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Elevated Appraisals of the Negative Impact of Naturally Occurring Life Events: A Risk Factor for Depressive and Anxiety Disorders

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Abstract

The tendency to appraise naturally occurring life events (LEs) as having high negative impact may be a predisposing factor for the development of depression and anxiety disorders. In the current study, appraisals of the negative impact of recent LEs were examined in relationship to depressive and anxiety disorders in a sample of 653 adolescents who were administered diagnostic and life stress interviews at ages 15 and 20. Participants' appraisals of the negative impact of LEs reported at age 15 were statistically adjusted using investigator-based ratings to control for objective differences across LEs. Higher appraisals of the negative impact of LEs were associated with both past and current depressive and anxiety disorders at age 15 and predicted subsequent first onsets of depressive and anxiety disorders occurring between ages 15 and 20. In addition, appraisals of the negative impact of LEs were particularly elevated among those experiencing both a depressive and anxiety disorder over the course of the study. The findings suggest that systematically elevated appraisals of the negative impact of LEs is a predisposing factor for depression and anxiety disorders and may represent a specific risk factor for co-morbid depression and anxiety in mid-adolescence and early adulthood. Keywords: depression; anxiety; stress appraisals; prospective study;

Various models of vulnerability for depressive and anxiety disorders posit that characteristic ways of responding to negative life events (LEs) play a role in the etiology and maintenance of these disorders (e.g., Abramson, Seligman, & Teasdale, 1978; Barlow, 1988; Beck, 1987; Williams, Watts, MacLeod, & Mathews, 1988). Consistent with this idea, a large number of studies have linked depressive and anxiety disorders to systematic biases in response to negative stimuli in a variety of cognitive-emotional processes, including attention, memory and interpretation (Gibb & Coles, 2005; Mathews & MacLeod, 2005). In the current study, systematic biases in the appraisal of the negative impact of naturally occurring LEs are examined as a potential vulnerability factor for depressive and anxiety disorders in an adolescent sample.

There are several reasons to suspect that appraisals of the stressfulness or negative impact of LEs are systematically elevated in individuals vulnerable to emotional disorders. First, negative LEs have been linked to the onset of depressive episodes in both adults (reviewed

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by Hammen, 2005; Mazure, 1998) and adolescents (Rudolph, 2009). Negative LEs have also been linked to the onset of anxiety disorders in adults (e.g., Faravelli, 1985; Roy-Byrne, Geraci, Uhde, 1986) and adolescents (e.g., Gothelf, Aharonovsky, Horesh, Carty, & Apter, 2004), though to a lesser extent than that established with depression. However, many individuals who experience significant negative LEs do not go on to develop a clinical syndrome of depression or anxiety; individual differences in the tendency to appraise LEs as having a negative impact may account for variability in syndromal reactions following LEs (Rudolph, 2009; Simons, Angell, Monroe, & Thase, 1993). Secondly, both depressive and anxiety disorders have been characterized by a tendency to perceive experiences in overly negative or threatening ways (Beck, 1987; Foa & Kozak, 1986). These biases in perception may to some extent reflect underlying vulnerability for emotional disorders as opposed to being the result of current syndromal states. Third, neuroticism which has been characterized as the tendency to react negatively to stressors (Eysenck, 1967) has been robustly associated with depression and anxiety disorders in both adults (Lahey, 2009; Malouff, Thorsteinson, & Schutte, 2005) and adolescents (Chorpita, 2002; Griffith et al., 2010; Tully, Zajac, & Venning, 2009). Thus, the tendency to appraise LEs as having elevated negative impact is likely to be associated with depression and a variety of anxiety disorders and may represent a predisposing factor common to both disorders.

Consistent with this idea, appraisals of the negative impact of naturally occurring LEs have been shown to be elevated in adult samples with depression and anxiety. For example, Schless, Schwartz, Goetz, and Mendels (1974) demonstrated that the subjective negative impact ratings for reported LEs in an inpatient depressed sample were uniformly elevated in comparison to established norms and, notably, did not change when reassessed following significant symptomatic improvement. Additionally, Rapee, Litwin, and Barlow (1990) reported that the subjective ratings of the negative impact of LEs occurring in the six month period preceding the onset of disorder in a group of individuals with panic disorder and in a group of individuals with anxiety disorders other than panic were significantly elevated in comparison to the subjective ratings of the negative impact of LEs occurring over a comparable timeframe in a nonanxious group. Elevated ratings of the subjective negative impact of LEs were posited to reflect dispositional vulnerability for depression and anxiety disorders, respectively.

Elevated appraisals of the negative impact of LEs may develop as a vulnerability factor for depression and anxiety during adolescence. Cognitive and emotional predispositions that may moderate depressive and anxious reactivity to negative LEs have been posited to become fixed into trait-like vulnerability factors during the transition from childhood to adolescence (Chorpita, 2001; Lakdawalla, Hankin, & Mermelstein, 2007). Even more, the stabilization of cognitive-emotional vulnerability factors during adolescence is posited to account in part for the increased risk for depression and anxiety disorders during this developmental period (Rudolph, 2009). Establishing whether systematic elevations in the appraisal of the negative impact of LEs *predisposes* adolescents for emotional disorders may help elucidate a critical vulnerability factor that contributes to the rise of depression and anxiety disorders during this developmental stage.

Elevated appraisals of the negative impact of naturally occurring LEs have been linked to depression and anxiety in adolescent samples. For example, Krackow and Rudolph (2008) demonstrated that the negative impact ratings of LEs among clinically depressed youth were significantly elevated compared to non-depressed youth. Additionally, Charbonneau, Mezulis, and Hyde (2009) demonstrated that average subjective ratings of the negativity of recent interpersonal LEs were correlated with depressive symptoms in a sample of 15 year-olds. Finally, Gothelf et al. (2004) reported in a sample of children and adolescents that average perceived impact ratings of experienced negative LEs were predicted by higher

levels of anxiety symptoms. Thus, elevated appraisals of the negative impact of LEs may increase risk for depression and anxiety disorders during adolescence.

