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The Relationship of Explanatory Flexibility to Explanatory Style

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Traditional cognitive vulnerability-stress models regarding the etiology of depression emphasize the content of the depressed individual's thoughts. One important cognitive content index, explanatory style, represents the habitual way that individuals assign causes to events that occur in their lives. A more contemporary model, however, emphasizes the cognitive process by which these attributions are made and to what extent the individual can make different attributions depending on the particular context of the event. This process is referred to as explanatory flexibility. Given that both indices of causal explanation are derived from the same assessment instrument, the Attributional Style Questionnaire, the current investigation sought to examine the extent to which the two variables can be differentiated from one another. Results indicated that explanatory style (a measure of cognitive content) and explanatory flexibility (a cognitive process measure) are empirically related, but distinct, constructs.

THE REFORMULATED LEARNED HELPLESSNESS THEORY (Abramson, Seligman, & Teasdale, 1978), as well as the hopelessness theory (Abramson, Metalsky, & Alloy, 1989), are cognitive vulnerability-stress models of depression that follow from the original learned helplessness theory (Seligman, 1974). The reformulated learned helplessness theory (Abramson et al., 1978) infused attribution theory into the original model and posited that the causal attributions that individuals assign to events in their lives confer protection from, or risk for, depression.

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Explanatory Style

The attributional component of the reformulated learned helplessness theory, referred to as attributional style or explanatory style, is defined as an individual's habitual way of assigning causes to negative events. Specifically, explanatory style is defined by the content of these causes. Individuals who attribute negative life events to internal (e.g., "It's all my fault"), stable (e.g., "It will be around permanently"), and global (e.g., "It will affect everything I do") causes are more vulnerable to depression. Hopelessness theory retains the causal attribution component but deemphasizes the internality dimension in favor of the stability and globality dimensions and refers to this component as generality. The current investigation utilized the operationalization of explanatory style as derived from hopelessness theory. Considerable evidence supports the relationship of explanatory style to the etiology, maintenance, and treatment of emotional disorders (Alloy et al., 1999, 2000; Abramson et al., 1999; DeRubeis et al., 1990; Hollon et al., 1992). However, this focus on cognitive content has left room for inquiries into the nature of cognitive processes in predicting depression.

Explanatory Flexibility

One potential cognitive process relevant to depression, explanatory flexibility, is defined as the degree of variability that an individual displays in assigning causes to negative events. It is operationalized as the intra-individual standard deviation from the stability and globality of causes attributed to negative events on the Attributional Style Questionnaire (ASQ; Peterson et al., 1982), a commonly used measure of explanatory style. The dimensions of stability and globality are used exclusively in calculating explanatory flexibility scores as flexibility has been conceptualized within the tradition of hopelessness theory. Therefore, the use in the

current investigation of the definition of attributional style, as presented in hopelessness theory, allowed for comparisons between explanatory flexibility and explanatory style that are more easily interpretable. There is mounting evidence that explanatory flexibility makes a meaningful contribution to our understanding of emotional problems above and beyond the effects of explanatory style. For example, in a sample of 78 unselected college students, Fresco, Rytwinski, et al. (2007) obtained self-report measures of explanatory style and flexibility (as assessed by the ASQ), depressive symptoms (as assessed by the Beck Depression Inventory [BDI]; Beck, Rush, Shaw, & Emery, 1979), and life stress (as assessed by the Life Experiences Survey [LES]; Sarason, Johnson, & Siegel, 1978). Explanatory flexibility was only modestly correlated ($r = -.27$) with explanatory style. Importantly, explanatory flexibility-not explanatory style-moderated the relationship of negative life events to levels of depression measured 8 weeks later. The magnitude of the interaction involving explanatory flexibility approached Cohen's definition of a medium effect size ($f^2 = .11$). The moderation effect for explanatory flexibility held even after controlling for the influence of explanatory style as a main effect as well as the interaction of explanatory style and negative life events. This moderation effect indicated that low explanatory flexibility (rigidity) was associated with higher levels of depression in the face of negative life events. Fresco and Haigh (2007) replicated this finding in a sample of 45 pessimistic college students who were identified from a larger sample. The magnitude of the interaction between explanatory flexibility and negative life events ($f^2 = .20$) exceeded conventions for a medium effect size.

