probably adequately tapped the negative inferential style proposed in the hopelessness model (Abramson et al., 1989).

Another limitation concerns the generalizability of our findings given the nature of our sample. Graduate students constitute a select group and the general population and the results of the current student may not apply to others suffering from a history of depression. It is possible, for example, that the interpersonal domain may be an area of vulnerability in other samples. Future research should target other populations and specify domains of vulnerability to shed some light on who is at risk and when. Since most depressive episodes represent recurrences rather than new onsets, researchers should continue to control for history of depression (see Daley et al., 2000) to identify pertinent predictors for the course of the disorder and isolate targets of intervention.

The current findings suggest that therapists might profitably attend to the explanatory style and the defeating behaviors associated with an autonomous personality style in an effort to prevent the recurrence of the disorder in a vulnerable student population. This is in line with recent research on the efficacy of cognitive therapies particularly for relapse prevention (see Hollon, Haman, & Brown, 2002; Segal, Vincent, & Levitt, 2002). These bodies of work suggest that cognitive, and personality vulnerability models are alive and well and merit continued attention from depression researchers.

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