Several limitations of prior studies linking subjective negative impact ratings with emotional disorders should be noted, however. First, prior studies, with the exception of Krackow and Rudolph (2008), lacked assessment of the objective characteristics of the reported LEs. As a result, it cannot be ruled out that elevated appraisals of the negative impact of LEs among depressed and anxious individuals reflect *actual* differences in the objective severity of LEs rather than differences in the subjective appraisal of their negative impact (Espejo et al., 2011). Secondly, studies examining negative impact appraisals in currently affected individuals cannot rule out whether elevations in appraisals reflect the effects of current symptoms on the reporting of LEs rather than dispositional risk for emotional disorders. For instance, current negative mood states may *cause* affected individuals to recall LEs with exaggeratedly negative views of its impact (Monroe & Simons, 1991). Additionally, currently affected individuals may attribute their symptoms to recent environmental circumstances and may interpret and report on their recent circumstances in support of their attribution (Brown, 1974). Finally, observed elevations in negative impact ratings among currently affected and remitted individuals may reflect consequences of clinical syndromes rather than a preexisting factor that causally contributed to the onset of disorders (“scar hypothesis”; see Just, Abramson, & Alloy, 2001).

The Current Study

The primary goal of the current study is to examine systemic elevations in appraisals of the negative impact of LEs as a vulnerability factor for depression and anxiety disorders during adolescence while addressing the limitations of prior investigations. To do so, the current study uses data from a larger study of over 800 youths and their mothers originally designed to investigate processes involved in the intergenerational transmission of depression (Hammen, Brennan & Keenan-Miller, 2008). This dataset has several features that were ideal for the current investigation. First, participants’ appraisals of the negative impact of recently experienced LEs were examined within the context of an interview-based approach. The interview-based procedure entails eliciting sufficiently detailed accounts of LEs from the respondent so that trained investigators can provide an estimate of the negative impact each event would have on a typical individual given the same specific life circumstances as the respondent while minimizing the influence of the respondent’s subjective reactions (Brown & Harris, 1978; Dohrenwend, 2006). Examining participants’ ratings of the negative impact of LEs while controlling for investigator-based ratings of stressor severity provide a way to isolate dispositional processes that influence appraisals of the negative impact of LEs from the environmental aspects that also contribute to appraisals of their negative impact (Lazarus, 1991; Monroe, 2008). This can help to establish whether the tendency to *appraise* LEs as having high or elevated negative impact poses risk for depression and anxiety disorders separate from the risk resulting from mere *exposure* to LEs.

Second, the original study employed a prospective longitudinal design which permits examination of negative impact appraisals in relationship to future first-onsets of depressive and anxiety disorders, in addition to remitted and current disorders. Prospective associations with first-onset disorders can help to establish whether elevated appraisals of the negative impact of LEs represents a *preexisting* vulnerability factor for both disorders and is not merely an artifact of current mood state or a consequence of prior disorders.

Third, participants in the original study were all assessed in mid-adolescence and again in early adulthood, a period that is well-established as one of increasing risk for first onsets of depression and a number of anxiety disorders (Kessler et al., 2005; Kessler et al., 2007).

Examining negative impact appraisals during this period is not only ideal for establishing prospective associations with first-onsets of both disorders, it may help illuminate a critical vulnerability factor for depression and anxiety disorders during this high risk stage. Moreover, gender disparities in depression (Hankin et al., 1998) and anxiety disorders (Craske, 2003) become especially apparent during mid-adolescence such that females are at significantly increased risk for both disorders. Negative LEs have been shown to elicit greater depressive and anxious reactions in females compared to males (Grant et al., 2006). It is possible then that negative impact appraisals contributes to greater risk for depression and anxiety disorders among females as compared to males. If so, this may help to explain the increased risk for depression and anxiety disorders among females which begins during adolescence.

Finally, nearly half of study participants were at elevated risk for depression and anxiety as a function of maternal history of depression. The increased rates of depression and anxiety in the current sample may not only enhance the detection of associations of negative impact appraisals with each disorder, it permits examination of negative impact appraisals in relation to pure depression and pure anxiety disorders as well as with instances in which the conditions are co-morbid. Given the high rates of co-morbidity between these conditions in adolescents (Angold, Costello, & Erkanli, 1999), it is critical to determine whether any associations between negative impact appraisals and depression and anxiety disorders may be due to the effects on only one disorder or whether it may represent a common risk factor for both disorders.

It was hypothesized that appraisals of the negative impact for naturally occurring LEs are associated with both depressive and anxiety disorders, such that elevated or higher appraisals of their negative impact is associated with both past and current depressive and anxiety disorders. It is further hypothesized that elevated negative impact appraisals predicts subsequent first onsets of both depressive and anxiety disorders. Exploratory analyses are conducted to determine whether associations between negative impact appraisals and depression and anxiety disorders are moderated by gender. Exploratory analyses are additionally conducted to determine whether associations between negative impact appraisals and depression and anxiety disorders are due to the effects of only one disorder or whether it poses risk for comorbid depression and anxiety.

Methods

Participants

The current sample was drawn from a study of children born at the Mater Misericordiae Mothers' Hospital in Brisbane, Queensland, Australia, between 1981 and 1984. The original birth cohort participants were part of the Mater-University Study of Pregnancy (MUSP), which followed 7,775 mothers and their children, 4,038 males and 3,737 females, from birth through age 5 (Keeping et al., 1989) in a study of child and mother health and development. The present study is part of an investigation of children at risk for depression due to maternal depression which commenced when the children reached age 15 with a follow-up assessment at age 20.

From the original sample, a subset of 816 mothers and adolescents, 414 males and 402 females, was selected for follow-up when the youth were 15 based on the mother's self-report of depression on the Delusion-States Symptom Inventory (DSSI; Bedford, Foulds, & Sheffield, 1976) during MUSP. The decision to assess youth and mothers at youth age 15 was determined by the timing of the opportunity that arose for C. Hammen and P. Brennan to launch a follow-up investigation with the original birth cohort. The identified subset was selected with the intention of including women with a range of depression experiences

(including no depression) while oversampling for mothers with a probable history of depressive disorders. Further details of recruitment and subsample selection are reported in Hammen and Brennan (2001). Clinically significant depression was verified by diagnostic evaluations when the child was 15 as described below. The ethnicity of the adolescents in the sample was determined by the mothers' reports: 91.4 % Caucasian (N = 746), 3.6 % Asian (N = 29), 2.0 % Maori or Aborigine (N = 16), and 0.4 % other (N = 3); 2.7% (N = 22) did not report their ethnicity. Overall, the families in this sample were lower middle to low socioeconomic status.