Fresco, Heimberg, Abramowitz, and Bertram (2006) administered a negative mood priming procedure to both euthymic and dysphoric individuals with past major depressive disorder (MDD), as well as individuals without any history of MDD. After the mood induction, euthymic participants with a history of MDD experienced a significant reduction in explanatory flexibility, whereas the other two groups did not. In addition, dysphoric participants with a history of MDD reported a more depressogenic explanatory style for negative events after the mood induction, whereas the other groups experienced no such change in their explanatory style. This latter finding is not particularly surprising given research that posits that depressed mood may serve to activate cognitions typically associated with such a mood, and visa-versa, and that this increased cognitive reactivity and accessibility of negative mood may serve in the etiology and maintenance of mood disorders (Ingram, 1984; Teasdale, 1988). Related research has shown that explanatory style, primed by stressful events (such as false negative feedback on an "IQ test"), is more predictive of the future occurrence of depressive symptoms than when it is measured unprimed (Abela & Brozina, 2004; Abela, Brozina, & Seligman, 2004). Dysphoric participants with histories of MDD would therefore experience more severe increases in negative affect as a result of the mood prime, and this increase would be more associated with negative thoughts than would be for participants in the other two groups.

With respect to currently euthymic participants with a past MDD, the authors speculated that the reduction in explanatory flexibility following the mood priming challenge may function in a similar manner to the protective bias described by McCabe and colleagues (cf. McCabe, Gotlib, & Martin, 2000; McCabe & Toman, 2000) in studies using the deployment of attention task (Gotlib, McLachlan, & Katz, 1988). Specifically, McCabe and colleagues have consistently found that euthymic participants, especially euthymic participants with a history of MDD, when presented with word pairs, show a preference for positive or neutral, versus negative words. They have speculated that this bias away from negative stimuli serves to protect the individual from exposure to stimuli that might result in a return to a depressed state. Similarly, reductions in explanatory flexibility may serve to constrict the individual's attention to the world away from the impact of the negative mood priming challenge.

The formerly depressed participant after negative mood induction may feel particularly vulnerable to emotional hyperarousal; such an individual who suffers from impaired emotion-regulation skills may ignore attributions likely to result in increased emotional consequences. In fact, a substantial body of research exists that characterizes the depressed individual as lacking in precisely these skills (Bonnano & Keltner, 1997; Gehricke & Shapiro, 2000; Rottenberg, Kasch, Gross, & Gotlib, 2002; Wexler, Levenson, Warrenburg, & Price, 1993). The finding that currently dysphoric individuals do not evidence increases in rigidity whereas euthymic individuals with a history of MDD evidence increases in rigidity corresponds favorably to work by Rottenberg, Gross, and Gotlib (2005), who posit that current depression results in reduced emotion context sensitivity and a lack of reactivity for both negative and positive stimuli, whereas remitted depression may result in heightened reactivity to negative stimuli.

Finally, Fresco, Schumm, et al. (2007) conducted a secondary analysis of the Jacobson and colleagues (1996) dismantling study of Beck's cognitive therapy of depression (CT; Beck et al., 1979) in hopes of identifying explanatory flexibility as a moderator of the effects of treatment in CT. In the Jacobson et al. (1996) study, 150 patients with current MDD were randomly assigned to one of three treatments: a treatment focused exclusively on the behavioral activation (BA) component of CT; a treatment that included both BA and the teaching of skills to modify automatic thoughts (AT), but excluding the components of CT focused on core schema; or the full CT treatment. The study was predicated on the hypothesis that treatment response following an intervention that emphasized challenging and disputing cognitive products (AT) would be associated with decreased pessimistic explanatory style. Conversely, treatment response following a treatment that emphasized behavioral activation, role-playing, and imaginal rehearsal of behavioral responses (BA) was hypothesized to be associated with increases in explanatory flexibility. All patients completed a self-report measure of explanatory style-thereby permitting for a secondary analysis of explanatory flexibility as well. All three treatments demonstrated equivalent success by the end of the acute treatment phase. New analyses were conducted to examine the role of explanatory flexibility and explanatory style in the recovery from depression. As predicted, BA responders scored higher on explanatory flexibility than BA nonresponders, but they did not differ on explanatory style. In contrast, but also according to expectations, AT responders scored lower on explanatory style than AT nonresponders, but they did not differ on explanatory flexibility. Further, high flexibility was associated with lower depression for BA participants whereas low explanatory style was associated with lower depression for AT participants.

