

A TEST OF VULNERABILITY-SPECIFIC STRESS GENERATION

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## ABSTRACT

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Although there is a substantial amount of evidence documenting the stress generation effect in depression (i.e., the tendency for depression-prone individuals to experience higher rates of stressful life events that are in part influenced by the individual), additional research is required to elucidate its underlying mechanisms as well as to advance current understanding of the specific types of dependent life stresses (i.e., events influenced by characteristics and attendant behaviors of the individual) relevant to this effect. The present study proposed an extension of the stress generation hypothesis, in which the content of dependent stresses that are produced by depression-prone individuals is contingent upon, and matches, the nature of their particular vulnerability. This extension was tested within the context of the hopelessness theory of depression (Abramson, Metalsky, & Alloy, 1989) and Cole's (1990, 1991) competency-based model of depression. Also assessed were the specificity of excessive reassurance-seeking and negative feedback-seeking to stress generation in social domains and as potential mediators or moderators of the relation between cognitive vulnerability and dependent stress. General support was found for vulnerability-specific stress generation. Specifically, in analyses across vulnerability domains, evidence of relational specificity was found for all domain-specific cognitive vulnerabilities with the exception of self-perceived social competence. In analyses within cognitive vulnerability domains, support for the specificity hypothesis was found for self-perceived competence in academic and appearance domains. The within-domain analyses for negative inferential styles in

achievement, interpersonal, and appearance domains produced more mixed results, but were largely supportive. Additionally, excessive reassurance-seeking was found specifically to predict dependent stress in the social domain, and moderated, but did not mediate, the relation between negative inferential styles overall and in the interpersonal domain and their corresponding generated stress. Finally, no evidence was found for a stress generation effect with negative feedback-seeking.

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## CHAPTER 1

### INTRODUCTION

Although an extensive body of research has established that stressful life events significantly increase the risk for developing depression (see Hammen, 2005; Kessler, 1997; Paykel, 2003 for reviews), relatively recently, researchers also have given theoretical and empirical consideration to the possibility of a more complex, transactional relation between stress and depression. According to Hammen's (1991) stress generation hypothesis, individuals vulnerable to depression are not simply passive respondents to stressful life events, but active agents in the generation of depressogenic life stressors. That is, depression-prone individuals are likely to experience higher rates of negative dependent events (i.e., events to which they at least partly contributed), particularly within interpersonal domains, but not independent or fateful events (i.e., events outside their control). Moreover, these dependent or interpersonal events are to some degree caused by maladaptive characteristics (e.g., cognitive styles, personality traits, attachment styles, values, beliefs, and expectations) and behaviors of the individual (Hammen, 1991, 2006). As dependent or interpersonal events, compared to independent ones, appear to be more predictive of depression (Hammen, Marks, Mayol, & DeMayo, 1985; Kendler, Karkowski, & Prescott, 1999), the generation of interpersonal and dependent life stresses, in turn, may potentially maintain current depression or increase the likelihood of subsequent depression onset and recurrence (Hammen, 1991; Joiner, Wingate, & Otamendi, 2005b). Thus, stress generation, in some measure, may account for the often chronic course of depression (Belsher & Costello, 1988; Monroe & Harkness, 2005; Solomon et al., 2000).

Initial support for the stress generation perspective came from Hammen's (1991) finding that relative to women with chronic medical conditions, bipolar disorder, and healthy controls, unipolar depressed women experienced higher rates of dependent stressful life events, especially within interpersonal domains, but did not differ in the number of independent stressful life events over a one-year period. This finding has been replicated in several other samples, including children of depressed parents (Adrian & Hammen, 1993; Shih, Abela, & Starrs, 2009), clinically depressed children and adolescents (Rudolph et al., 2000; Williamson, Birmaher, Anderson, Al-Shabbout, & Ryan, 1995), men (Cui & Vaillant, 1997), and women (Hammen, Shih, & Brennan, 2004). The stress generation hypothesis has been similarly supported in non-clinical samples of children (Hankin, Mermelstein, & Roesch, 2007; Kercher & Rapee, 2009), college students (Joiner, Wingate, Gencoz, & Gencoz, 2005a; Potthoff, Holahan, & Joiner, 1995), and older adults (Moos, Schutte, Brennan, & Moos, 2005). Furthermore, stress generation has been found to occur for both episodic, or acute, stressors (e.g., Daley et al., 1997; Harkness, Lumley, & Truss, 2008; Potthoff et al., 1995) and chronic life stressors (e.g., Nelson, Hammen, Daley, Burge, & Davila, 2001). The consistent trend that emerged from most of these studies is that individuals with depression, or a history of depression, were significantly more likely to experience high levels of stressors, and that this effect was specific to dependent life events, particularly interpersonal ones, rather than independent life events (see Liu & Alloy, 2010 for a review).

*Interpersonal and Cognitive Vulnerabilities Relevant to the Generation of Stress*

Although symptoms of depression (e.g., irritability and loss of interest) may be understood as having a deleterious effect on interpersonal relationships, depressive symptomatology alone does not seem to account adequately for the stress generation pattern, as heightened levels of negative dependent life events have been found to occur during periods of remission (Chun, Cronkite, & Moos, 2004; Daley et al., 1997; Hammen, 1991; Hammen & Brennan, 2002). Consistent with Hammen's (1991, 2006) assertion that stress generation, in large part, also results from enduring maladaptive characteristics and behaviors of the individual, a number of studies have found that the generation of negative dependent life events is mediated by various factors, including an avoidant coping style (Holahan, Moos, Holahan, Brennan, & Schutte, 2005), an insecure adult attachment style (Hankin, Kassel, & Abela, 2005), dismissive and preoccupied adult attachment styles (Bottonari, Roberts, Kelly, Kashdan, & Ciesla, 2007), excessive reassurance-seeking (Birgenheir, Pepper, & Johns, 2010; Potthoff et al., 1995; Shih et al., 2009), poor interpersonal problem-solving skills (Davila, Hammen, Burge, Paley, & Daley, 1995) and Axis II symptomatology (Daley, Hammen, Davila, & Burge, 1998).

Several researchers have also sought to examine the role of cognitive vulnerability to depression by integrating the stress generation hypothesis within a stress-cognitive vulnerability framework (e.g., Gibb, Beevers, Andover, & Holleran, 2006; Joiner et al., 2005a, 2005b; Kercher & Rapee, 2009; Safford, Alloy, Abramson, & Crossfield, 2007; Shih et al., 2009). In a series of studies, for example, Joiner et al. (2005a, 2005b) tested the stress generation effect within the context of the hopelessness theory of depression (Abramson et al., 1989). According to this theory, when faced with stressful life events, individuals who tend to attribute the event to stable and global

causes, and infer negative consequences and self-characteristics, are at greater risk for experiencing cognitions of hopelessness, which, in turn, leads to the eventual development of hopelessness depression. In one of these studies, hopelessness was found to predict increases in depressive symptoms over a five-week period through the partial mediation of interpersonal, but not general, stress (Joiner et al., 2005b). In other studies, hopelessness predicted actual increases, rather than merely the perception of change, in interpersonal stresses, and mediated the relation between baseline depressive symptoms and prospective stress (Joiner et al., 2005a). Similarly, Safford et al. (2007) found that negative cognitive styles, as articulated in the hopelessness theory (Abramson et al., 1989) and Beck's theory (1987), predicted elevated rates of interpersonal and dependent life stresses experienced over a six-month period. This effect was found to be specific to women, and could not be accounted for by current or past depression. Further support comes from a recent study by Kercher and Rapee (2009) which found that cognitive vulnerability, characterized by a combination of negative inferential styles and depressive rumination, was prospectively associated with increases in dependent stress. In focusing on negative inferential styles, separate from other cognitive vulnerabilities, Shih et al. (2009) found them to predict higher rates of dependent interpersonal stress, but not other types of dependent stress. In a multi-wave study, Gibb et al. (2006), however, found that negative inferential styles did not predict the rate of life hassles, or moderate their relation with prior depressive symptoms.

#### *An extension of the Stress Generation Hypothesis*

Overall, there appears to be some support for the role of cognitive vulnerability in stress generation, though further research is required to tease apart the specific

components of this general construct that are relevant to the stress generation effect. Furthermore, an important possible extension of the stress generation hypothesis not yet adequately explored is that the content or domains of dependent stresses produced in depression-prone individuals may match their particular vulnerability. That is, differences in vulnerabilities may predict different patterns of stress. For example, two individuals, differing in terms of cognitive vulnerability, may generate high levels of dependent stress that are relatively distinct from the other's in content, but each consistent with their own underlying vulnerability. An examination of this possibility may help to address the need in life stress research to extend beyond the broad approach of focusing on *overall* levels of stress towards more refined analyses involving *domains* of stress in relation to depressogenic risk factors (Shahar, Joiner, Zuroff, & Blatt, 2004); such an approach may help to clarify the specific type of stressors involved in stress generation (Hammen, 2006). Moreover, this extension of the stress generation effect may enhance our understanding of its possible role in the onset, maintenance, and recurrence of depression; insofar as specificity in the match between stresses and underlying vulnerability is important in placing individuals at significantly greater likelihood for developing depression (i.e., event congruency hypothesis; Beck, 1983, 1987; and specific vulnerability hypothesis; Abramson, Alloy, & Metalsky, 1995), those who generate the very life events specific to their vulnerability represent a particularly high risk group. Thus, this extension of the stress generation hypothesis may be conceptualized as a double-risk model of depression.

Relevant to this extended model of stress generation are a few preliminary stress generation studies involving personality traits, such as sociotropy and autonomy.

According to Beck's (1983) formulation of these two constructs, highly sociotropic individuals' sense of self-worth is unduly dependent on interpersonal interactions, making them especially sensitive to criticism and rejection from others, whereas highly autonomous individuals' self-worth is heavily based on independence and goal attainment, making them, in turn, susceptible to depression when confronted with loss of control or personal failure. Interestingly, in a sample of adolescent women, Nelson et al. (2001) reported a general mismatch between personality style and chronic stress. Specifically, the autonomy subscale of need for control predicted increases in chronic interpersonal stress over an 18-month period, whereas sociotropy interacted with poor problem solving or poor self-evaluations of interpersonal competence to predict increases in chronic achievement stress. In contrast, Shih (2006) found that, over a six-week period, sociotropy predicted higher episodic dependent interpersonal stress in women but not men, and neither sociotropy nor autonomy predicted episodic dependent achievement stress. In a third study focusing on the constructs of dependency and self-criticism, these two variables were found to be associated in women with prospective increases in the matching domains of romantic and academic stress, respectively, over a two-week period (Mongrain & Zuroff, 1994). For men, however, although self-criticism failed to predict the frequency of negative life events, dependency predicted higher rates of academic stress and marginally higher levels of stress in romantic relationships. These mixed results, in some measure, may be due to the short duration of and reliance on self-report measures of life stress in one study (Mongrain & Zuroff, 1994; see Blaney, 1986 and Hammen, 2005 for discussions of mood congruent subjective biases in self-report life-event measures), and the differing focus between studies on chronic (Nelson et al., 2001)

or episodic stress (Mongrain & Zuroff, 1994; Shih, 2006). Nevertheless, they collectively highlight the need for further research.

The purpose of the present study was to assess the possibility of vulnerability-specific stress generation, particularly in terms of cognitive and interpersonal vulnerabilities. The hopelessness theory of depression (Abramson et al., 1989) offers a promising theoretical framework in which to evaluate this extension of the stress generation hypothesis. The specific vulnerability hypothesis of the hopelessness theory (Abramson et al., 1995) proposes that individual variability may exist across different domains (e.g., interpersonal or achievement) in the tendency to form negative inferences. Some individuals, for example, may form negative inferences only in response to negative interpersonal events, whereas others may respond in similar fashion but only to negative achievement events.