Of the subset of youth who were studied at age 15, 705 (363 females and 342 males) agreed to further follow-up at 20 years of age. The decision to conduct further follow-up at youth age 20 was made to coincide with the youths' transition to adulthood so as to assess factors during this period, including aspects of role transitions, pertinent for the original study goal of investigating the intergenerational transmission of depression. Among the 110 who did not participate, the primary reasons were that they could not be located, refused, or were unavailable due to living abroad or health reasons. In addition, data from one additional participant was withdrawn at the request of the participant. Comparisons between the 110 who did not participate and the 705 who did participate indicated no significant differences in maternal history of depression by youth age 15, $\chi^2(1, n = 815) = 3.60, p > .05$, or youth history of depression by age 15, $\chi^2(1, n = 815) = 1.33, p > .05$. Those who participated at age 20 were more likely to be female, $\chi^2(1, n = 815) = 8.71, p < .01$. An additional 52 participants were excluded due to missing data as described below, resulting in a final sample size of 653 participants (343 females and 310 males).

Procedure

In the initial phase of the MUSP, women completed a self-report questionnaire on health problems, psychosocial factors, daily activities, and their attitudes toward their pregnancy at their first prenatal clinic visit, approximately 3 to 5 days after their child's birth, when the child reached the age of six months, and when the child reached the age of 5. Further details about the procedures used during the initial study are reported by Keeping et al. (1989).

When the child reached the age of 15, families selected for inclusion in the current study were contacted and asked to participate in a follow-up to the original MUSP. After obtaining consent/assent from the participants, trained clinicians, blind to maternal status on the DSSI, administered diagnostic and other semi-structured interviews separately and privately to both the adolescents and their parents in their homes and completed questionnaires. Similarly, at age 20 youth and mothers were interviewed privately at their homes or selected locations. For both follow-ups, youth and mothers provided informed consent, and the procedures were reviewed and approved by the ethics and institutional review boards of the University of Queensland, University of California, Los Angeles, and Emory University.

Mother diagnostic evaluations—Mothers' current and lifetime diagnostic history was assessed at the youth age 15 follow-up with the Structured Clinical Interview for DSM-IV (SCID-IV; First, Spitzer, Gibbon, & Williams, 1995). Interrater reliabilities for lifetime diagnoses were determined using 52 of the SCID interview tapes randomly selected for rating by a second clinician blind to the original diagnoses. Overall, the weighted kappa for any past maternal depressive disorders was .84. Forty-four per cent of the women had diagnosed major depressive disorders (MDD) or dysthymic disorder (DYS) during their youth's life to age 15.

Youth diagnostic evaluations—At the age 15 assessment, youth past and current diagnoses were based on the Schedule for Affective Disorders and Schizophrenia for

School-Age Children —Revised for DSM IV (K-SADS-E; Orvaschel, 1995). The K-SADS-E was administered separately to the mother and child, with best-estimate diagnostic decisions for past and current disorders made by the clinical rating team using all available information. Seventy-five of the K-SADS-E interview tapes were randomly selected for reliability ratings by a second clinician blind to the original diagnoses. The weighted kappa for depressive disorders was .82 for current disorders and .73 for past disorders. The weighted kappa for anxiety disorders was .76 for current disorders and .79 for past disorders. At age 15, youth meeting diagnostic criteria for current depressive and anxiety disorders were as follows: MDD ($N = 16$; 2.5%), DYS ($N = 13$; 2.0%), generalized anxiety disorder (GAD; $N = 10$; 1.5%), social phobia (SP; $N = 18$; 2.8%), obsessive-compulsive disorder (OCD; $N = 1$; 0.2%), posttraumatic stress disorder (PTSD; $N = 4$; 0.6%). Past depressive and anxiety disorders diagnoses were: MDD ($N = 58$; 8.9%), DYS ($N = 44$; 6.7%), GAD ($N = 12$; 1.8%), SP ($N = 23$; 3.5%), OCD ($N = 4$; 0.6%), PTSD ($N = 8$; 1.2%), separation anxiety disorder (SAD; $N = 25$; 3.8%), panic disorder (PD; $N = 1$; 0.2%), and acute stress disorder (ASD; $N = 2$; 0.3%).

At the age 20 interview, diagnoses for the five year period since the age 15 interview were based on the SCID-IV (First et al., 1995) conducted with the youth. A random sample of SCID-IV interview tapes were randomly selected for reliability ratings by a second clinician blind to the original diagnoses, yielding adequate kappas for current diagnoses (.83) and for diagnoses over the past 5 years (.89). Between ages 15 and 20, youth meeting diagnostic for depressive and anxiety disorders were: MDD ($N = 176$; 27.0%), DYS ($N = 23$; 3.5%), GAD ($N = 45$; 6.9%), SP ($N = 122$; 18.7%), OCD ($N = 18$; 2.8%), PTSD ($N = 38$; 5.8%), SAD ($N = 1$; 0.2%), PD ($N = 14$; 2.1%), AP without a history of PD ($N = 10$; 1.5%), and anxiety disorder not otherwise specified ($N = 7$; 1.1%).

So that appraisals of the negative impact of LEs could be examined in relationship to past, current, and future first-onset depression, the youth were categorized into four groups on the basis of their experience of depression: 1) *no depression* - no MDD or DYS through age 20, 2) *past depression* - experienced depression prior to age 15 but did not meet criteria for depression at the time of the age 15 assessment, 3) *current depression* - met criteria for depression at the time of the age 15 assessment, and 4) *future first-onset depression* - experienced a first onset of depression between the age 15 and 20 assessment. On the basis of these criteria, 426 (65.2%) were classified as *no depression*, 69 (10.6%) *past depression*, 27 (4.1%) *current depression*, and 131 (20.1%) *future first-onset depression*.