Summary and Hypotheses

Research into the reformulated learned helplessness (Abramson et al., 1978) and hopelessness theories (Abramson et al., 1989) of depression has established the importance of explanatory style as a vulnerability factor for depression when individuals are confronted with stressful life events. Recently, Fresco and colleagues (Fresco et al., 2006; Fresco, Rytwinski, et al., 2007; Fresco & Moore, 2007) demonstrated that explanatory flexibility, a counterpart to explanatory style, also demonstrates an independent and meaningful relationship to depression and generalized anxiety. However, one possible criticism of the explanatory flexibility work is that it might simply represent a proxy for an explanatory style characterized by highly stable and global explanations or alternatively highly unstable and specific explanations. Therefore, the current study sought to evaluate the similarities and differences between explanatory flexibility and explanatory style by examining both the correlation between the two and inspection of how three strata of explanatory style (high, medium, and low) are distributed within three similar strata of explanatory flexibility. This approach allowed for examination of the distributions of the three explanatory flexibility groups with the three explanatory style groups via a classification table (using a χ^2 statistic) and allows a more nuanced approach to exploring the relationship between these two variables. For instance, if two variables were to be strongly correlated with many values clustered toward the low end of the score distribution, but completely unrelated at the high end of the distribution, a small overall correlation coefficient might result. However, by dividing the variables into tertiles and analyzing the data with a 3×3 classification table, a significant χ^2 would result from unevenness in one or more of the cells in the matrix.

Our hypotheses for this examination were:

1. Explanatory style and explanatory flexibility will illustrate a low degree of correlation.
2. Individuals at all strata of explanatory style (e.g., high, medium, and low) will be equally likely to reside in the high, medium, or low strata of explanatory flexibility, illustrating that the two constructs are psychometrically unrelated.

Method

PARTICIPANTS AND PROCEDURES

Data were obtained from two samples of students enrolled in introductory psychology courses at a large, midwestern university in return for course credit. The use of two samples allowed us to replicate results obtained from Sample 1 and made it less likely that any findings were the result of chance sampling error. Sample 1 ($N = 745$) was composed of individuals who were given a measure of explanatory style, the ASQ (Peterson et al., 1982), and participated in the university's mass testing procedure in the fall of 2003. Of these students, 498 were female (66.8%) and 245 were male (32.9%; gender data on 2 individuals were missing), and the mean age was 19.4 years ($SD = 4.5$). The sample consisted of 606 Caucasian participants (81.6%), 93 African–American

participants (12.5%), 5 Asian–American participants (0.7%), 13 Hispanic participants (1.7%), 3 Native American participants (0.4%), 21 participants who marked "other" (2.8%), and 4 participants who failed to mark the item on race (0.5%). Sample 2 ($N = 457$) was composed of individuals who were screened in smaller, individual groups for participation in an unrelated study in the spring of 2004. Sample 2 participants were also given the ASQ. Of these students, 273 were female (59.7%), and 182 were male (39.8%; gender data on 2 individuals were missing), and the mean age was 23.0 years ($SD = 9.9$). The sample consisted of 383 Caucasian participants (83.8%), 54 African–American participants (11.8%), 2 Asian–American participants (0.4%), 2 Hispanic participants (0.4%), 14 participants who marked "other" (3.1%), and 2 participants who failed to mark the item on race (0.4%).