To date, few studies, and none relating to stress generation, have given consideration to the content domains of individuals' inferential styles, the more common approach being to examine this construct more generally, collapsing across domains. Nevertheless, an early study by Metalsky and colleagues (1987), in testing the vulnerability-stress component of the hopelessness theory, provides some evidence consistent with the specific vulnerability hypothesis. In this study, a negative inferential style in the achievement, but not interpersonal, domain interacted with a negative midterm grade to predict depressive mood in a sample of college students. Also worth noting, however, are two other studies similarly assessing the hopelessness model within a stress-diathesis framework that have yielded somewhat more mixed results. In the first of these studies (Abela & Seligman, 2000), negative inferential styles in both

achievement and interpersonal domains interacted with both achievement and interpersonal events in predicting subsequent depressed mood. In the second study (Abela, 2002), negative inferential styles in both achievement and interpersonal domains interacted with an achievement event to predict depressed mood, but the interaction was found to be stronger for a negative inferential style in the achievement domain relative to the interpersonal domain. To the degree that domain specificity exists in individuals' negative inferential styles, examining the correspondence between these domains and the domains in which subsequent dependent stress is generated may help to elucidate further the role of this cognitive vulnerability in the stress generation process.

Cole's (1990, 1991) competency-based model of depression in children and adolescents offers another interesting cognitive framework in which to test this extension of the stress generation hypothesis. This model suggests that an individual's cognitive self-schemata, in the form of self-perceived competencies in various domains, develop during childhood, and that the construction of these self-schemata is influenced by information in the child's environment, especially evaluative feedback from significant others (e.g., teachers, parents, and peers). Negative life events, particularly in the form of competency feedback, negatively influence the formation of children's self-perceptions, which subsequently increase their risk for depression. This mediational model has received considerable empirical support (e.g., Cole, Martin, & Powers, 1997; Jacquez, Cole, & Searle, 2004; Tram & Cole, 2000).

Within the context of the present study, Cole's (1990, 1991) competency-based model allows for several interesting possibilities. First, although, as mentioned above, several studies have evaluated cognitive models of depression in terms of stress

generation, none have considered a competency-based model of depression. Therefore, a goal of the present study was to expand on current literature on cognitive predictors of stress generation by examining whether personal sense of competency is associated prospectively with stressful life events. That low self-perceived social competence has been found to relate to increases in chronic interpersonal stress, even after controlling for past psychopathology, certainly lends some weight to this possibility (Herzberg et al., 1998).

Second, in acknowledging the multidimensional nature of self-concept (Wylie, 1974), Cole's (1990, 1991) competency-based model of depression posits that depression is related to evaluative feedback regarding competence (or incompetence) across several domains, such that: (a) positive evaluations in one domain may mitigate the effects of negative evaluations in another domain; (b) negative evaluations in one domain may nullify the effects of positive evaluations in another domain; and (c) negative evaluations across multiple domains increase the risk for depression in a cumulative fashion. Several studies, focusing on five domains (i.e., academic, social, physical attractiveness, behavioral conduct, and athletic competence), have provided support for this multidimensional conceptualization of self-competency (Cole, 1991; Seroczynski, Cole, & Maxwell, 1997). Thus, the competency-based model of depression offers a useful framework in which to evaluate the vulnerability-specific model of stress generation. To the extent that separate domains of self-perceived competence constitute distinct aspects of cognitive vulnerability, and to the extent that depressogenic cognitive schemata influence the manner in which an individual navigates their environment as well as the stresses they might encounter, it would not be unreasonable to suspect that negative self-

appraisal of competence in a specific domain will lead to generation of more congruent stressful life events than incongruent ones (Beck, 1983; Monroe & Simons, 1991).

Finally, although Cole's (1990, 1991) model has been extensively studied with children and adolescents, only recently has it been assessed in adult samples. In the only such study to date, Uhrlass and Gibb (2007) found support for Cole and his colleagues' (Cole et al., 2001; Tram & Cole, 2000) suggestion that as individuals reach adulthood, their self-competency schemata become relatively stable, such that their relation with negative life events and depression changes from one of mediation to one of moderation in a manner similar to other cognitive vulnerability-stress theories of depression in adults (Abramson et al., 1989; Beck, 1987). Specifically, global self-worth and self-perceived academic competence were found to moderate the relation between general negative events and negative academic events, respectively, and depressive symptoms in a sample of college students. In addition, global self-worth and self-perceived academic competence partially mediated the relation between domain-congruent negative events and depressive symptoms, perhaps indicating that self-perceived competence may still be developing in early adulthood (Uhrlass & Gibb, 2007). The present study aimed to address the need for more research in this area within a stress generation framework.

#### *Mediators of the Vulnerability – Specific Stress Generation Effect*

It is important also to consider potentially related mechanisms that may account for the speculated domain-specific stress generation effect. Although there may be several possible mechanisms that operate to varying degrees across multiple domains, the present study focused on two theoretically related interpersonal processes: excessive reassurance-seeking and negative feedback-seeking.

Based on the extensive literature on self-fulfilling prophecies (e.g., Kuklinski & Weinstein, 2001; Trouilloud, Sarrazin, Bressoux, & Bois, 2006), individuals with a low self-concept in a given domain may act in ways that ultimately confirm their self-expectations and maintain their self-schemata. Although research in this area has been conducted primarily with teachers' perceptions of students in classroom settings, it is likely that similarly self-fulfilling effects are produced with individuals' self-perceptions. Consistent with this view, Swann's (1983, 1987, 1990) self-verification theory argues that individuals seek to maintain their self-concepts by selectively soliciting (Cassidy, Ziv, Mehta, & Feeney, 2003; Giesler, Josephs, & Swann, 1996; Swann & Read, 1981), attending to (Swann & Read, 1981), and believing (Swann, Griffin, Predmore, & Gaines, 1987) feedback from others that is consistent with their self-perceptions. This tendency holds even in the case of individuals predisposed to depression, who strive to verify their negative self-perceptions by seeking negative feedback, leading to negative interpersonal interactions (Joiner, 2000; Joiner, Katz, & Lew, 1997) and increases in depressive symptoms (Joiner, 1995). For example, individuals with negative self-concepts have been found to be more satisfied in relationships that confirm their self-schemata, and in which they receive negative feedback, than in relationships that disconfirm their negative self-concepts (Swann, Hixon, & de la Ronde, 1992). Negative feedback-seeking has also been proposed as a possible mechanism of stress generation (Joiner, 2000), though this relation has yet to be tested. With regards to the vulnerability-specific extension of the stress generation hypothesis, negative feedback-seeking may serve as a mediating mechanism increasing the likelihood of domain-related stresses and negative feedback in areas of low self-perceived competence. Interestingly, it is also noteworthy that negative feedback-

seeking seems not to have been studied in prior research within the context of Cole's (1990, 1991) competency-based model of depression, particularly as a possible mechanism involved in the development and maintenance of low self-perceived competence.

Excessive reassurance-seeking, a similarly self-propagatory interpersonal vulnerability of particular relevance to Coyne's (1976) interpersonal theory of depression, may also play a role in the generation of domain-consistent stress. Coyne (1976) and Joiner and colleagues (1999) have suggested that individuals susceptible to depression seek reassurance from others in an attempt to confirm their self-worth, as well as the care and interest of significant others. Depression-prone individuals, however, tend to discount the initial reassurance they receive as being insincere, perhaps motivated by pity, causing them to solicit additional reassurance. The repetitive pattern of seeking and discounting reassurance continues until irritation and frustration are experienced by others, leading to deterioration of the relationship and rejection of the depression-prone individual, ironically appearing to confirm their negative self-perceptions and doubts regarding the validity of the initial feedback. Indeed, studies have shown excessive reassurance-seeking to be associated with depressive symptoms and interpersonal rejection (see Starr & Davila, 2008 for a review). Of particular relevance to the current study, excessive reassurance-seeking has been found to predict the generation of interpersonal stress (Birgenheir et al., 2010; Potthoff et al., 1995; Shih et al., 2009). It has been argued that negative feedback-seeking and excessive reassurance-seeking may often operate in a self-perpetuating cycle of co-occurring and interrelated processes in that the need for negative self-confirming feedback may induce depression-prone individuals to

discount initial positive evaluative information, while the resulting emotional pain induces them to seek additional feedback (Joiner, Metalsky, Katz, & Beach, 1999). From the view of significant others, this presents a confusing mixture of seemingly contradictory messages.

The combination of these two interpersonal vulnerabilities appears to confer a heightened risk for depression (Joiner, Alfano, & Metalsky, 1993). Therefore, it stands to reason that, like the tendency to seek negative feedback, excessive reassurance-seeking may exert a greater effect in domains of low self-perceived competence. For example, an individual who feels assured of their ability in intellectual or academic domains, but is concerned about their physical attractiveness, would be considerably more motivated to seek feedback or reassurance in the latter domain than the former. In addition, the effects of negative feedback-seeking and excessive reassurance-seeking may be more pronounced in interpersonal domains (e.g., social competence and physical attractiveness) than achievement-oriented ones (e.g., academic competence) to the degree that they differ in the availability of more objective feedback (e.g., test scores). That these perseverative processes have been theorized and found specifically to be associated with negative interpersonal interactions is certainly consistent with this possibility (Borelli & Prinstein, 2006; Joiner, 2000; Joiner & Metalsky, 1995; Prinstein, Borelli, Cheah, Simon, & Aikins, 2005; Starr & Davila, 2008). Where these interpersonal factors may nevertheless produce stresses in achievement-oriented domains is in the solicitation of feedback regarding the consequences and self-implications of positive performances (e.g., if an individual's grades are satisfactory), and negative ones (e.g., if a poor test score implies some negative self-characteristics of the individual).

### *The Current Study*

In summary, the current study examined the specificity of the relation between depressogenic vulnerabilities, in the form of negative inferential styles and self-perceived competence domains, and prospectively generated stress, as well as the role of negative feedback-seeking and excessive reassurance-seeking as potential mediating mechanisms. Specifically, it was hypothesized that negative inferential styles and low self-perceived competence would predict higher levels of prospective dependent, but not independent, episodic stress. Second, mirroring Cole and colleagues' (Cole, 1990; Seroczynski et al., 1997) negative cumulation hypothesis, negative inferential styles and low self-perceived competence, respectively, across a greater number of domains was hypothesized to be associated longitudinally with higher levels of dependent, but not independent, episodic stress. In order to assess the vulnerability-specific stress generation model *between* vulnerability domains, the third hypothesis was that negative inferential styles and low self-perceived competence, respectively, within a given domain would predict more matching dependent episodic stress than would other vulnerability domains. For example, relative to poor self-views in physical attractiveness or social domains, low self-perceived academic ability would better predict subsequent academic-related dependent episodic stress. Fourth, to evaluate the specificity of stresses generated *within* vulnerability domains, it was hypothesized that negative inferential styles and low self-perceived competence, respectively, within a given domain would predict more domain-congruent than domain-incongruent dependent episodic stress. Fifth, negative feedback-seeking and excessive reassurance-seeking were hypothesized to predict subsequent dependent episodic stress, and these relations were predicted to be strongest for social stressors

compared to academic- or physical appearance-related stressors. Neither depressogenic interpersonal style is hypothesized to predict subsequent independent episodic stress. Finally, negative feedback-seeking and excessive reassurance-seeking were assessed as potential mediators and moderators of the relation between negative inferential styles and low self-perceived competence, respectively, and the generation of domain-relevant dependent episodic stress.

An interesting alternative hypothesis was also considered. Specifically, comparing *within* vulnerability domains, it may be possible that negative inferential styles and low self-perceived competence, respectively, generate more dependent episodic stress in non-matching domains than within their own, as such a pattern has been found with sociotropic and autonomous personalities in relation to chronic interpersonal stress (Nelson et al., 2001). The reasoning behind this perspective is that, as active agents in their environment, individuals selectively prefer certain settings and experiences while avoiding others (Buss, 1987). Moreover, they may seek situations matching their strengths and avoid ones relevant to their domains of low self-perceived competence. In an act of avoidance, for example, a shy individual may attempt to reduce their exposure to social situations that generate discomfort, and seek out more solitary ones that do not prime the relevant self-schema. Similarly, an individual with a low self-estimation of their academic prowess may be less likely to try out for the regional spelling bee. Furthermore, individuals may value domains of strength more than ones of weakness, and thus focus on them in corresponding proportion (Cole, 1991).