Similarly, youth were categorized into four groups on the basis of their experience of anxiety disorders: 1) *no anxiety* - no anxiety disorder through age 20, 2) *past anxiety* - experienced an anxiety disorder prior to age 15 but did not meet criteria for anxiety disorder at the age 15 assessment, 3) *current anxiety* - met criteria for anxiety disorder at the time of the age 15 assessment, and 4) *future first-onset anxiety* - experienced a first onset of an anxiety disorder between the age 15 and 20 assessment. On the basis of these criteria, 439 (67.2%) youth were classified as *no anxiety*, 32 (4.9%) *past anxiety*, 31 (4.7%) *current anxiety*, and 151 (23.1%) *future first-onset anxiety*.

Finally, youth were categorized into four groups on the basis of their experience of depression and anxiety disorders over the entire duration of the study: 1) *neither disorder* - experienced neither a depressive nor an anxiety disorder through age 20, 2) *depression only* - experienced a depressive disorder but not an anxiety disorder through age 20, 3) *anxiety only* - experienced an anxiety disorder but not a depressive disorder through age 20, and 4) *both disorders* - experienced a depressive and an anxiety disorder by age 20. On the basis of these criteria, 321 (49.2%) youth were classified as experiencing *neither disorder*, 118 (18.1%) *depression only*, 105 (16.1%) *anxiety only*, and 109 (16.7%) *both disorders*.

Current depressive symptoms—At youth age 15, the 21-item self-report Beck Depression Inventory (BDI; Beck & Steer, 1987) was administered as a measure of the current presence and severity of depressive symptoms. This measure has been widely used in the study of depression, with internal consistency estimates ranging from .73 to .95 for the BDI (Beck, Steer, & Garbin, 1988). Coefficient alpha at youth age 15 is .86. Of the 705 youth who participated in the age 15 and 20 assessments, nine (5 females and 4 males) were missing BDI scores thus were excluded.

Life event assessment—The UCLA Stress Interview (LSI), a semi-structured assessment of chronic strain and stressful life events, was adapted for adolescents from previous versions (e.g., Hammen, Ellicott, Gitlin, & Jamison, 1989) and was administered to the youth at age 15. The LSI assessment of episodic life stress is modeled after the contextual threat assessment methods of Brown and colleagues (e.g., Brown & Harris, 1978). A goal of this assessment method is to obtain sufficient information about the event and surrounding circumstances so that the investigator can characterize the impact of the event on the person's life as objectively as possible. Trained interviewers inquire about several life domains (e.g., close friendships, larger friend groups, romantic relationships, parent-child relationships, school, finances, and health), identifying and carefully dating events that have occurred over the period of investigation (for the present study, the previous twelve months). Each reported event is probed to obtain detailed information about what happened, how long it continued, what resources were available to the person, what the consequences were, whether it was expected, whether the person had ever experienced similar events, and any other relevant background. To obtain a participant (i.e., subjective) rating of the negative impact of each event, immediately following their report of each event participants were asked, "How would you rate the overall negative impact of this event?" and provided a rating from 1 (*no negative impact*) to 5 (*extremely severe negative impact*). The test-retest reliability of participant ratings of negative impact have previously been demonstrated to be adequate (intraclass correlation coefficient = 0.84; Espejo et al., 2011).

To obtain an investigator (i.e., objective) rating of the negative impact of each event, narrative accounts of each event were prepared by the interviewer and presented to an independent rating team, omitting any information about the participant's subjective rating of the event and any emotional consequences experienced by the participant following the event. The team first determined whether the event meets objective criteria to be considered an event -minor stressors that occur frequently or daily hassles are excluded from consideration. The team then considers the details of the event and any surrounding circumstances that may modify the meaning of the event within the context of the participant's life. The team attempts to estimate the impact the event would have for a typical person under the same conditions and assigns a rating from 1 (*no negative impact*) to 5 (*extremely severe negative impact*) with consideration for how an event compares to other rated events in terms of its importance and the severity of its consequences. For instance, a "fight with a friend" that results in the friendship ending with the participant's only friend is assigned a higher rating of negative impact than would a "fight with a friend" over a trivial matter with fewer consequences. Reliability of team negative impact ratings was obtained by comparing two separate rating team scores. The intraclass correlation of team ratings for 74 events from a randomly chosen set of participants was .92.

The mean number of events reported by youth was computed to serve as an indicator of recent exposure to LEs. The mean number of reported LEs was 3.21 ($SD = 2.04$). Of the 705 youth who participated in both the age 15 and age 20 assessments, 43 (6.1%) did not report a LE occurring in the 12 months leading up to the age 15 assessment. These 43 youths (28 males, 15 females) were excluded from further analyses because negative impact appraisal scores could not be computed for them. Compared to the 662 youths (314 males, 348

females) who reported LEs, youth not reporting a LE were more likely to be male, $\chi^2(1, n = 705) = 5.06, p = .02$, and were less likely to experience depression, $\chi^2(1, n = 705) = 6.08, p = .01$, or an anxiety disorder, $\chi^2(1, n = 705) = 6.53, p = .01$, through age 20.

To develop a measure of negative impact appraisals that accounts for differences in the objective negative impact of the LEs, average participant ratings and average team ratings were first computed separately for each youth for all LEs occurring within the 12 month period leading up to the assessment. The mean average participant negative impact rating was 2.42 ($SD = 0.80$) and a mean average team negative impact rating was 1.88 ($SD = 0.40$). Standardized residual scores were then computed for each participant by regressing average subjective ratings of negative impact onto average objective ratings of negative impact. Using this approach, more positive scores reflect higher ratings of negative impact whereas more negative scores reflect lower ratings. This method of calculating standardized residuals has been used in prior studies comparing subjective and objective ratings (e.g., De Los Reyes & Prinstein, 2004; Krackow & Rudolph, 2008). Average team negative impact ratings were moderately correlated with average participant negative impact ratings ($r(653) = .46, p < .001$). The standardized residual scores were normally distributed.