MEASURES

The ASQ is a self-report inventory that assesses causal attributions for six hypothetical positive and six hypothetical negative events along the dimensions of stability and globality that are rated on 1–7 scales. Higher ratings represent more pessimistic responses and more stable and global causes, while lower ratings represent more unstable and specific causes. A generality score is then computed by averaging the values of the 12 stability and globality items across negative events to produce a score that ranges from 1 to 7. In addition, explanatory flexibility can be computed by determining the standard deviation of these same 12 stable and global items for negative events.

The ASQ has demonstrated adequate internal consistency ($\alpha = .70$–$.75$; Peterson et al., 1982; Sweeney, Anderson, & Bailey, 1986) and test-retest reliability for the negative event dimensions ($r = .52$–$.60$) and composite of the negative events ($r = .70$–$.73$) (Colin, Sweeney, & Schaeffer, 1981; Peterson et al., 1982; Sweeney et al., 1986) in both psychiatric and undergraduate populations. Adequate internal consistency values were found both in Sample 1 ($\alpha = .77$) and Sample 2 ($\alpha = .76$).

Results

To determine differences in the distributional properties of explanatory flexibility and explanatory style, univariate (skewness and kurtosis) as well as multivariate normality statistics (Shapiro-Wilk's W test) were computed for both variables for Samples 1 and 2. A significant multivariate statistic (indicating significant deviation from normality) does not specifically indicate the source of nonnormality (in either skewness or kurtosis). This information is significant as information about the source of nonnormality is required if a researcher wishes to transform a variable such that parametric statistics can be used with it. Typically, tests of normality in the distribution are assessed by converting skew and kurtosis values to z scores and evaluating differences in z from zero as a function of sample size. However, sample size can affect whether results are statistically significant. Consequently, the Shapiro-Wilk's W statistic can be used as an average correlation between the obtained values in the distribution and their respective ideal values if the distribution were perfectly normal (Royston, 1982). The statistic ranges from 0 to 1, and the values of W approaching 1.0 are indicative of distributions with small deviations from normality.

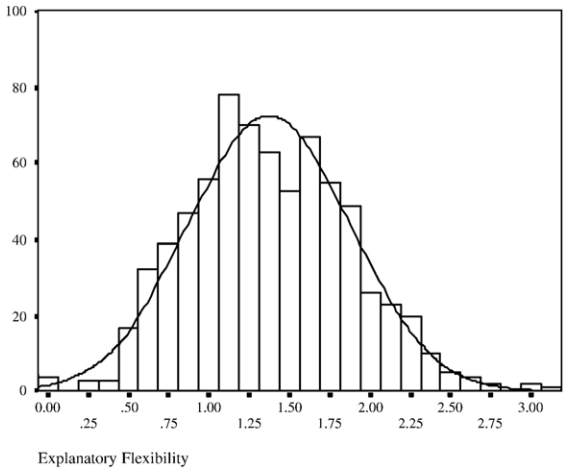

FIGURE 1 Distribution of explanatory flexibility in Sample 1.

Both explanatory style and explanatory flexibility evidenced violations of normality in skewness and/or kurtosis when using standard measures of statistical significance. However, these findings were likely the result of the large sample sizes used in the current investigation artificially deflating the p-values associated with them. Visual inspection of the histograms (see Figures 1–4), as well as computation of the Shapiro-Wilks W, provides support for the idea that the large sample sizes involved artificially deflated the p-values associated with them. Explanatory flexibility evidenced significant deviation from normality in Sample 1 [see Figure 1; Shapiro-Wilk's W ($df = 729$) $= .994$, $p = .001$] as it possessed a significant degree of positive skew ($z = 2.65$, $p = .008$), but a nonsignificant degree of kurtosis ($z = -.10$, ns). In Sample 2, however, explanatory flexibility was normally distributed [see Figure 2; W ($df = 444$) $= .994$, $p = .10$] and