## CHAPTER 2 METHODS

### *Participants*

Participants were recruited from the Temple University undergraduate population through introductory psychology courses and flyers posted in the campus community. Participants received either research credits in partial fulfillment of their class research requirements or a small monetary compensation for their participation. Of the 203 participants who completed baseline assessment, 185 completed the follow-up phase of the study and constitute the final sample.

### *Measures*

#### Depressive Symptomatology

The Beck Depression Inventory-II (BDI-II; Beck, Brown, & Steer, 1996) is a 21-item self-report questionnaire used to assess participants' initial levels of depressive symptoms. For each item, participants were asked to select the statement that best describes how they have been feeling over the past two weeks. Total scores on the BDI-II range from 0 to 63, with higher scores indicative of more severe levels of depressive symptoms. The BDI-II has been previously shown to have high internal consistency ( $\alpha = .89$ ; Whisman, Perez, & Ramel, 2000), and test-retest reliability (Beck et al., 1996). The internal consistency was similarly found to be good in the current sample ( $\alpha = .89$ ). The BDI-II has also been found to correlate with other measures of depressive symptoms, including the Hamilton Psychiatric Rating Scale for Depression ( $r = .71$ ; Beck et al., 1996) and the depression subscale of the Symptom Checklist-90-Revised ( $r = .89$ ; Steer, Ball, Ranieri, & Beck, 1997).

#### Depression History

Past episodes of Diagnostic and Statistical Manual-Fourth Edition-Text Revision (DSM-IV; American Psychiatric Association, 1994) Major Depressive Disorder (MDD) were assessed with the Schedule for Affective Disorders and Schizophrenia-Lifetime version (SADS-L; Endicott & Spitzer, 1978). The SADS-L is a widely used semi-structured diagnostic interview for assessing current and past psychopathology that has demonstrated high inter-rater reliability (Endicott & Spitzer, 1978). For the purposes of the current study, an expanded version of the SADS-L, allowing for the assessment of DSM-IV diagnoses (Alloy et al., 2000), was used. The expanded SADS-L has demonstrated high inter-rater reliability ( $\kappa \geq .95$  for MDD diagnoses). Interviews were conducted by trained research assistants and graduate students (see Alloy et al., 2006 for additional details regarding interviewer training).

#### Negative Cognitive Styles

The Cognitive Style Questionnaire (CSQ; Alloy et al., 2000; Haefffel et al., 2008) is a modified version of the Attributional Style Questionnaire (ASQ; Peterson et al., 1982) used to assess individuals' tendency to make internal, global, and stable attributions, and to infer negative consequences and characteristics about themselves following the occurrence of a negative life event. Participants were presented with 12 hypothetical negative events and told to imagine that the events had happened to them. They were then asked what they believe to be the major cause of each event (e.g., "Someone says something bad about how you look") and rated the internality, globality, and stability of the cause provided. Using a 7-point Likert scale, they then answered questions regarding the likely consequences of each event (e.g., "Do you think other bad things will happen to you because someone said something bad about your looks?"), as

well as its possible negative self-implications (e.g., “Do you think there is something wrong with you because someone said something bad about your looks?”). A composite score was calculated for inferences (mean ratings for the globality, stability, consequences, and self-implication dimensions) in response to the hypothetical events, with higher scores reflecting more negative inferential styles. The CSQ was originally composed of two subscales assessing negative inferential styles in achievement and interpersonal domains. Drawing from items in the Adolescent Cognitive Style Questionnaire (ACSQ; Hankin & Abramson, 2002), it was modified in the current study to include negative hypothetical events involving physical appearance so as to allow for assessment of a third cognitive vulnerability domain. Adequate internal consistency was demonstrated with the current sample for the overall negative composite score ( $\alpha = .96$ ), as well as each of the negative composite scores for the individual subscales ( $\alpha = .91$  for the achievement domain,  $\alpha = .92$  for the interpersonal domain, and  $\alpha = .92$  for the physical appearance domain). In previous studies, the CSQ has exhibited good test-retest reliability over one year ( $r = .80$ ; Alloy et al., 2000), and predictive validity for depressive episodes (Alloy et al., 2000; 2006).

The Self-Perception Profile for College Students (SPPCS; Neemann & Harter, 1986) is a self-report measure of global self-worth and self-perceived competence in 12 domains relevant to college-aged students. In the current study, only three of the domain-specific scales were included (i.e., academic competence, social competence, and physical appearance), chosen specifically because of their correspondence to scales in the Self-Perception Profile for Children (SPPC; Harter, 1985) and the Self-Perception Profile for Adolescents (SPPA; Harter, 1988). These scales on the SPPC and SPPA have been

widely used in previous research on Cole's (1990, 1991) competency-based model of depression in child and adolescent samples (e.g., Bruce et al., 2006; Cole et al., 2001; Jacquez et al., 2004; Tram & Cole, 2000). For similar reasons, two of the domain-specific scales of the SPPCS used in the present study were included in a recent study on Cole's (1990, 1991) competency-based model utilizing a college sample (Uhrlass & Gibb, 2007). For each item, students are first asked to select one of two statements indicating whether they perceive themselves as good at a particular activity (e.g., "Some students feel confident that they are mastering their coursework," "Other students do not feel so confident"). They are then asked to indicate whether the statement they selected is "Really true for me" or "Sort of true for me." Items are scored on a 4-point Likert scale, with higher summed scores reflecting higher self-perceived competence. The SPPCS has demonstrated high reliability and validity (Neemann & Harter, 1986; Uhrlass & Gibb, 2007). In the current sample, internal consistency for each subscale was adequate ( $\alpha = .82$  for academic competence,  $.82$  for social competence and  $.84$  for physical appearance).

#### Excessive Reassurance-Seeking

The Reassurance Seeking Scale (RSS; Joiner, Alfano, & Metalsky, 1992; Joiner & Metalsky, 1995, 2001) is a 4-item questionnaire that measures the tendency to seek reassurance from close others as formulated in Coyne's (1976) interpersonal theory of depression (e.g., "In general, do you frequently seek reassurance from the people you feel close to as to whether they *really* care about you?"). Each item is rated on a 7-point Likert scale ranging from 1 ("no, not at all") to 7 ("yes, very much"). Higher summed scores on this measure are indicative of higher reassurance-seeking. This measure has

been found in numerous past studies to have high reliability, with alpha coefficients ranging from 0.85 to 0.95 (Shahar et al., 2004). Similarly, the RSS demonstrated adequate internal consistency in the current sample ( $\alpha = .83$ ). This measure has also shown adequate criterion and construct validity, with responses on this scale being found to predict interpersonal reassurance-seeking behavior, increases in depressive symptoms in response to stress, diagnostic specificity to depression, and the development of future depressive symptoms in initially asymptomatic individuals (Joiner & Metalsky, 2001).

### Negative Feedback-Seeking

The Feedback Seeking Questionnaire (FSQ; Swann, Wenzlaff, Krull, & Pelham, 1992) assesses participants' preference for feedback from close others within five domains (i.e., social, intellectual, artistic/musical, physical appearance, and sports). Within each domain, participants are presented with a list of six questions, three being positively framed (e.g., "What is some evidence you have seen that \_\_\_ has good social skills?"), and the other three being negatively framed (e.g., "What is some evidence you have seen that \_\_\_ doesn't have good social skills?"). They are asked to choose two out of six questions that they would like a close other to answer about them. From participants' responses to this measure, a composite score is created by summing the number of negatively framed items selected, with higher scores reflecting a greater preference for negative feedback. The FSQ has also demonstrated adequate reliability, with an alpha coefficient of .78 in a college sample (Weinstock & Whisman, 2004), and .66 in the current sample. In support of the construct validity of this measure, depressed individuals tend to engage in more negative feedback-seeking (Joiner & Metalsky, 1995). Negative feedback-seeking, in turn, has been found to predict increases in depressive

symptoms, to be associated with interpersonal rejection, and specifically related to depression rather than general distress (Joiner, 1995; Joiner et al., 1997). The FSQ has also been found to correlate with a behavioral measure of negative feedback-seeking (Rehman, Boucher, Duong, & George, 2008).

### Negative Life Events

The Life Events Scale (LES; Alloy & Abramson, 1999; Alloy & Clements, 1992; Needles & Abramson, 1990) and Life Events Interview (LEI; Alloy & Abramson, 1999) are a combination of questionnaire and semi-structured interview designed to assess the occurrence of episodic and chronic stressful life events spanning a wide range of content domains relevant to college students (e.g., school, family, relationships, finances). It was used in the current study to assess stressful life events that occurred between the initial visit and four-month prospective follow-up period. This four-month follow-up interval was chosen based on previous findings that recollection of mild to moderate stressors tend to become less reliable after approximately half a year (Brown & Harris, 1982), while also being of sufficient duration to allow for meaningful variability in the types of life stressors under consideration, particularly within the academic domain (e.g., midterms and finals). The LES was modified to cover more comprehensively dependent life events relevant to the three vulnerability domains assessed in the CSQ and SPPCS. In particular, the number of academic-relevant events was expanded to include negative oral evaluative feedback (e.g., negative comments from an authority figure regarding performance) in addition to more typical written evaluative feedback (e.g., poor grades or academic probation). Relatively minor events were also removed, the basis for this decision being that whereas there is generally strong and consistent support for the role of

major life stressors in depressive onset (Mazure, 1998; Monroe & Reid, 2008), the evidence linking hassles to depression has been relatively weak and inconsistent (Harkness, 2008; Mazure, 1998). Moreover, and mirroring these findings from stress exposure studies of depression, cognitive vulnerabilities may be associated more with the generation of major dependent stressors (Safford et al., 2007) than with minor daily hassles (Gibb et al., 2006).

Following completion of the LES, participants were interviewed with the LEI by a trained research assistant or graduate student. The LEI serves as a reliability and validity check on the LES, as it allows for life events to be more objectively identified in order to reduce potential subjective report biases. The LEI includes explicit criteria for event definition and *a priori* probes to help the interviewer determine whether reported events on the LES meet the event definition criteria. It also allows for obtaining additional information regarding the nature and context in which the event occurred. Any events that did not meet the event definition criteria were disqualified, as were events that started or occurred before the initial study visit.

Finally, each event was separately coded by three raters blind to participants' diagnoses, depression symptoms, and vulnerabilities. Using the contextual threat method of Brown and Harris (1978), the objective impact of each qualifying event was rated on a 3-point scale (0 = mild; 1 = moderate; 2 = major) for the amount of objective impact it would have on most people in the same circumstance. As in past studies utilizing the LES and LEI (Safford et al., 2007), all life events were assessed by independent raters in terms of independence vs. dependence on a 3-point scale (1 = mostly independent of participant; 2 = at least partly dependent on participant; 3 = mostly dependent on

participant). Objective impact and dependence ratings were each averaged across the three raters. Based on its average dependence rating, each event was then dichotomized as either independent, or at least partly dependent, on the participant. Similarly, each event was dichotomized, based on its average impact rating, as either mild or non-mild. As non-mild life stressors were the primary focus of the current study, averaged objective impact ratings essentially functioned as another means to identify and screen out hassles or mild life stressors that had been endorsed during the course of the LEI interview. Thus, events rated on average as minor were excluded from all analyses.