Results

Group comparisons and correlations were computed to identify potential covariates to be controlled in the primary analyses examining the hypothesized associations between negative impact appraisals and depression and anxiety disorders. Negative impact appraisals were first examined in relationship to participant gender and maternal depression status with two-tailed independent samples *t*-tests. A significant gender difference was identified such that females reported higher negative impact appraisals ($M = 0.14, SD = 0.94$; versus $M = -0.13, SD = 1.02$; $t(651) = 3.54, p < .001$) when compared to males. Youth of depressed and non-depressed mothers did not differ, however, in negative impact appraisals ($M = 0.05, SD = 0.99$; versus $M = -0.01, SD = 0.98$; $t(651) = 0.86, p = .39$). Additionally, youth gender and maternal depression associations with both youth depression and anxiety to age 20 were examined using chi-square tests. There were significant gender differences in youth depression and anxiety such that females were more likely to experience both depressive (43.7% versus 24.8%) and anxiety disorders (38.2% versus 26.8%) in comparison to males (both χ^2 's (1, $N = 653$) > 9.50 , both p 's $< .002$). There were also significant differences by maternal depression status for both youth depression and anxiety such that youth of depressed mothers were more likely to experience both depressive (40.7% versus 29.9%) and anxiety disorders (39.7% versus 27.1%) than were youth of non-depressed mothers (both χ^2 's (1, $N = 653$) > 8.00 , both p 's $< .004$). Finally, to examine potential associations between concurrent BDI scores and event counts with negative impact appraisals, two-tailed Pearson correlations were computed. Negative impact appraisals were significantly correlated with both BDI scores ($r(653) = .23$) and event counts ($r(653) = .13$, both p 's $< .002$). Thus, youth gender, maternal depression, BDI scores, and event counts were included as covariates in all analyses examining the hypothesized associations between negative impact appraisals and depression and anxiety.

Negative Impact Appraisals Predicting Depression

Hierarchical logistic regression analyses were conducted to examine the hypothesis that elevated negative impact appraisals are associated with increased risk for depression. Dichotomous variables were created to predict four different depression outcomes contrasting the *no depression* group with: 1) *any depression* (i.e., experienced depression at any time during the period of investigation [past, current, or future first-onset]), 2) *past depression*, 3) *current depression*, and 4) *future first-onset depression*. Thus, four separate logistic regression analyses were conducted. In each regression, gender, maternal

depression, BDI scores, and event counts were entered as covariates simultaneously on the first step. Negative impact appraisals were entered on a subsequent step and results were evaluated against a one-tailed p -value of .05. Results of final regression equations are presented in Table 1. After controlling for covariates, negative impact appraisals was a significant predictor of *any depression*, $\chi^2(1, N = 653) = 5.81, p < .01$, *past depression*, $\chi^2(1, n = 495) = 3.32, p = .03$, *current depression*, $\chi^2(1, n = 453) = 3.88, p = .02$, and *future first-onset depression*, $\chi^2(1, n = 557) = 3.56, p = .03$. The odds ratio (OR) indicates that for a one unit increase in negative impact appraisals, the risk for depression is multiplied by the value of the OR. Thus, higher or more elevated negative impact appraisals predict higher risk for depression.

Negative Impact Appraisals Predicting Anxiety Disorders

To examine the hypothesis that elevated negative impact appraisals are associated with risk for anxiety disorders, four separate hierarchical logistic regression analyses were again conducted this time predicting dichotomous outcome variables contrasting the *no anxiety* group with *any anxiety* (i.e., past, current, or future), *past anxiety*, *current anxiety*, and *future first-onset anxiety*. Again, youth gender, maternal depression, BDI scores, and event counts were entered as covariates simultaneously on the first step prior to entering negative impact appraisals and results were evaluated against a one-tailed p -value of .05. Results of final regression equations are also presented in Table 1. After controlling for covariates, negative impact appraisals was a significant predictor of *any anxiety*, $\chi^2(1, N = 653) = 12.13, p < .001$, *past anxiety*, $\chi^2(1, n = 471) = 4.77, p = .01$, *current anxiety*, $\chi^2(1, n = 470) = 3.13, p = .04$, and *future first-onset anxiety*, $\chi^2(1, n = 590) = 8.48, p < .002$. The resulting ORs indicate that more elevated negative impact appraisals predict higher risk for anxiety disorders.

Test of a Moderating Effect of Gender

To determine whether the associations between negative impact appraisals and depression and anxiety may be moderated by gender, hierarchical logistic regression analyses examining the relationship between negative impact appraisals and depression and anxiety were repeated while adding a gender by negative impact appraisals interaction term on a subsequent step. After controlling for covariates, including gender, and the main effect of negative impact appraisals, the gender by negative impact appraisals interaction term was not a significant incremental predictor of *any depression*, $\chi^2(1, N = 653) = 1.39, p = .34$, nor *past*, *current*, or *future first-onset depression* (all χ^2 's < 0.79 , all p 's $> .37$). Similarly, the gender by negative impact appraisals interaction term was not a significant incremental predictor of *any anxiety*, $\chi^2(1, N = 653) = 0.01, p = .93$, nor *past*, *current*, or *future first-onset anxiety* (all χ^2 's < 0.17 , all p 's $> .67$).

Negative Impact Appraisals Predicting Depression Controlling for Anxiety Disorders

Additional analyses were conducted to assess whether the observed associations between negative impact appraisals and depression might be accounted for by the association between negative impact appraisals and anxiety disorders. Thus, using hierarchical logistic regression, negative impact appraisals were examined as a predictor of *any depression* after controlling for *any anxiety* along with the other covariates of gender, maternal depression, BDI scores, and event counts. Results indicate that negative impact appraisals remained a significant predictor of *any depression* (OR = 1.20; 90% CI = 1.03 – 1.40; $\chi^2(1, N = 653) = 3.68, p = .03$). Negative impact appraisals were also examined as a predictor of *future first-onset depression* while controlling for preexisting anxiety (i.e., past or current anxiety at age 15) and the other covariates. Negative impact appraisals remained a significant predictor of *future first-onset depression* (OR = 1.21; 90% CI = 1.01 – 1.45; $\chi^2(1, n = 557) = 3.08, p = .04$).