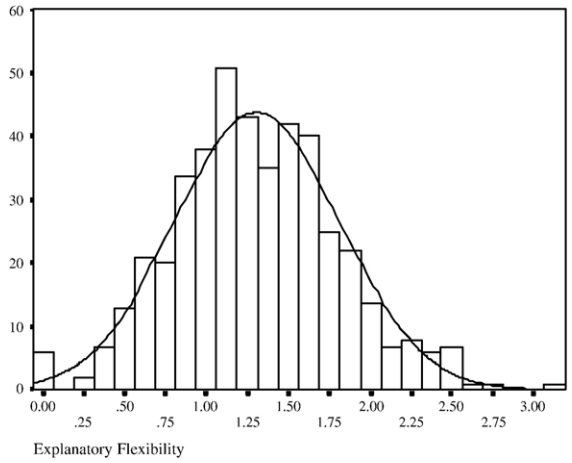

FIGURE 2 Distribution of explanatory flexibility in Sample 2.

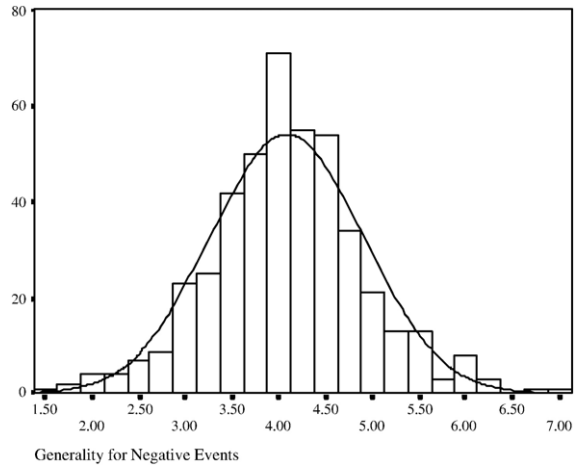

FIGURE 4 Distribution of explanatory style (Generality for negative events) in Sample 2.

possessed a nonsignificant degree of skew ($z = 1.76$, $p = .08$), but a significant degree of kurtosis ($z = 3.44$, $p < .001$) as the distribution was peaked in the center (leptokurtic). Explanatory style also differed significantly from normality in Sample 1 [see Figure 3; W ($df = 729$) $= .996$, $p = .05$] despite the fact that the distribution possessed a statistically nonsignificant degree of skew ($z = -1.56$, $p = .12$) and kurtosis ($z = 1.89$, $p = .06$). The distribution for explanatory style was also significantly nonnormal for Sample 2 [see Figure 4; W ($df = 444$) $= .990$, $p = .004$], although it again possessed a nonsignificant degree of skew ($z = .88$, *ns*), but a significant degree of kurtosis ($z = 3.44$, $p < .001$) as the distribution was also leptokurtic.

Hypothesis 1 stated that explanatory flexibility and explanatory style would demonstrate independence on a zero-order level. To evaluate this hypothesis, the zero-order correlation among explanatory flexibility and explanatory style was computed for Samples 1 and 2. In line with expectations, in Sample 1 the correlation between flexibility and generality was low [$r(729) = .02$, *ns*], and was less than Cohen's (1988) convention for a small effect. Slightly different results were found in Sample 2, with a correlation that corresponded to a small-to-medium effect and was statistically significant [$r(444) = -.18$, $p < .001$].

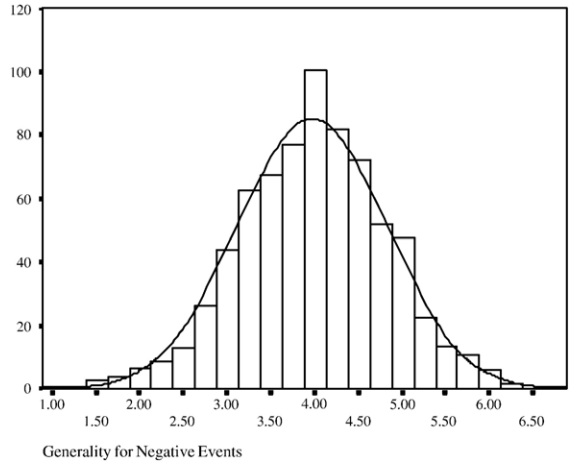

FIGURE 3 Distribution of explanatory style (Generality for negative events) in Sample 1.