Past studies have found the LES and LEI to exhibit good reliability and validity, particularly in terms of producing an accurate record of life events experienced within a period of time (Alloy & Abramson, 1999; Alloy & Clements, 1992; Needles & Abramson, 1990; Safford et al., 2007). A previous version of the LES has been found to have good two- to three-week test-retest reliability, with an alpha coefficient of .82 in a college sample (Needles & Abramson, 1990). LES scores have also been found to interact with cognitive vulnerability to predict concurrent and future depression (McClain & Abramson, 1988). A rigorous inter-rater reliability study of 40 LEI interviews, in which different interviewers independently interviewed the same participant (within two days) with the LEI for the same 6-week interval, yielded an average  $r = .89$  between interviewers for rating and dating of events. In addition, in a validity study using the LES and LEI, participants correctly recalled 100% of the major events they experienced over a month when compared to daily life events listings made during the month. Participants dated these events to the exact day with 92% accuracy. In the current study, inter-rater

reliabilities (i.e., intra-class correlations) were .87 for dependence ratings and .85 for objective impact ratings.

### *Procedure*

Participants were assessed at two time-points, separated by four months ( $M = 117.28$  days,  $SD = 9.67$ ). During the initial assessment (Time 1), participants completed the BDI-II, CSQ, SPPCS, RSS, and FSQ. At the four-month follow-up period (Time 2), participants completed the LES. They also completed two semi-structured interviews: SADS-L and LEI. For participants who were unable to come to the laboratory during Time 2 (e.g., during school breaks), assessments were conducted by phone and internet.

### *Analyses*

The hypothesis that negative inferential styles and low self-perceived competence would predict higher levels of prospective dependent, but not independent, episodic stress was tested in a separate series of analyses for overall dependent and independent episodic stress, respectively. For each domain of cognitive vulnerability, episodic stress was regressed on to the cognitive vulnerability, controlling for Time 1 BDI-II scores and past history of depressive episodes.

The hypothesis that negative inferential styles across a greater number of domains would be associated longitudinally with higher levels of dependent episodic stress in a cumulative fashion was tested by first identifying participants who scored in the highest and lowest quartile for negative inferential styles within each domain (see Alloy & Abramson, 1999 for more on this approach for determining high cognitive risk). Then, a regression analysis was performed with overall dependent stress being regressed on to a sum variable indicating the number of domains in which participants' negative inferential styles were in the upper quartile, controlling for initial BDI-II scores and past depression.

A similar procedure was used to assess whether low self-perceived competence across a greater number of domains would be associated prospectively with higher rates of dependent episodic stress, with cognitive vulnerability within a domain being determined using scores registered in the lowest quartile.

To assess the vulnerability-specific stress generation model *between* vulnerability domains, it was hypothesized that cognitive vulnerability within a given domain would predict more matching dependent episodic stress than would cognitive vulnerability in other domains. For each domain of stress, a stepwise regression was conducted, with Time 1 BDI-II scores, past depression history, and the two cognitive vulnerabilities from incongruent domains first entered simultaneously as predictors of dependent episodic stress in the domain of interest. The domain-congruent cognitive vulnerability was next entered into the model to determine if it explained variability in domain-specific episodic stress over and above cognitive vulnerabilities in non-congruent domains, baseline depression symptoms and past history of depression. These analyses were conducted separately for negative inferential styles and self-perceived competence.

Recall that to evaluate the specificity of stressors generated *within* vulnerability domains, it was hypothesized that cognitive vulnerability within a given domain would more strongly predict domain-congruent than domain-incongruent dependent episodic stress. For each cognitive vulnerability domain, a series of regression analyses was conducted with each stress domain regressed on to the particular vulnerability domain, controlling for Time 1 BDI-II and past depression. If a cognitive vulnerability was found to be associated with dependent episodic stress in multiple domains, a comparison of the relative strength of the relation between the particular vulnerability domain and each

associated stress domain was conducted using the SUEST command in the Stata data analysis and statistical program. The SUEST command allows for an assessment of significant difference between the regression slopes of two regression models involving the same independent variables but different dependent variables. This approach also served to test the alternative hypothesis that cognitive vulnerability in a given domain generates more dependent episodic stress in some of the other domains than within its own. Again, these analyses were performed separately for negative inferential styles and self-perceived competence.

Regarding excessive reassurance-seeking and negative feedback-seeking, it was hypothesized that these maladaptive interpersonal processes would be associated with subsequent dependent episodic stress, and that these relations would be strongest for social stressors compared to academic- or physical appearance-related stressors. Furthermore, neither negative interpersonal process was hypothesized to predict later independent episodic stress. The first part of this hypothesis was examined in two separate models, by regressing overall dependent stress on to excessive reassurance-seeking and negative feedback-seeking, respectively, controlling for Time 1 BDI-II and past history of clinical depression. The specificity of these interpersonal processes to social stressors was evaluated in a manner similar to that used to assess the specificity of prediction to stressors within cognitive vulnerability domains. Specifically, for each of these interpersonal processes, a series of regression analyses was computed with each stress domain regressed on to the particular interpersonal vulnerability, with Time 1 BDI-II and past depression covaried. If an interpersonal process was related to dependent episodic stressors in multiple domains, the SUEST command in the Stata data analysis

and statistical program was used to assess the relative strength of the relation between the interpersonal vulnerability and the stress domains with which it was associated. To assess whether the two depressogenic interpersonal styles prospectively predict independent episodic stress, two regression analyses were conducted with independent episodic stress regressed on to excessive reassurance-seeking and negative feedback-seeking, respectively, with baseline depression symptomatology and history of clinical depression entered as covariates in each case.

Finally the hypothesis that excessive reassurance-seeking and negative feedback-seeking would mediate the relation between cognitive vulnerability domains and the generation of domain-relevant dependent episodic stress was tested using the PRODCLIN program (MacKinnon, Fairchild, & Fritz, 2007; MacKinnon, Fritz, Williams, & Lockwood, 2007). This program tests for the significance of the indirect effect in a mediational model by dividing the product of the two unstandardized path coefficients by their pooled standard error (i.e.,  $\alpha\beta/\sigma_{\alpha\beta}$ ), around which a 95% confidence interval is then calculated. A confidence interval that does not include zero is indicative of statistically significant mediation at  $p < .05$ . This method for testing mediation has demonstrated greater power and reduced Type I error rates than commonly used procedures for testing for significant mediation that assume a normal distribution of the indirect effect (e.g., Baron & Kenny, 1986; see MacKinnon, 2008).<sup>1</sup> This procedure was only conducted in instances where excessive reassurance-seeking or negative feedback-seeking had already been demonstrated in earlier analyses to be significantly related to a particular stress domain.

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<sup>1</sup> As the shape of the sampling distribution of the indirect effect tends to be asymmetric (MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2004; Shrout & Bolger, 2002), the distribution of the products approach utilized by the PRODCLIN program similarly yields asymmetric confidence intervals.

## CHAPTER 3 RESULTS

### *Preliminary Analyses*

Of the 203 participants who enrolled at Time 1, 91% completed Time 2. A series of independent samples  $t$  tests and chi-square tests was conducted to assess potential differences between attritors and non-attritors on baseline study and demographic variables. Specifically, the two groups were compared in terms of age, gender, ethnicity, depressive symptoms, excessive reassurance-seeking, negative feedback-seeking, academic competence, social competence, self-perceived physical appearance, as well as overall negative inferential styles, and in achievement, social, and appearance domains. Relative to participants who completed the study, attritors had fewer symptoms of depression at baseline ( $t = 2.167, p < .05, d = .30$ ), and endorsed less reassurance-seeking ( $t = 2.263, p < .05, d = .31$ ) and negative feedback-seeking ( $t = 2.198, p < .05, d = .30$ ). The demographic features of participants who completed the longitudinal phase of the study are presented in Table 1. Table 2 provides descriptive statistics for all study variables. After a Bonferroni correction was employed for the number of tests conducted ( $n = 13$ ), producing a critical  $\alpha$  value of .004 (.05/13), no differences were observed between the two groups. Finally, correlations among the main study variables are presented in Table 3.

Of the 185 participants who completed Time 2, 59% did so in person, whereas 41% completed the follow-up over phone and internet. Another set of independent samples  $t$  tests was conducted to determine potential differences between the two media on baseline study variables (i.e., depressive symptoms, excessive reassurance-seeking, negative feedback-seeking, academic competence, social competence, self-perceived

physical appearance, as well as overall negative inferential styles, and in achievement, social, and appearance domains) and follow-up variables (i.e., independent stress, overall dependent stress, and dependent stress in academic, social, and appearance domains). No group differences were found for any of these variables, which is suggestive of the viability of the phone and internet as a medium for increasing study retention.

Table 1. Demographic characteristics of the sample.

Variable	<i>N</i>	<i>M (SD)</i>	%
Female	140		75.7
Ethnicity	185		
Caucasian	104		56.2
African-American	44		23.8
Asian-American	23		12.4
Latino-American	9		4.9
Other	5		2.7
Age (years)	185	19.65 (1.49)	
Education (years)	185	13.19 (1.02)	

Table 2. Descriptive statistics for the sample.

Variable	<i>M (SD)</i>	%
<i>Depression</i>		
History of clinical depression		33.5
Baseline BDI-II symptomatology	8.19 (7.15)	
<i>Cognitive Vulnerability Variables</i>		
Overall Negative Inferential Style	132.96 (46.86)	
In Achievement Domain	49.62 (17.87)	
In Interpersonal Domain	42.90 (17.62)	
In Appearance Domain	40.32 (16.65)	
Self-Perceived Competence in Academic Domain	11.96 (2.62)	
Self-Perceived Competence in Social Domain	12.45 (2.85)	
Self-Perceived Competence in Appearance Domain	11.09 (2.88)	
<i>Interpersonal Vulnerability Variables</i>		
Excessive Reassurance-Seeking	11.92 (5.46)	
Negative Feedback-Seeking	2.83 (1.97)	
<i>Episodic Stress</i>		
Independent stress	0.75 (0.92)	
Overall Dependent Stress	3.11 (2.84)	
Dependent Stress in Academic Domain	1.11 (1.26)	
Dependent Stress in Social Domain	1.71 (1.67)	
Dependent Stress in Appearance Domain	0.24 (0.70)	

Table 3. Summary of intercorrelations between main study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Baseline depression symptoms	–															
2 Past depression	.232 <sup>c</sup>	–														
3 Overall inferential style	.484 <sup>c</sup>	.089	–													
4 Inferential style – achievement	.463 <sup>c</sup>	.091	.896 <sup>c</sup>	–												
5 Inferential style – interpersonal	.372 <sup>c</sup>	.087	.900 <sup>c</sup>	.708 <sup>c</sup>	–											
6 Inferential style – appearance	.427 <sup>c</sup>	.034	.892 <sup>c</sup>	.695 <sup>c</sup>	.715 <sup>c</sup>	–										
7 Self-perceived competence – academic	-.349 <sup>c</sup>	-.064	-.179 <sup>a</sup>	-.196 <sup>a</sup>	-.141	-.157 <sup>a</sup>	–									
8 Self-perceived competence – Social	-.319 <sup>c</sup>	-.065	-.426 <sup>c</sup>	-.361 <sup>c</sup>	-.478 <sup>c</sup>	-.305 <sup>c</sup>	.122	–								
9 Self-perceived competence – appearance	-.236 <sup>c</sup>	-.026	-.464 <sup>c</sup>	-.327 <sup>c</sup>	-.409 <sup>c</sup>	-.529 <sup>c</sup>	.121	.317 <sup>c</sup>	–							
10 Reassurance seeking	.258 <sup>c</sup>	.024	.242 <sup>c</sup>	.172 <sup>a</sup>	.189 <sup>a</sup>	.282 <sup>c</sup>	-.085	-.219 <sup>b</sup>	-.220 <sup>b</sup>	–						
11 Negative feedback seeking	.322 <sup>c</sup>	.149 <sup>a</sup>	.349 <sup>c</sup>	.342 <sup>c</sup>	.341 <sup>c</sup>	.252 <sup>c</sup>	-.159 <sup>a</sup>	-.399 <sup>c</sup>	-.231 <sup>b</sup>	.099	–					
12 Independent stress	.165 <sup>a</sup>	.192 <sup>b</sup>	.147	.195 <sup>b</sup>	.126	.084	-.125	-.017	-.027	-.044	-.046	–				
13 Dependent stress – general	.436 <sup>c</sup>	.368 <sup>c</sup>	.491 <sup>c</sup>	.470 <sup>c</sup>	.408 <sup>c</sup>	.431 <sup>c</sup>	-.281 <sup>c</sup>	-.111	-.216 <sup>b</sup>	.261 <sup>c</sup>	.195 <sup>b</sup>	.268 <sup>c</sup>	–			
14 Dependent stress – academic	.362 <sup>c</sup>	.183 <sup>a</sup>	.324 <sup>c</sup>	.363 <sup>c</sup>	.218 <sup>b</sup>	.286 <sup>c</sup>	-.317 <sup>c</sup>	-.029	-.104	.113	.132	.127	.738 <sup>c</sup>	–		
15 Dependent stress – social	.346 <sup>c</sup>	.341 <sup>c</sup>	.467 <sup>c</sup>	.430 <sup>c</sup>	.416 <sup>c</sup>	.383 <sup>c</sup>	-.194 <sup>b</sup>	-.132	-.179 <sup>a</sup>	.291 <sup>c</sup>	.195 <sup>b</sup>	.288 <sup>c</sup>	.852 <sup>c</sup>	.348 <sup>c</sup>	–	
16 Dependent stress – appearance	.262 <sup>c</sup>	.171 <sup>a</sup>	.301 <sup>c</sup>	.214 <sup>b</sup>	.264 <sup>c</sup>	.332 <sup>c</sup>	-.116	-.055	-.238 <sup>c</sup>	.128	.091	.137	.627 <sup>c</sup>	.339 <sup>c</sup>	.387 <sup>c</sup>	–