Negative Impact Appraisals Predicting Anxiety Disorders Controlling for Depression

Analyses were similarly conducted to examine whether the observed associations between negative impact appraisals and anxiety could be accounted for by the association between negative impact appraisals and depression. After controlling for *any depression* and the other covariates, negative impact appraisals remained a significant predictor of *any anxiety* (OR = 1.35; 90% CI = 1.15 – 1.57; χ^2 (1, N = 653) = 9.93, p < .001). Additionally, negative impact appraisals remained a significant predictor of *future first-onset anxiety* after controlling for preexisting depression (i.e., past or current depression at age 15) and other covariates (OR = 1.35; 90% CI = 1.13 – 1.60; χ^2 (1, n = 590) = 7.96, p < .005).

Negative Impact Appraisals Predicting Co-morbid Depression and Anxiety Disorders

Finally, analyses were conducted to determine whether the observed association of negative impact appraisals with both depression and anxiety disorders may be attributable to a subgroup of youth who experienced both depression and an anxiety disorder over the duration of the study. Dichotomous variables were created to contrast youth on the basis of their experience of depression and anxiety over the period of investigation (i.e., *neither disorder*, *depression only*, *anxiety only*, or *both disorders*) and a series of logistic regression analyses were again conducted while controlling for youth gender, maternal depression, BDI scores, and event counts. First, the *depression only*, *anxiety only*, and the *both disorders* groups were predicted from the *neither disorder* group in three separate analyses. Results were evaluated against a one-tailed p -value of .05. After controlling for covariates, negative impact appraisals was not a statistically significant predictor of *depression only* (OR = 1.12; 90% CI = 0.91 – 1.37; χ^2 (1, N = 439) = 0.80, p = .19). Negative impact appraisals was, however, a statistically significant predictor of *anxiety only* (OR = 1.24; 90% CI = 1.03 – 1.50; χ^2 (1, n = 426) = 3.54, p = .03) as well as *both disorders* (OR = 1.70; 90% CI = 1.35 – 2.15; χ^2 (1, n = 430) = 14.12, p < .0001). Subsequently, the *both disorders* group was predicted from the *depression only* and the *anxiety only* groups in separate analyses. Since there were no *a priori* hypotheses regarding a relationship between negative impact appraisals and co-morbid depression and anxiety, results were evaluated against a two-tailed p -value of .05. After controlling for covariates, negative impact appraisals significantly predicted the *both disorders* group from the *depression only* group (OR = 1.49; 95% CI = 1.09 – 2.05; χ^2 (1, N = 227) = 6.07, p = .01) and from the *anxiety only* group (OR = 1.41; 95% CI = 1.03 – 1.92; χ^2 (1, n = 214) = 4.63, p = .03).

Discussion

In the current study, appraisals of the negative impact of recent LEs were examined as a risk factor for depression and anxiety disorders in an adolescent sample. Negative impact appraisals were significantly associated with depression and anxiety such that higher or more elevated appraisals of the negative impact of LEs were linked with remitted and current clinical syndromes of both disorders. Importantly, elevated negative impact appraisals were also predictive of subsequent first onsets of both depressive and anxiety disorders. These associations were demonstrated despite controlling for a number of covariates, including exposure to LEs, current depressive symptoms, and the presence of the other disorder, suggesting that the tendency to appraise LEs as having elevated negative impact represents a vulnerability factor for both depressive and anxiety disorders. Additional analyses revealed, however, that negative impact appraisals were particularly associated with co-morbid depression and anxiety. Indeed, negative impact appraisals significantly predicted co-morbid depression and anxiety over pure depression and pure anxiety in the current study. Thus, a tendency toward making elevated appraisals of the negative impact of LEs may not only increase risk for depression and anxiety disorders, it may represent a specific risk factor for the combination of depression and anxiety.

Though other investigators have suggested that elevated appraisals of the negative impact of LEs among currently affected individuals reflect dispositional vulnerability for depression and anxiety disorders, prior studies could not rule out plausible alternative explanations. While negative impact appraisals were significantly correlated with current depressive symptoms, associations between negative impact appraisals and the experience of depression and anxiety disorders (past, current, and future first onsets) were demonstrated despite controlling for current depressive symptoms. Thus, any effects that current depressive mood may have had on the *reporting* of LEs cannot account for the observed associations between negative impact appraisals and the experience of depression and anxiety disorders. Furthermore, prospective associations of negative impact appraisals with depression and anxiety disorders included additional controls for prior disorders, thus ruling out “scarring” effects of previous emotional disorders as an alternative explanation. Altogether, the current findings permit more definitive conclusions regarding systematically elevated appraisals of the negative impact of LEs as a vulnerability factor that contributes to the onset of both emotional disorders.

The current study was conducted in sample that was followed from mid-adolescence into early adulthood, a period that has been associated with increased risk for first onsets of depression and a number of anxiety disorders. Establishing the link between elevated negative impact appraisals and risk for depression and anxiety disorders in this sample suggests that the tendency to appraise LEs as having elevated negative impact may be an important dispositional risk factor for depression and anxiety during this developmental period. Though cognitive-emotional appraisal processes are likely to vary substantially with development (Grant et al., 2003; Muldoon, 2003), such processes may stabilize in the transition from childhood to adolescence developing into trait-like vulnerability factors for emotional disorders during this stage. Studies have shown that ratings of the severity of negative LEs vary as a function of age. For instance, Gothel et al. (2004) in a sample consisting of children and adolescents demonstrated that older age predicted higher ratings of the negative impact of LE even while controlling for anxiety and depression. Additional studies are needed to determine whether negative impact appraisals stabilize during adolescence and whether developmental shifts in appraisal tendencies can help account for the increased risk for emotional disorders during adolescence.