Hypothesis 2 stated that individuals at all strata of explanatory style (e.g., high, medium, and low) will be equally likely to reside in the high, medium, or low strata of explanatory flexibility. To address this hypothesis, participants in Samples 1 and 2 were classified into High, Medium, and Low groups by dividing each distribution into tertiles. In Sample 1, the association between the two variables in the 3×3 classification table was significant at a trend level [see Table 1; χ^2 (4, $N = 725$) $= 9.27$, $p = .06$, Cohen's $w = .11$], with this finding corresponding to the convention for a small effect. Given the small effect, however, it is probable that the large sample size artificially deflated the p-value. In addition, examination of the 3×3 classification table in Sample 2 (see Table 2) reflected a significant degree of association between rigidity and pessimism [χ^2 (4, $N = 426$) $= 18.18$, $p = .001$, $w = .21$]; however, this finding corresponded to an effect size in between Cohen's conventions for small and medium effect and may have indicated that the large sample size may have artificially deflated the p-value. Inspection of the number of participants in each cell indicated that individuals low in flexibility also tended to endorse a depressogenic explanatory style, and individuals who were highly flexible also tended to possess a nondepressogenic explanatory style in Sample 2.

Table 1
Relationship between explanatory flexibility and explanatory style in Sample 1

Explanatory style	Explanatory flexibility			
	Low	Medium	High	Total
Low	68 (9.4%)	93 (12.8%)	85 (11.7%)	246 (33.9%)
Medium	93 (12.8%)	64 (8.8%)	80 (11%)	237 (32.7%)
High	79 (10.9%)	80 (11%)	83 (11.4%)	242 (33.4%)
Total	240 (33.1%)	237 (32.7%)	248 (34.2%)	725

However, as stated previously, this tendency was only present in Sample 2 to a small-to-medium effect.

Discussion

The aim of the current study was to establish the discriminant validity of a measure of cognitive process (explanatory flexibility) by illustrating its psychometric nonequivalence to a closely related measure of cognitive content (explanatory style). Findings from the current study satisfy a necessary step in the development of the construct validity of explanatory flexibility as it is derived from the same measure as explanatory style, the ASQ. It is reasonable to expect, therefore, that explanatory flexibility likely would share considerable variance with explanatory style in the form of common method and error variance. Counter to this expectation, the current investigation found that explanatory flexibility and explanatory style were relatively distinct constructs, as evidenced by a low degree of covariance and the independence of subgroupings of these two variables. However, explanatory flexibility and explanatory style evidenced a small-to-medium correlation in Sample 2, indicating that these variables were not completely unrelated. The current study illustrated that although cognitive content and cognitive process are closely related in the theory related to the etiology of depression (Beck et al., 1979), they can be empirically distinguished.

The current study adds to the currently sparse literature on the phenomena of explanatory flexibility. Future work will address both the ability of the interaction of explanatory flexibility and negative life events to predict future episodes of depression as well as the incremental validity that explanatory flexibility provides over explanatory style. A necessary first step in answering such questions is establishing that explanatory flexibility and style are distinct constructs. As research in this area is in its infancy, much theoretical and empirical work remains to be done. For example, it is thought that the characteristics of the attributions of flexible individuals (in terms of their stability and globality) differ across situations primarily because flexible individual are better able to incorporate contextual information from their environments in making these attributions. As mentioned previously, Fresco et al. (2006) have implied that biases in attention away from negative stimuli may underlie drops in explanatory flexibility found in euthymic individuals with a history of clinically significant depression following a negative mood induction. Research, however, has yet to directly address this question of how flexible and rigid individuals attend to their surroundings. Perhaps explanatory flexibility is associated with other information processing variables, and it is these variables that allow explanatory flexibility to exert its influence on mood states.[1] Wells and Matthews' Self-Regulatory Executive Function (S-REF; Wells, 2000; Wells & Matthews, 1994) model posits that heightened self-focus, repetitive negative thinking (rumination), maladaptive coping behavior, and threat monitoring result in emotional disturbance. Perhaps it is the case that high explanatory flexibility allows individuals to flexibly disengage from self-focused or ruminative thought, and that this, in turn, results in more positive mood outcomes.