<sup>a</sup>  $p < .05$ , <sup>b</sup>  $p < .01$ , <sup>c</sup>  $p < .001$

Spearman correlations are reported for past depression and Pearson correlations for all remaining variables.

As preliminary analyses revealed baseline BDI-II to be significantly positively skewed, it was submitted to a square root transformation to satisfy assumptions of normality. An initial set of Spearman and Pearson correlations were computed for gender and age, respectively, in relation to past depression, baseline depressive symptoms, excessive reassurance-seeking, negative feedback-seeking, self-perceived competence in academic, social competence, and appearance domains, overall negative inferential styles, and in achievement, social, and appearance domains, as well as independent stress, dependent stress overall, and in academic, social and appearance domains. As none of these correlations were significant, neither gender nor age was included as a covariate in subsequent analyses. For theoretical reasons, baseline BDI-II and past history of depression were entered as covariates in all analyses. Additionally, to account for the possibility that stressors in certain domains of competence occurred with greater frequency than stressors in other domains, a consideration of particular relevance to analyses involving comparisons between stress domains, z-scores were calculated for participant's' stress sum in each episodic stress domain. Finally, collinearity diagnostics (i.e., Variance Inflation Factor; VIF) were conducted in all analyses that included multiple domains of vulnerability as predictor variables. In all cases, there were no indications of multicollinearity using a standard VIF critical value of 5.

#### *Test of General Stress Generation Effect with Cognitive Vulnerabilities*

To determine whether overall and domain-specific negative inferential styles predicted subsequent overall dependent, but not independent, episodic stress, two sets of regression analyses were conducted. In the first set, overall dependent episodic stress was regressed on to each predictor variable of interest separately, controlling for baseline

depression symptoms and past history of depression. In the second set of analyses, independent episodic stress was similarly regressed on to each predictor variable separately, with baseline depression symptoms and past depression entered as covariates. The results of these analyses are presented in Table 4. Negative inferential styles overall, and in achievement, interpersonal, and appearance domains, predicted overall dependent episodic stress. Specifically, more negative inferential styles overall, and in each of the three domains, were associated with greater subsequent dependent episodic stress. In contrast, none of the predictors was significantly associated with subsequent independent episodic stress.

Two identical sets of regression analyses were conducted with self-perceived competence in academic, social, and appearance domains substituted for the predictor variables. As summarized in Table 5, self-perceived competence in the academic domain, but not in the social or appearance domains, was associated with subsequent overall dependent episodic stress. In particular, lower self-perceived academic competence was found to predict greater dependent episodic stress. As was the case with negative inferential styles, none of the self-perceived competence domains predicted independent episodic stress.

*Cumulative Effect of Multiple Domains of Cognitive Vulnerability on Generated Stress*

As an initial step to evaluate the cumulative effects of multiple domains of a negative inferential style on the generation of overall dependent episodic stress, participants were determined to possess cognitive vulnerability within a domain if their score fell within the top quartile for that particular domain. The domains of vulnerability for each participant was then summed and entered as the predictor variable in a

Table 4. Overall and domain-specific negative inferential styles predicting overall dependent and independent episodic stress

Negative Inferential Style Domain	Dependent Episodic Stress					Independent Episodic Stress				
	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>
Overall Negative Inferential Style	.373	.002	5.338	< .001	.16	.097	.002	1.151	.251	-
In Achievement Domain	.342	.004	4.958	< .001	.14	.155	.005	1.901	.059	-
In Interpersonal Domain	.299	.004	4.343	< .001	.11	.078	.005	.979	.329	-
In Appearance Domain	.313	.004	4.542	< .001	.12	.033	.005	.399	.691	-

Table 5. Self-perceived competence in academic, social, and appearance domains predicting overall dependent and independent episodic stress

Competency Domain	Dependent Episodic Stress					Independent Episodic Stress				
	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>
Academic	-.149	.026	-2.189	.030	.03	-.077	.029	-.998	.320	-
Social	-.032	.024	.465	.642	-	.041	.027	.541	.589	-
Appearance	-.128	.023	-1.943	.054	-	.008	.026	.105	.916	-

regression model with overall dependent episodic stress as the outcome variable, and baseline depression symptoms and history of clinical depression entered as covariates. Number of vulnerability domains was found to be associated significantly with prospective dependent episodic stress, with cognitive vulnerability in a greater number of domains predicting more subsequent dependent episodic stress ( $t = 5.145, p < .001, f^2 = .15$ ).

In the case of self-perceived competence, cognitive vulnerability within a given domain was determined based on scores falling within the bottom quartile for the particular domain. When overall dependent episodic stress was regressed on to the number of low self-perceived competence domains, with baseline depression symptoms and past clinical depression treated as covariates, the number of cognitive vulnerability domains was predictive of dependent episodic stress. That is, individuals with more domains of low self-perceived competence tended to experience greater subsequent dependent episodic stress ( $t = 2.126, p < .05, f^2 = .02$ ).

#### *Test of Stress Generation Specificity Between Domains of Cognitive Vulnerability*

To examine whether a negative inferential style within a given domain would predict more domain-congruent dependent episodic stress than would negative inferential styles in other domains, three stepwise regression analyses were conducted. Baseline depression symptoms and history of clinical depression were entered as covariates and negative inferential styles incongruent with the stress domain of interest were entered as the predictor variables in Step 1, with domain-specific dependent episodic stress as the criterion variable. The domain-congruent negative inferential style was then entered as the predictor in Step 2. As detailed in Table 6, negative inferential styles in the

achievement, interpersonal, and appearance domains predicted domain-congruent dependent episodic stress in the final regression model, indicating that each negative inferential style predicted domain-congruent dependent episodic stress over and above what may be accounted for by domain-incongruent negative inferential styles. For each of the three vulnerability domains, a more negative inferential style predicted greater domain-congruent dependent episodic stress. Moreover, in each case, negative inferential styles in the two incongruent domains were not predictive of domain-specific dependent episodic stress in the final regression model, indicating that any variance in the criterion variable accounted for by domain-incongruent negative inferential styles was better explained by the domain-congruent negative inferential style.

Although none of the predictors evidenced multicollinearity based on their VIFs, suppressor effects were observed in two of the regression analyses (for more details regarding suppressor variables, see Tabachnick & Fidell, 1996; Tzelgov & Avishai, 1991). Specifically, a negative inferential style in the interpersonal domain was positively correlated with dependent episodic stress in the academic domain ( $r = .218, p < .01$ ), but had a negative regression coefficient in the regression model with negative inferential styles in the achievement and appearance domains also entered as predictors. Similarly, a negative inferential style in the achievement domain was positively correlated with dependent episodic stress in the appearance domain ( $r = .214, p < .01$ ), but had a negative regression coefficient when considered simultaneously with negative inferential styles in interpersonal and appearance domains also as predictors in a regression model. To address this issue, the relevant regression analyses were repeated with a negative inferential style in the interpersonal domain excluded from the first model, and a negative

Table 6. Hierarchical regressions of negative inferential styles predicting domain-specific dependent episodic stress

	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	
<i>Predicting dependent episodic stress in academic domain</i>						
Step 1	Baseline depression symptoms	.288	.060	3.590	<.001	
	History of clinical depression	.100	.154	1.372	.172	
	Negative inferential style in interpersonal domain	.007	.006	.067	.946	
	Negative inferential style in appearance domain	.143	.006	1.373	.172	
Step 2	Baseline depression symptoms	.238	.061	2.909	.005	
	History of clinical depression	.100	.151	1.392	.186	
	Negative inferential style in achievement domain	.276	.006	2.467	.015	.04
	Negative inferential style in interpersonal domain	-.102	.006	-.928	.355	
	Negative inferential style in appearance domain	.047	.007	.430	.668	
<i>Predicting dependent episodic stress in social domain</i>						
Step 1	Baseline depression symptoms	.096	.057	1.239	.217	
	History of clinical depression	.245	.140	3.617	<.001	
	Negative inferential style in achievement domain	.258	.005	2.654	.009	
	Negative inferential style in appearance domain	.149	.005	1.584	.115	
Step 2	Baseline depression symptoms	.096	.056	1.252	.212	
	History of clinical depression	.238	.139	3.541	.001	
	Negative inferential style in achievement domain	.169	.006	1.608	.110	
	Negative inferential style in interpersonal domain	.218	.006	2.114	.036	.03
	Negative inferential style in appearance domain	.056	.006	.549	.584	
<i>Predicting dependent episodic stress in appearance domain</i>						
Step 1	Baseline depression symptoms	.169	.065	1.993	.048	
	History of clinical depression	.125	.163	1.672	.096	
	Negative inferential style in achievement domain	-.041	.006	-.372	.710	
	Negative inferential style in interpersonal domain	.217	.006	2.097	.037	
Step 2	Baseline depression symptoms	.136	.064	1.634	.104	
	History of clinical depression	.144	.159	1.977	.050	
	Negative inferential style in achievement domain	-.163	.006	-1.434	.154	
	Negative inferential style in interpersonal domain	.073	.006	.649	.517	
	Negative inferential style in appearance domain	.340	.007	3.042	.003	.06

inferential style in the achievement domain excluded from the second model. In each case, the results remained virtually unchanged.

Three identical stepwise regression analyses were conducted with low self-perceived competence in academic, social, and appearance domains replacing negative inferential styles as the predictors of interest (see Table 7). Self-perceived competence in

both academic and appearance domains predicted domain-congruent dependent episodic stress in the final regression model, indicating that both vulnerabilities of interest predicted domain-congruent dependent episodic stress over and above what may be accounted for by domain-incongruent vulnerabilities. In both cases, lower self-perceived competence was associated with more domain-congruent dependent episodic stress. Additionally, in both cases, domain-incongruent self-perceived competence did not predict domain-specific dependent episodic stress in the full regression model. In contrast, however, self-perceived competence in the social domain was not predictive of subsequent domain-congruent dependent episodic stress. Self-perceived competence in the academic and appearance domains were similarly non-predictive of dependent episodic stress in the social domain.