Consistent with other studies, females reported elevated appraisals of recent LEs in comparison to males (Espejo et al., 2011; Muldoon, 2003; Newcomb, Huba, & Bentler, 1986). However, there was no evidence in the current study that the association between negative impact appraisals and depression and anxiety disorders were moderated by gender. It may be necessary to distinguish among specific domains of LEs in order elucidate gender differences in the association between negative impact appraisals and depression and anxiety. For instance, females may be more sensitive than males to negative interpersonal LEs especially during adolescence which may help to account for the gender disparity in depression and anxiety which begins to emerge during this period (Rudolph, 2002). Recently, Charbonneau et al. (2009) demonstrated that appraisals of the negativity of interpersonal LEs moderated the relationship between exposure to negative interpersonal LEs and depressive symptoms; this interaction in turn helped to account in part for gender differences in depressive symptoms. Examining negative impact appraisals without differentiating between different domains of LEs in the current study may have masked meaningful gender moderating effects in the association between negative impact appraisals and depression and anxiety disorders.

Nonetheless, the current study adds to the extensive literature on the relationship between negative LEs and depression and anxiety disorders. Negative LEs as measured by both subjective and objective measures has been repeatedly linked with depression and, to a

lesser extent, anxiety disorders. By examining subjective ratings of the negative impact of LEs while controlling for objective ratings of stressor severity and exposure to negative LEs, the current study isolated individual differences in the tendency to appraise LEs as having negative impact which both influences subjective ratings of stressor severity and represents an independent vulnerability for depression and anxiety disorders. This finding has broad implications for life stress research in providing definitive evidence that life stress assessment methods that rely on subjective or respondent-based ratings of stressor severity confound measures of life stress with vulnerability for depression and anxiety (Simons et al., 1993). Additionally, individual differences in the tendency to appraise LEs as having high negative impact may represent a dispositional vulnerability that can help account for variability in depressive and anxious reactions following negative LEs. Indeed, a critical follow-up to the current study would be to determine if systematic biases in appraisal, as measured by the current approach, moderates risk for depressive and anxiety disorder onset following exposure to negative LEs, such that tendencies toward elevated appraisals of negative impact increase risk for depression and anxiety following exposure to both major and minor objectively-defined LEs ("diathesis-stress").

The current findings are consistent with prominent theories of cognitive vulnerability for depression which posit cognitive sets that lead to systematically biased interpretations of negative LEs (Beck, 1987). While this was confirmed in the current study, it was also demonstrated that cognitive biases in the evaluations of the negative impact of LEs are not specific to risk for depression but also pose risk for anxiety. Future studies should determine whether negative impact appraisals for specific types of LEs are differentially associated with depression versus anxiety. For instance, interpersonal loss events (e.g., separations or endings) may be more strongly linked to depression whereas danger/threat events (e.g., accidents or assaults) may be more strongly link to anxiety disorders (e.g., Sandin, Chorot, Santed & Valiente, 2004). Individuals at risk for depression may exhibit elevated appraisals of the negative impact of interpersonal loss events whereas individuals at risk for anxiety disorders may exhibit elevated appraisals of the negative impact of danger/threat events. Alternatively, at-risk individuals may have a non-specific tendency toward elevated appraisals and experience depression or anxiety depending on whether loss or danger/threat events are experienced.

The findings are also consistent with cognitive theories of anxiety which posit that interpretive biases, including viewing potential negative LEs as having exaggerated negative costs (Foa & Kozak, 1986) play a causal and maintaining role in anxiety disorders. Though cognitive theories of anxiety posit that exaggerated judgments of negative costs are content specific for each anxiety disorder (e.g., individuals with social phobia exaggerate the cost of negative social situations but not physically threatening events), the current study found associations with negative impact appraisals without differentiating among different anxiety disorders or among different domains of LEs. While it is possible that the current findings reflect a non-specific tendency toward elevated appraisals as a general risk factor for anxiety disorders, future studies should examine disorder-specific biases in the appraisal of actual LEs.

Consistencies between the current findings and two other lines of research in the risk for depression and anxiety should also be noted. First, the current findings comport with extensive research linking neuroticism with depression and anxiety disorders in both adults and adolescents. Neuroticism, when characterized as the tendency to react negatively to stressors, is conceptually similar to the concept of systematically elevated appraisals of the negative impact of LEs. However, neuroticism has also been characterized by various other definitions, including a proneness to experience distress, even in the absence of overt stressors (Watson, Pennebaker, & Folger, 1987), as well as the tendency to experience

negative affective states including depression and anxiety (Costa & McCrae, 1980). Future studies may seek to examine negative impact appraisals and neuroticism simultaneously in the prediction of depression and anxiety disorders to determine if negative impact appraisals predict risk for both disorders beyond the effects of neuroticism. Second, systematic biases in other cognitive-emotional domains, such as attention, interpretation, and memory, have also been linked with depression and anxiety disorders (Mathews & MacLeod, 2005). The current study not only adds to existing findings of biases in cognitive-emotional processes, it demonstrates an ecologically valid approach to studying cognitive-emotional biases in depression and anxiety disorders. Future research should determine whether systematic biases in stress appraisals, as measured by this approach, are linked to other well-established cognitive-emotional biases.

The current study clarifies a cognitive-emotional bias that increases risk for depression and anxiety disorders suggesting that therapeutic interventions that can modify this bias may be successful in bringing about reductions in depressive and anxiety symptoms. Estimates of the cost of hypothetical negative LEs have been demonstrated to diminish following cognitive-behavioral therapy (CBT) for agoraphobia (McNally & Foa, 1987) and social phobia (Foa, Franklin, Perry, & Herbert, 1996). Additionally, Foa et al. demonstrated that reductions in cost estimates for social events mediated improvements in social phobia following CBT. Future studies may seek to determine whether appraisals of the negative impact of actual LEs, as measured by the current approach, also diminish following a course of CBT.