Although this question has never been directly addressed in the literature on flexibility, prior research has examined the relationship between flexibility and rumination and their differential ability to predict mood states. Fresco and Moore (2007) subjected undergraduate students to a negative mood induction procedure. Participants were assessed for explanatory flexibility, rumination, and depression both pre- and postinduction and again 6 months later. Explanatory flexibility exhibited a generally small and statistically nonsignificant degree of correlation with ruminative brooding at all three time points. In addition, while the interaction of explanatory flexibility and negative life events (between mood induction and 6-month follow-up) significantly added to the prediction of symptoms of depression at follow-up

[1] Credit goes to an anonymous reviewer for addressing this point.

Table 2
Relationship between explanatory flexibility and explanatory style in Sample 2

Explanatory style	Explanatory flexibility			
	Low	Medium	High	Total
Low	27 (6.3%)	51 (12%)	60 (14.1%)	138 (32.4%)
Medium	56 (13.1%)	45 (10.6%)	50 (11.7%)	151 (35.4%)
High	58 (13.6%)	40 (9.4%)	39 (9.2%)	137 (32.2%)
Total	141 (33.1%)	136 (31.9%)	149 (35%)	426

over and above pre-induction symptoms of depression and mood reactivity, the brooding by negative life events interaction did not. Therefore, it would appear, based on these preliminary findings, that explanatory flexibility and ruminative brooding are conceptually related, though empirically distinct, constructs.

As explanatory flexibility has been shown to predict long-term outcome of depressed mood (Fresco & Moore, 2007; Fresco, Rytwinski, et al., 2007; Fresco, Schumm, et al., 2007), future research should address how this information can be used practically to improve treatment outcome. For instance, much of the work within the cognitive behavioral tradition has concerned itself with cognitive content-how dysfunctional or irrational is one's thinking or how pessimistic is a person's outlook. Similarly, much of the work of cognitive behavior therapies is in helping individuals change the cognitive appraisals of or reactions to negative thoughts with a goal of reducing negative affective states and engaging in adaptive behaviors, again a focus on cognitive content and changing that content (DeRubeis et al., 1990; Seligman, 1981). By contrast, explanatory flexibility represents a facet of one's cognitive life conceptualized as process rather than content. It is possible therefore, that while explanatory style has been shown to serve as a mediator of improvement in CBT (DeRubeis et al., 1990; Hollon et al., 1992), perhaps explanatory flexibility serves as a mediator for reductions in symptoms of depression in more process-oriented therapeutic approaches. Behavior therapies that focus more explicitly on the processes that give rise to thoughts and their influence on mood (e.g., Acceptance and Commitment Therapy; Hayes, Strohsal, & Wilson, 1999), and particularly therapies that focus on flexibly viewing events from a wider, more contextualized perspective (e.g., Mindfulness-Based Cognitive Therapy; Segal, Williams, & Teasdale, 2002), may represent just such approaches.

The findings of the current study should be evaluated in light of its limitations. First, the participants consisted of highly functioning university students. As a result, the generalizability of the results to older and/or more psychiatrically disabled populations remains uncertain. Future research in this area should also attempt to replicate these findings, both with the ASQ and with other closely related measures of attributional style, such as the Cognitive Style Questionnaire (Abramson & Metalsky, 1986). In addition, the discriminant validity of explanatory flexibility and explanatory style could be strengthened by illustration of differential convergent validity of the two constructs with theoretically relevant, extra-test measures.

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