Although self-perceived social competence was only moderately correlated with self-perceived competence regarding appearance ( $r = .317, p < .001$ ) and not significantly correlated with self-perceived academic competence ( $r = .122, ns$ ), suppressor effects were also evident in these analyses. Specifically, self-perceived competence in the social domain was negatively correlated with dependent episodic stress in academic ( $r = -.029, ns$ ), social ( $r = -.132, ns$ ), and appearance domains ( $r = -.055, ns$ ), although none of these associations was significant. In the three regression models with dependent episodic stress in each of the three domains as criterion variables, however, self-perceived social competence had a positive regression coefficient. Removing this variable from analyses in the case of dependent episodic stress in academic and appearance domains, and removing the domain-incongruent predictors in the case of stress in the social domain did not substantially alter the results.

Table 7. Hierarchical regressions of self-perceived competence predicting domain-specific dependent episodic stress

	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	
<i>Predicting dependent episodic stress in academic domain</i>						
Step 1	Baseline depression symptoms	.366	.056	4.862	< .001	
	History of clinical depression	.091	.150	1.290	.199	
	Self-perceived competence in social domain	.111	.027	1.473	.143	
	Self-perceived competence in appearance domain	-.051	.026	-.698	.486	
Step 2	Baseline depression symptoms	.292	.058	3.757	< .001	
	History of clinical depression	.094	.147	1.353	.178	
	Self-perceived competence in academic domain	-.218	.028	-3.023	.003	.05
	Self-perceived competence in social domain	.111	.026	1.508	.133	
	Self-perceived competence in appearance domain	-.043	.025	-.592	.554	
<i>Predicting dependent episodic stress in social domain</i>						
Step 1	Baseline depression symptoms	.233	.055	3.129	.002	
	History of clinical depression	.274	.145	4.011	< .001	
	Self-perceived competence in academic domain	-.081	.027	-1.138	.257	
	Self-perceived competence in appearance domain	-.109	.024	-1.586	.114	
Step 2	Baseline depression symptoms	.234	.057	3.048	.003	
	History of clinical depression	.274	.146	4.000	< .001	
	Self-perceived competence in academic domain	-.081	.027	-1.135	.258	
	Self-perceived competence in social domain	.007	.026	.092	.927	
	Self-perceived competence in appearance domain	-.110	.025	-1.551	.123	
<i>Predicting dependent episodic stress in appearance domain</i>						
Step 1	Baseline depression symptoms	.236	.061	2.886	.004	
	History of clinical depression	.130	.156	1.771	.078	
	Self-perceived competence in academic domain	-.029	.029	-.379	.705	
	Self-perceived competence in social domain	.033	.027	.437	.663	
Step 2	Baseline depression symptoms	.205	.060	2.538	.012	
	History of clinical depression	.137	.153	1.901	.059	
	Self-perceived competence in academic domain	-.020	.029	-.273	.786	
	Self-perceived competence in social domain	.090	.027	1.175	.242	
	Self-perceived competence in appearance domain	-.213	.026	-2.846	.005	.05

#### *Test of Stress Generation Specificity Within Domains of Cognitive Vulnerability*

In order to assess the vulnerability-specific stress generation model within domains of vulnerability, a series of regression analyses was conducted with each stress domain regressed on to each negative inferential style domain, controlling for initial depressive symptoms and history of clinical depression. Given the number of analyses

conducted, an adjustment to the critical  $\alpha$  value was conducted so as to reduce the likelihood of Type I errors. It should be noted, however, that a specific pattern of results was predicted, for which a null result in most analyses would be *more* supportive of the hypothesis under consideration. For this reason, and so as to reduce the likelihood of Type II errors, a Bonferroni correction was made for the number of independent tests within each domain of cognitive vulnerability ( $n = 3$ ), producing a critical  $\alpha$  value of .016 (.05/3).

The results of these analyses are presented in Table 8. A negative inferential style within the achievement domain predicted greater domain-congruent dependent episodic stress, but also more dependent episodic stress in the social domain. It was, however, not predictive of events in the appearance domain. A negative inferential style in the interpersonal domain was prospectively associated with more dependent episodic stress in the matching social domain and appearance domain, but not the academic domain. Similarly, a negative inferential style in the appearance domain predicted greater dependent episodic stress in its own and the social domains, but not in the academic domain.

As a next step, the SUEST command in the Stata data analysis and statistical program was used to examine the relative strength of the relations between domain-specific cognitive vulnerabilities and dependent episodic stress in different domains. This analysis was conducted only for stress domains that were found to be significantly associated with a domain-specific cognitive vulnerability. No significant differences were found in the paired comparisons. Specifically, a negative inferential style for achievement events did not differ in the strength of its association with dependent episodic stress in the

matching domain and those in the social domain ( $\chi^2 = .69, p = .405$ ). Additionally, a negative inferential style in the interpersonal domain did not predict dependent events in the matching domain relative to those in the appearance domain ( $\chi^2 = 1.90, p = .169$ ). Similarly a negative inferential style in the appearance domain was equally associated with dependent episodic events in the matching and social domains ( $\chi^2 = .02, p = .875$ ).

A set of regression analyses was also conducted with self-perceived competences replacing negative inferential styles as the predictor variables, again controlling for baseline depressive symptomatology and history of clinical depression (see Table 9). An adjusted critical  $\alpha$  value of .016 (.05/3) was also used for this set of analyses. As illustrated in Table 9, low self-perceived competence in academic and appearance domains predicted higher rates of domain-congruent but not domain incongruent dependent episodic stress. Contrasting with these findings, however, self-perceived social competence was not associated with dependent episodic stress in any of the three domains.

*Test of General and Domain-Specific Stress Generation with Interpersonal Vulnerabilities*

For each interpersonal vulnerability, a pair of regression analyses was conducted with overall dependent episodic stress and independent episodic stress as the criterion variable, respectively, controlling for baseline depression symptoms and clinical depression history. As summarized in Table 10, excessive reassurance-seeking predicted overall dependent, but not independent, episodic stress. That is, more excessive reassurance-seeking was prospectively associated with higher rates of general dependent

Table 8. Summary of domain-specific regression analyses of negative inferential styles predicting dependent episodic stress

Negative Inferential Style Domain	Dependent Academic Stress					Dependent Social Stress					Dependent Appearance Stress				
	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>
Achievement	.248	.004	3.242	.001	.06	.342	.004	4.761	<.001	.13	.121	.005	1.503	.135	-
Interpersonal	.099	.004	1.306	.193	-	.349	.004	4.968	<.001	.14	.200	.004	2.578	.011	.04
Appearance	.156	.005	2.040	.043	-	.303	.004	4.175	<.001	.10	.282	.005	3.632	<.001	.08

Table 9. Summary of domain-specific analyses of self-perceived competences predicting dependent episodic stress

Competency Domain	Dependent Academic Stress					Dependent Social Stress					Dependent Appearance Stress				
	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>
Academic	-.218	.028	-3.030	.003	.05	-.086	.027	-1.200	.232	-	-.029	.029	-.375	.708	-
Social	.097	.026	1.338	.182	-	-.024	.025	-.337	.736	-	.033	.026	.433	.665	-
Appearance	-.023	.025	-.322	.748	-	-.112	.024	-1.634	.104	-	-.191	.025	-2.647	.009	.04

episodic stress. Negative feedback-seeking, however, was not associated with either overall dependent or independent episodic stress.

To evaluate the specificity of interpersonal vulnerabilities to dependent episodic stress in the social domain, two sets of regression analyses were conducted with each stress domain regressed on to excessive reassurance-seeking and negative feedback-seeking, respectively, with initial depressive symptomatology and history of clinical depression entered as covariates (see Table 11). As before, an adjusted critical  $\alpha$  value of .016 (.05/3) was used for this set of analyses. Excessive reassurance-seeking predicted higher rates of dependent episodic events in the social, but not academic nor appearance, domain. No relation was observed between negative feedback-seeking and dependent episodic stress in any of the three domains.

#### *Test of Mediation of the Association Between Cognitive Vulnerabilities and Stress*

##### *Generation by Interpersonal Vulnerabilities*

To evaluate the hypothesis that interpersonal vulnerabilities mediate the relation between cognitive vulnerabilities and generated episodic stress, the 95% confidence interval around the product of the two components of the mediational pathway was computed using the PRODCLIN program. Tests of mediation were only considered for dependent episodic stress domains in cases where both the interpersonal and domain-congruent cognitive vulnerabilities were found in earlier analyses to be significant predictors. Specifically, excessive reassurance-seeking was assessed as a possible mediator of the relation between an overall negative inferential style and overall dependent episodic stress, and between negative inferential style for interpersonal events and dependent episodic stress in the social domain. As an additional step required to test

Table 10. Interpersonal vulnerabilities predicting overall dependent and independent episodic stress

Interpersonal Vulnerability	Dependent Episodic Stress					Independent Episodic Stress				
	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>
Excessive reassurance-seeking	.160	.012	2.425	.016	.03	-.093	.014	-1.243	.215	-
Negative feedback-seeking	.045	.035	.665	.507	-	-.122	.039	-1.609	.109	-

Table 11. Interpersonal vulnerabilities predicting domain-specific dependent episodic stress

Interpersonal Vulnerability	Dependent Academic Stress					Dependent Social Stress					Dependent Appearance Stress				
	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>
Excessive reassurance-seeking	.022	.013	.303	.762	-	.217	.012	3.214	.002	.06	.065	.013	.882	.379	-
Negative feedback-seeking	.011	.037	.151	.880	-	.076	.036	1.077	.283	-	-.001	.038	-.018	.985	-

these associations, the unstandardized coefficient and standard error for the pathway from the predictor to the mediator were determined by regressing excessive reassurance-seeking on to overall and interpersonal-specific negative inferential styles, respectively, controlling for baseline depression symptoms and past depression. The unstandardized coefficient and standard error for the pathway from the mediator to the dependent variable were calculated by regressing dependent episodic stress overall and in the social domain, respectively, on to excessive reassurance-seeking, controlling for the relevant predictor variable as well as baseline depressive symptoms and past clinical depression. Entering these values into the PRODCLIN program yielded a 95% confidence interval of -.0001 and .0011 for mediation of the relation between an overall negative inferential style and dependent stress, indicating that excessive reassurance-seeking was not a significant mediator. Excessive reassurance-seeking was not evaluated using the PRODCLIN program as a mediator of the relation between a negative inferential style and dependent stress in the social domain as it was not found to be significantly predicted by an interpersonal-specific negative inferential style after controlling for baseline depression symptoms and past clinical depression ( $t = 1.649, p = .101$ ).

*Test of Moderation of the Association Between Cognitive Vulnerabilities and Stress*

*Generation by Interpersonal Vulnerabilities*

Also considered was the alternative possibility that excessive reassurance-seeking functioned as a moderator, rather than mediator, of the association between cognitive vulnerability and dependent stress both overall and in the social domain. In each case, dependent episodic stress overall and in the social domain, respectively, were regressed on to excessive reassurance-seeking, the domain-congruent negative inferential style and

the interaction between the two risk factors, with baseline depressive symptoms and past depression covaried. As summarized in Table 12, excessive reassurance-seeking interacted with an overall negative inferential style to predict general dependent episodic stress. Specifically, higher excessive reassurance-seeking predicted greater rates of overall dependent episodic events in the case of individuals with an overall highly negative inferential style ( $t = 2.229, p < .05, f^2 = .06$ ). In the case of individuals with an overall less negative inferential style, however, excessive reassurance-seeking was not predictive of overall dependent episodic stress ( $t = -.087, p = .931$ ). This interpersonal vulnerability was similarly found to moderate the relation between a negative inferential style in response to interpersonal events and dependent episodic stress in the social domain. That is, excessive reassurance-seeking was predictive of greater subsequent dependent episodic stress in the social domain among individuals with a highly negative inferential style for interpersonal events ( $t = 2.499, p < .05, f^2 = .07$ ), but not those with a less negative inferential style in this domain ( $t = .627, p = .532$ ). These results are illustrated in Figures 1 and 2.