A number of strengths and limitations of the current study should be noted. The longitudinal design permitted a prospective examination of negative impact appraisals on future first onsets which, combined with the examination of remitted and current syndromes, enhanced the ability to make inferences regarding systematically elevated negative impact appraisals as a vulnerability factor for both depression and anxiety disorders. Additionally, the assessment of actual LEs using an interview-based method provided an ecologically-valid approach for examining biased negative impact appraisals in the risk for emotional disorders while isolating dispositional influences on appraisals from the objective characteristics of LEs by controlling for investigator-based ratings. Examinations of negative impact appraisals for actual LEs are restricted, however, by the number of LEs endorsed by respondents. As a result, participants' appraisal scores may be based on a limited number of events ($M = 3.21$, $SD = 2.04$ in the current study) which may restrict the degree to which appraisal scores reliably and validly reflect *systematic tendencies* in the appraisal of the negative impact of LEs. This potential limitation was balanced in the current study by the large sample size which facilitated the detection of the hypothesized associations despite numerous statistical controls. Additionally, participants who did not endorse any LEs could not be included in the current analyses. These participants were shown to vary systematically from the included sample in terms of gender and risk for both depression and anxiety disorders which may limit the generality of the current findings.

The generality of the current study was further limited by characteristics of the current sample which was predominantly Caucasian, largely lower middle to low socioeconomic status, and all age 15 at the time of the assessment of negative impact appraisals. Some studies have demonstrated that ethnicity moderates the risk of psychopathology following negative LEs in adolescence (see Grant et al., 2006). Additionally, ethnic, cultural, and socioeconomic factors have been found to influence appraisals of the negative impact of LEs (Muldoon, 2003; Newcomb et al., 1986), though a high degree of resemblance in the appraisals of the negative impact of LEs among youth across different countries have also been found (Yamamoto, Soliman, Parsons, Davies, 1987; Yamamoto et al., 1996). While the influence of ethnic and cultural factors on negative impact appraisals and risk for emotional

disorder are clearly important areas of study, the homogeneity of the current sample prohibited examinations of such factors in the current study. Future research should seek not only to replicate the current findings in a more ethnically and culturally diverse sample, but should also examine whether ethnic and culturally factors moderate the association between negative impact appraisals and depression and anxiety.

In summary, the current study demonstrated that elevated appraisals of the negative impact of LEs are associated with past, current, and future first onsets of clinical syndromes of depressive and anxiety disorders in a mid-adolescent sample. The current findings helped to rule out current mood state effects and consequences of prior clinical syndromes as alternative explanations for elevated appraisals of the negative impact of LEs in at-risk adolescents. Additionally, participants' appraisals of the negative impact of LEs were statistically adjusted using investigator-based ratings to rule out that elevated appraisals of the negative impact of LEs among depressed and anxious individuals reflect *actual* differences in the objective severity of experienced LEs. Thus, systematically elevated appraisals of the negative impact of LEs may be viewed as a vulnerability factor for depression and anxiety disorders and may be a specific risk factor for experiencing both disorders. Further examinations of negative impact appraisals for may help to clarify the nature of risk for emotional disorders across various developmental stages.

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Logistic Regression Analyses Predicting Depressive and Anxiety Disorders from Negative Impact Appraisals

Table 1

Variable	β	SE	OR(90% CI)
<i>Any Depression</i>			
Gender	.65	.18	1.91 (1.41 – 2.57)
Maternal Depression	.41	.18	1.50 (1.12 – 2.01)
BDI Scores	.08	.01	1.08 (1.06 – 1.11)
Event Counts	.14	.05	1.15 (1.07 – 1.24)
Appraisals	.23	.09	1.26 (1.07 – 1.47)
<i>Past Depression</i>			
Gender	.91	.29	2.50 (1.54 – 4.05)
Maternal Depression	.47	.27	1.60 (1.02 – 2.51)
BDI Scores	.05	.02	1.06 (1.02 – 1.09)
Event Counts	.19	.07	1.21 (1.08 – 1.35)
Appraisals	.27	.15	1.30 (1.03 – 1.66)
<i>Current Depression</i>			
Gender	.93	.61	2.54 (0.93 – 6.96)
Maternal Depression	1.30	.56	3.67 (1.45 – 9.26)
BDI Scores	.19	.03	1.21 (1.15 – 1.27)
Event Counts	.32	.12	1.38 (1.13 – 1.68)
Appraisals	.54	.28	1.72 (1.09 – 2.71)
<i>Future First-Onset Depression</i>			
Gender	.53	.21	1.70 (1.20 – 2.40)
Maternal Depression	.27	.21	1.30 (0.93 – 1.84)
BDI Scores	.07	.02	1.07 (1.04 – 1.10)
Event Counts	.09	.06	1.10 (1.00 – 1.20)
Appraisals	.20	.11	1.23 (1.03 – 1.47)
<i>Any Anxiety</i>			
Gender	.39	.18	1.47 (1.09 – 1.99)

Variable	β	SE	OR(90% CI)
Maternal Depression	.55	.18	1.73 (1.29 – 2.31)
BDI Scores	.07	.01	1.07 (1.04 – 1.09)
Event Counts	-.03	.05	0.97 (0.90 – 1.05)
Appraisals	.32	.09	1.38 (1.19 – 1.61)
<i>Past Anxiety</i>			
Gender	.57	.39	1.77 (0.93 – 3.39)
Maternal Depression	.60	.38	1.82 (0.98 – 3.40)
BDI Scores	.02	.03	1.02 (0.97 – 1.08)
Event Counts	.05	.09	1.05 (0.90 – 1.22)
Appraisals	.43	.20	1.54 (1.11 – 2.14)
<i>Current Anxiety</i>			
Gender	.26	.41	1.29 (0.66 – 2.53)
Maternal Depression	.84	.41	2.32 (1.19 – 4.55)
BDI Scores	.09	.02	1.01 (1.06 – 1.14)
Event Counts	-.05	.10	0.95 (0.81 – 1.13)
Appraisals	.40	.20	1.43 (1.03 – 2.00)
<i>Future First-Onset Anxiety</i>			
Gender	.38	.20	1.46 (1.04 – 2.04)
Maternal Depression	.49	.20	1.63 (1.18 – 2.25)
BDI Scores	.07	.02	1.07 (1.04 – 1.10)
Event Counts	-.03	.05	0.97 (0.89 – 1.05)
Appraisals	.31	.11	1.36 (1.14 – 1.61)

OR = Odds Ratio; CI = confidence interval