Table 12. Regression models of excessive reassurance-seeking moderating the relation between negative inferential styles and dependent episodic stress

	Beta	S.E.	<i>t</i>	<i>p</i>	<i>f</i> <sup>2</sup>
<i>Predicting overall dependent episodic stress</i>					
Baseline depression symptoms	.179	.053	2.534	.012	
History of clinical depression	.247	.131	4.046	<.001	
Overall negative inferential style	-.044	.003	-.282	.778	
Excessive reassurance-seeking	-.391	.035	-2.105	.037	
Overall negative inferential style x excessive reassurance-seeking	.734	<.001	2.839	.005	.05
<i>Predicting dependent episodic stress in social domain</i>					
Baseline depression symptoms	.095	.052	1.342	.182	
History of clinical depression	.255	.133	3.945	<.001	
Negative inferential style in interpersonal domain	-.092	.009	-.558	.578	
Excessive reassurance-seeking	-.309	.033	-1.723	.087	
Negative inferential style in interpersonal domain x excessive reassurance-seeking	.716	.001	2.817	.005	.05

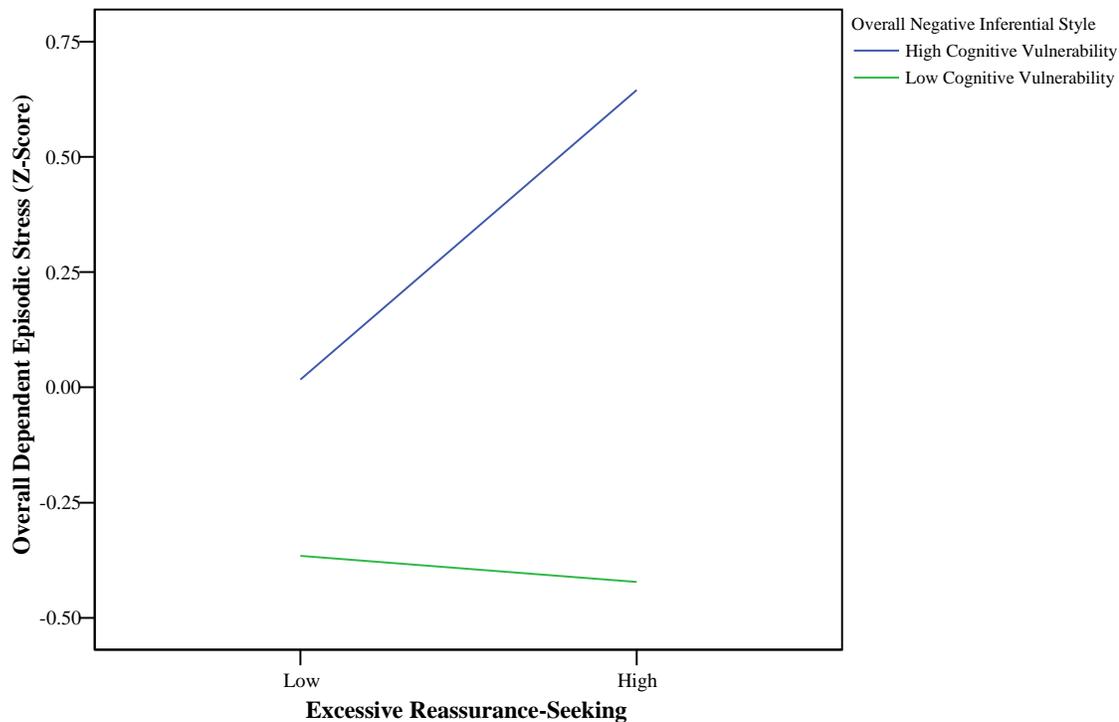


Figure 1. Interaction between excessive reassurance-seeking and overall negative inferential style in predicting overall dependent episodic stress.

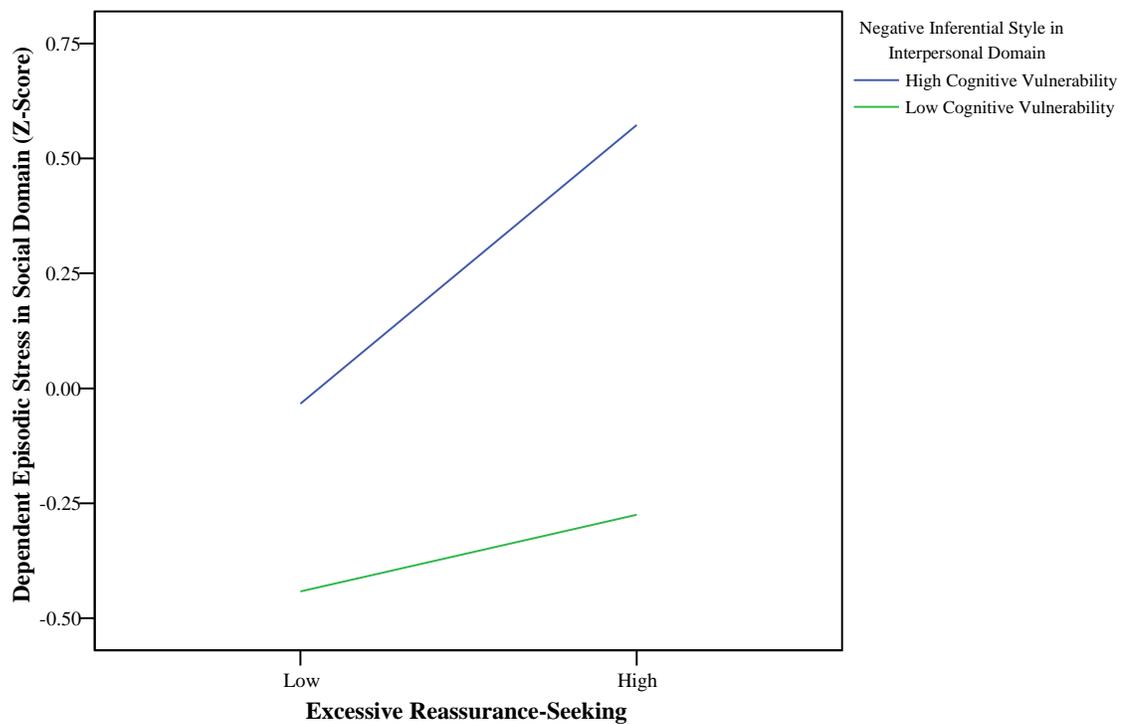


Figure 2. Interaction between excessive reassurance-seeking and interpersonal-specific negative inferential style predicting dependent episodic stress in social domain.

## CHAPTER 4

### DISCUSSION

The current study sought to test a conceptual extension of the stress generation hypothesis. The principal aim was to examine whether a specificity exists in the relation between depressogenic vulnerabilities, within the context of cognitive and interpersonal theories of depression, and the dependent stress that they generate. To this end, it assessed whether domain-specific cognitive vulnerabilities, relative to those in other domains, were more strongly associated with subsequent domain-congruent dependent episodic stress. Additionally, it examined the extent to which cognitive vulnerabilities within specific domains better predicted subsequent dependent episodic stress in matching domains relative to other domains. Consideration was also given to an alternative hypothesis that cognitive vulnerabilities within specific domains are associated more with dependent episodic stress in incongruent, rather than congruent, domains. Similarly, the present study evaluated the degree of specificity in the relation between interpersonal vulnerabilities and dependent episodic stress in the social domain.

A secondary objective was to determine the interrelation between these cognitive and interpersonal vulnerabilities in prospectively predicting dependent episodic stress. That is, a mediational model was tested with cognitive vulnerabilities prospectively associated with later dependent episodic stress through the indirect effect of interpersonal vulnerabilities. The alternative possibility of a moderational effect between cognitive and interpersonal vulnerabilities was also assessed.

Finally, a cumulative vulnerability model was tested, according to which cognitive vulnerability in multiple domains would prospectively predict greater rates of

dependent episodic stress in a cumulative fashion. More specifically, individuals with cognitive vulnerabilities in several domains were predicted to experience more subsequent dependent episodic stress relative to those with cognitive vulnerabilities in few or no domains.

As a preliminary step prior to examining the main study hypotheses, however, the general stress generation hypothesis was tested. Consistent with several previous findings relating to this hypothesis (Birgenheir, Pepper, & Johns, 2010; Kercher & Rapee, 2009; Potthoff et al., 1995; Safford et al., 2007), an overall negative inferential style and excessive reassurance-seeking predicted greater dependent episodic stress. As not all past studies have fully assessed the stress generation hypothesis by establishing the specificity of the relation between depressogenic vulnerabilities to dependent, rather than independent, stress, the current study extended the existing literature by also demonstrating that neither overall negative inferential style nor excessive reassurance-seeking predicted independent episodic stress. In examining individual domains of cognitive vulnerability in relation to overall dependent stress, we found an identical pattern of results for all three domains of negative inferential styles. Specifically, negative inferential styles in achievement, interpersonal and appearance domains were each prospectively associated with greater overall dependent, but not independent, episodic stress. When cognitive vulnerability in terms of self-perceived competence was considered, however, this pattern of results was found only for low self-perceived competence within the academic domain. In contrast, self-perceived competence within the appearance domain marginally predicted higher rates of overall dependent ( $p = .054$ ), but not independent, episodic stress, whereas self-perceived competence within the social

domain failed to predict either overall dependent or independent episodic stress.

Additionally, no indication of a general stress generation effect was found for negative feedback-seeking, which was not predictive of dependent or independent episodic stress.

In analyses examining between domains of cognitive vulnerability, I found general support for the vulnerability-specific model of stress generation. That is, negative inferential styles in the achievement, interpersonal, and appearance domains prospectively predicted higher rates of domain-congruent dependent episodic stress when controlling for negative inferential styles in incongruent domains. Furthermore, in all cases, the domain-incongruent negative inferential styles were not predictive of dependent episodic stress in the domain of interest, after controlling for the effect of the domain-congruent negative inferential style. With regards to self-perceived competence, the evidence is also mostly consistent with the vulnerability-specific stress generation model. In particular, low self-perceived competence in the academic and appearance domains similarly predicted more dependent domain-consistent episodic stress when controlling for low self-perceived competence in other domains. Again, when accounting for the domain-congruent self-perceived competence, domain-incongruent self-perceived competences failed to predict dependent episodic stress in the target domain. Contrasting with these results, self-perceived social competence failed to predict domain-congruent dependent episodic stress.

Analyses assessing within specific domains of cognitive vulnerabilities produced slightly more mixed results, yet they remained largely consistent with the study hypotheses. The pattern that emerged within domain-specific negative inferential styles was partially supportive of the vulnerability-specific model of stress generation, with

each negative inferential style domain equally predicting higher rates of dependent episodic stress within its own domain and one of the others. More specifically, negative inferential styles in the achievement and appearance domains were equally predictive of greater dependent episodic stress within their own and in the social domains. A negative inferential style in the social domain predicted dependent episodic stress significantly and equally within its own and the appearance domains. In terms of cognitive vulnerability as conceptualized in Cole's (1990, 1991) competency-based model of depression, low self-perceived competence in the academic and appearance domains were only predictive of generated episodic stress within their own domain. Contrasting these findings, but also consistent with results when examined between cognitive vulnerability domains, self-perceived competence within the social domain did not predict dependent episodic stress in its own or any of the other two domains.

Evaluating the specificity of the relation between interpersonal vulnerabilities and generated stress to the social domain yielded supporting evidence for excessive reassurance-seeking, but not for negative feedback-seeking. That is, excessive reassurance-seeking predicted higher levels of dependent episodic stress within the social, but not academic or appearance, domain. Conversely, yet in line with previous findings for overall generated episodic stress, negative feedback-seeking failed to predict subsequent dependent episodic stress in any of the three domains. When considered in relation to negative inferential styles, excessive reassurance-seeking moderated, but did not mediate, the relation between overall and interpersonal-specific negative inferential styles, respectively, and their corresponding dependent episodic stress.

Finally, the results were supportive of the cumulative effects model of stress generation, with a greater number of vulnerability domains in the case of negative inferential styles and self-perceived competence, respectively, predicting higher rates of overall dependent episodic stress.

Several points may be noted regarding the current findings. First, the current study replicated previous findings of a general stress generation effect with overall cognitive vulnerability as conceptualized by the hopelessness theory of depression (Abramson et al., 1989), and excessive reassurance-seeking. It also extended the stress generation literature to include assessments of other forms of cognitive and interpersonal vulnerabilities by providing the first test of this phenomenon within the framework of Cole's (1990, 1991) competency-based model of depression and negative feedback-seeking, respectively. General support of the stress generation hypothesis was found for self-perceived competence, but not for negative feedback-seeking, within the context of both overall and domain-specific generated episodic stress. Furthermore, the results were largely supportive of a vulnerability-specific stress generation effect, with the evidence appearing to be the strongest in analyses between cognitive vulnerability domains; within vulnerability domains for self-perceived competence; and for the association between excessive reassurance-seeking and generated social stressors.

The current study also contributed to the extant literature by providing the first prospective study of negative inferential styles, separate from other cognitive vulnerabilities, as predictors of stress generation in adults. Additionally, it is the second study of cognitive vulnerability as articulated in Cole's (1990, 1991) competency-based

model of depression in adults, and provided the first assessment of this model in adults to utilize a longitudinal framework.

Also worth noting is that, although in line with the primary study hypothesis, the finding that a negative inferential style in the academic domain was found prospectively to predict domain-matching generated episodic stress is, in some measure, inconsistent with previous studies that have failed to document a relation between an overall negative inferential style and subsequent achievement-related stressors (Safford et al., 2007) and non-interpersonal dependent stressors (Shih et al., 2009). Moreover, that this inconsistency may have resulted from differences between achievement-specific and overall negative inferential styles seems not to be the case, as a follow-up analysis revealed an overall negative inferential style also to be predictive of dependent episodic stress in the achievement domain, even after controlling for baseline depression symptoms and past history of depression ( $t = 2.409, p < .05, f^2 = .03$ ).

One possible reason for these divergent findings is that Safford et al. (2007) operationalized cognitive vulnerability as a combination of dysfunctional attitudes and negative inferential styles, and Shih et al.'s (2009) assessment of dependent non-interpersonal stress included both academic and non-academic events, whereas the current study examined negative inferential styles and academic stressors separately from other cognitive vulnerabilities and stress domains, respectively. A more likely explanation, however, is that the measure of academic-related negative events used in the current study was expanded to include negative verbal evaluations (e.g., being told you are not cut out for a major or college) as well as the standard written forms of negative feedback regarding academic performance (e.g., poor exam grades, failed courses, or

being placed on academic probation), so as more comprehensively to document stressors within this domain. Indeed, when negative academic events were limited to written evaluations and consequences of performance, the results were more consistent with previous findings, with an overall negative inferential style no longer being predictive of dependent episodic stress in the academic domain ( $t = 1.415, p = .159$ ). Also worth mentioning, however, is that negative cognitive styles in the achievement and academic domains, as characterized by a negative inferential style and low self-perceived competence, respectively, remained significantly associated with higher rates of generated academic stress ( $t = 2.360, p < .05, f^2 = .03$  for achievement-specific negative inferential style, and  $t = -2.624, p < .01, f^2 = .04$  for low self-perceived competence in the academic domain), after controlling for baseline depression symptomatology and history of clinical depression. In addition to the need for more fine-grained analyses of cognitive vulnerability in a variety of domains, these findings illustrate the importance of incorporating non-written evaluations in measures of dependent academic or achievement stressors. This consideration may be of particular relevance in studying achievement-related stress generation with adults in non-academic work settings, where formal evaluations may occur with reduced frequency and more informal verbal feedback occur with greater frequency.

The failure to detect a stress generation effect with low self-perceived competence, either in terms of general or domain-congruent dependent episodic stress, is especially curious, given the evidence of stress generation in all other studied negative inferential style and self-perceived competence domains. Interestingly, this lack of finding for self-perceived social competence parallels recent research examining this

same construct within the context of a stress-diathesis model of depression and Beck's (1983; 1987) event congruency hypothesis (Uhrlass & Gibb, 2007). In this study, low self-perceived academic competence interacted with negative events in the congruent domain to predict subsequent depression symptomatology in a sample of college students. Contrasting with this finding, self-perceived social competence did not significantly interact with domain-congruent negative events to predict depression symptoms. Previous studies from the stress generation literature have also yielded mixed results. Mirroring the results of the current study, Segrin (2001) found little evidence of a relation between self-perceived interpersonal competence and later social stressors in a sample of college students. In contrast, Caldwell et al. (2004) reported a relation between negative relational self-schemata, characterized as a composite of social self-worth and self-competence, and prospective peer-related stressors in a sample of early adolescents. These results, however, also differed from findings from another study that found *high* self-perceived interpersonal competence to interact with trait hostility to predict greater daily dependent stress (Sahl, Cohen, & Dasch, 2009). Given this wide range of results, more research is required before any firm conclusion can be drawn regarding the potential role of self-perceived social competence in the stress generation process.

Another point worth mentioning is that support for the vulnerability-specific model of stress generation appeared somewhat stronger for self-perceived competences than for depressogenic inferential styles, particularly in within-vulnerability analyses. This difference in specificity patterning in the stress generation effect may in large part be reflective of corresponding differences in cognitive vulnerability as conceptualized by the hopelessness theory (Abramson et al., 1989) and Cole's (1990, 1991) competence-

based model of depression. Cole et al. (1990, 1991, 2001) and Harter (1982, 1999) have conceptualized competence as a multidimensional construct, with significant variability being possible across several relatively distinct domains. For this reason, an overall competence score cannot be derived by a simple summation of competency ratings across several domains. This multidimensional model of cognitive vulnerability has received empirical support (Cole, 1991; Cole et al., 2001; Seroczynski et al., 1997). The results from the current study are also certainly consistent with this conceptualization. What is more, in the current sample, self-perceived academic competence was not significantly correlated with self-perceived competence in the social ( $r = .122, p = .099$ ) or appearance ( $r = .121, p = .103$ ) domains. In addition, self-perceived social competence was significantly, but modestly, correlated with self-perceived competence in the appearance domain ( $r = .317, p < .001$ ). In the case of negative inferential styles as characterized by the hopelessness theory of depression (Abramson et al., 1989), the specific vulnerability hypothesis (Abramson et al., 1995) posits that individuals with a negative inferential style in a particular domain are at increased risk of depression when confronted with a domain-congruent negative life event, implying a significant degree of distinctiveness between inferential style domains. Vulnerability-stress studies testing the specific vulnerability hypothesis have produced mixed but generally supportive results (Abela, 2002; Abela & Seligman, 2000; Metalsky et al., 1987). Interestingly, and paralleling results from the current study, Abela (2002) found negative inferential styles in both achievement and interpersonal domains to be associated with depressive symptoms when confronted with a negative achievement event, but this interaction was stronger for an achievement-specific negative inferential style. Taken together, these findings suggest that negative

inferential styles in different content domains may be significantly interrelated, yet still relatively distinct, vulnerability constructs. Consistent with this view, the correlations between the three domain-specific negative inferential styles in the current study were moderately strong ( $r_s = .695$  to  $.715$ ,  $p_s < .001$ ).

The current study is characterized by several strengths. Perhaps chief among them is the use of diagnostic interviews and rigorous context-based life events interviews (for more information regarding the importance of interview-based measures of diagnostic and life event data in life stress research, as well as limitations inherent in self-report approaches, see Hammen, Mayol, deMayo, & Marks, 1986; Liu & Alloy, 2010; Monroe & Reid, 2008). Additionally, the four-month prospective interval was ideal in terms of mitigating memory biases and errors associated with more long-term recall (Brown & Harris, 1982) while also of sufficient duration to allow for meaningful variability in the occurrence of life events.

The present findings, however, must also be interpreted within the context of its limitations. First, the study sample was predominantly female which limits the generalizability of the findings to males, and precludes the possibility of examining gender interactions.<sup>2</sup> Given the increasing evidence of a degree of gender specificity in the stress generation effect (Liu & Alloy, 2010; Shih, 2006; Shih & Eberhart, 2010), it would be important for future research to examine the degree to which vulnerability-specific stress generation is specific to females or generalizable to males. Additionally,

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<sup>2</sup> In a series of independent samples t-tests, female participants experienced higher rates of independent stress relative to male counterparts ( $t = 2.232$ ,  $p < .01$ ,  $d = .51$ ). Note, however, that no significant main effects were predicted for independent stress, and, indeed, none were found among the principal variables of interest even without gender covaried. Additionally, no significant gender differences was observed for overall dependent stress, as well as dependent stress in the academic, social, and appearance domains, respectively. Further suggesting that the current study was underpowered to study gender effects, no gender differences emerged in an independent samples t-test of baseline depression symptoms and a chi-square test of clinical depression history.

just as there may be vulnerability processes specifically associated with stress generation in females (e.g., interpersonal processes such as sociotropy [Shih, 2006] and over-concern for others [Shih & Eberhart, 2010]), it would also be important to uncover processes that may be similarly specific to males (Shih, 2006). Moreover, that generated stress may manifest differently in men compared to women represents an interesting prospect for future investigation. Second, although the present sample was very diverse and a sizeable percentage had a history of depression, additional research is required to replicate current findings with clinical samples. Third, and of particular clinical relevance, the current study provided only a partial assessment of the etiological chain underlying the chronicity of depression articulated in the stress generation hypothesis. Specifically, although cognitive and interpersonal vulnerabilities were assessed in relation to generated episodic stress, the degree to which the generated stress, in turn, precipitates future depressive episodes is unclear. As there has been only one study to date to have examined clinical depression as a pathogenic sequelae of generated stress (Bos, Bouhuys, Geerts, van Os, & Ormel, 2007), there is a pressing need to address this gap in the literature.

#### *Conclusions and Clinical Implications*

Overall, the results from the current study provide a more nuanced understanding of the stress generation effect, and reflect the need for more fine-grained studies of this phenomenon (Hammen, 2006; Shahar et al., 2004). When examined in relation to general dependent episodic stress, excessive reassurance-seeking and domain-specific cognitive vulnerabilities, with the exception of self-perceived social competence, appeared implicated in the stress generation process. When episodic stress was analyzed at a finer

level according to content domain, however, a notably different pattern of results emerged, with general support being found for a degree of specificity in the relation between the nature of a particular vulnerability and the episodic stress that it generates. Inasmuch as individual vulnerabilities generate stressors preferentially within their own domains, and inasmuch as the specificity in the match between stressors and underlying vulnerability significantly increases risk for depression within a stress-diathesis framework (Beck, 1983, 1987; Abramson et al., 1995), the present study offers an advancement in current understandings of the manner in which the stress generation process may influence the onset, maintenance, and recurrence of this often chronic illness.

In terms of clinical implications of the current findings, they are suggestive of the importance of assessing depressogenic vulnerability and functioning in multiple domains within treatment settings. To the degree that subsequently generated stress is specific to vulnerability domain, dependent episodic stress within the congruent domain may provide a clear and very precise goal and measure of progress in treatment. Additionally, patterns of stressors falling within specific domains may point to important targets for intervention. An individual experiencing stressful events chiefly within academic or achievement settings, for example, may benefit most from an emphasis on changing maladaptive self-focused tendencies or characteristics specific to the domain, whereas an individual whose functional difficulties and related stress lie primarily within interpersonal or social domains may derive greater benefit from a similar focus on modifying maladaptive behaviors and cognitions related to the same domain. In contrast to attempting to reduce stress more generally, this greater precision in targeting

maladaptive cognitions and characteristics, and in measuring progress and therapeutic gains, allows for greater customization of treatment to client-specific needs. Thus, the current extension of the stress generation model highlights the importance of similar specificity in identifying vulnerabilities and stress domains as targets and outcome measures of treatment and prevention efforts.

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