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Rumination as a Vulnerability Factor to Depression During the Transition From Early to Middle Adolescence: A Multiwave Longitudinal Study

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The current study examined vulnerability to depression during the transition from early to middle adolescence from the perspective of the response styles theory. During an initial assessment, 382 adolescents (ages 11–15 years) completed self-report measures assessing rumination and depressive symptoms as well as a semistructured clinical interview assessing current and past major depressive episodes. Every 3 months for the subsequent 2 years, adolescents completed self-report measures assessing depressive symptoms and negative events. Every 6 months, adolescents completed a semi-structured clinical interview assessing the onset of new major depressive episodes. Higher levels of rumination were associated with a greater likelihood of exhibiting a past history of major depressive episodes, a greater likelihood of experiencing the onset of a future major depressive episode, and greater duration of future depressive episodes. Consistent with a vulnerability-stress perspective, rumination moderated the association between the occurrence of negative events and the development of future depressive symptoms and major depressive episodes.

Keywords: rumination, depression, early adolescence, middle adolescence

Research examining the epidemiology of depression suggests that adolescence is a critical period for understanding the development of this disorder for two reasons. First, although during childhood, sex differences in depression are not reliably found, during the transition from early to middle adolescence (i.e., ages 12–15 years), sex differences emerge, with girls reporting higher levels of both depressive symptoms (Angold, Erkanli, Silberg, Eaves, & Costello, 2002; Twenge & Nolen-Hoeksema, 2002) and disorders (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Hankin et al., 1998) than boys. Second, the majority of individuals who develop depression experience their first clinically significant episode during the transition from middle to late adolescence (i.e., ages 15–18 years). Within this brief window of time, there is a dramatic sixfold increase in the prevalence of depression (Hankin et al., 1998; Kessler, Avenevoli, & Merikangas, 2001). Prevalence rates remain at similarly high levels throughout adulthood, with adult depression typically being preceded by adolescent depression (Kim-Cohen, Caspi, & Moffitt, 2003). Such startling facts strongly argue for the need to identify vulnerability factors to depression in adolescence so that intervention efforts can be initiated prior to the surge in depression rates and before sensitization factors lead to recurrences (Monroe & Harkness, 2005).

Rumination as a Vulnerability Factor for Depressive Symptoms and Episodes

Our goal in the current study was to examine the development of depression during the transition from early to middle adolescence from the perspective of the response styles theory (Nolen-Hoeksema, 1991). The response styles theory posits that the way in which individuals respond to their symptoms of depression determines both the severity and the duration of such symptoms. Two such responses are proposed: rumination and distraction. Nolen-Hoeksema argued that individuals who engage in ruminative responses to depressive symptoms are likely to experience increased severity and duration of such symptoms, whereas those who engage in distracting responses are likely to experience relief. The response styles theory was originally proposed to explain the finding that prevalence rates of depression are higher among women than men. Nolen-Hoeksema proposed that this difference could be accounted for, at least in part, by the differential response styles of the sexes. More specifically, she hypothesizes that women are more likely to ruminate in response to depressed mood, whereas men are more likely to distract themselves.

Seven prospective studies, to our knowledge, have examined the vulnerability hypothesis of the response styles theory in youth. Results from these studies have been consistently supportive of the hypothesis that rumination is associated with greater severity of depressive symptoms over time. More specifically, in samples of third- and seventh-grade students (Abela, Brozina, & Haigh, 2002), sixth- through eighth-grade students (Burwell & Shirk, 2007), sixth- through 10th-grade students (Hankin, 2008), 11- to 15-year-old adolescent females (Nolen-Hoeksema, Stice, Wade, & Bohon, 2007), ninth-grade students (Abela, Parkinson, Stolow, &

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Starrs, 2009), ninth- through 12th-grade students (Schwartz & Koenig, 1996), and six- to 14-year-old children of affectively ill parents (Abela, Aydin, & Auerbach, 2007), higher levels of rumination have been found to be associated with greater increases in depressive symptoms over time. At the same time, results have been less supportive of the hypothesis that distractive responses are associated with decreases in depressive symptoms over time, with one study providing support for this hypothesis (Abela et al., 2007) and an additional two failing to obtain such support (Abela et al., 2002; Schwartz & Koenig, 1996).

Our first goal in the current study was to examine the vulnerability hypothesis of the response styles theory of depression in a sample of youth transitioning from early to middle adolescence. An important limitation of past research examining the vulnerability hypothesis of the response styles theory is the almost exclusive reliance on short-term prospective designs (e.g., six weeks) as opposed to longitudinal designs that follow youth through developmentally meaningful transition periods (i.e., the transition from early to middle adolescence). Expanding on past research, we assessed participants in the current study at multiple time points as they traversed a theoretically meaningful period of development: the transition from early to middle adolescence, a time in which sex differences in depression emerge (Hankin et al., 1998) and depression rates begin to increase rapidly (Kessler et al., 2001).

An additional limitation of past research is the exclusive reliance on self-report measures of depressive symptoms as opposed to semistructured interviews assessing clinically significant depressive episodes (for an exception, see Nolen-Hoeksema et al., 2007). Expanding on past research, we assessed depression using a multimethod and multi-informant approach. More specifically, in addition to assessing depressive symptoms using a self-report measure, we assessed depressive symptoms and episodes using a semistructured clinical interview conducted with both the adolescent and one of his or her parents. Such an approach also allowed for a multidimensional approach toward assessing the phenomenology of depression, including an examination of symptom severity, symptom duration, and episode frequency.

Rumination as a Moderator of the Association Between Negative Events and Depression

Our second goal in the current study was to examine whether rumination moderates the association between the occurrence of negative events and increases in depressive symptoms and the onset of depressive episodes. Although the response styles theory was originally proposed as a main effect model, researchers have begun to conceptualize the theory within a vulnerability-stress framework (Nolen-Hoeksema, Larson, & Grayson, 1999). Providing empirical support for this approach, higher levels of rumination have been found to interact with higher levels of stress to predict higher levels of depressive symptoms concurrently in adult samples (Nolen-Hoeksema et al., 1999) and prospectively in samples of individuals in middle to late adolescence (Abela, Parkinson, Mineka, Yao, & Zhu, 2010; for an exception, see Abela et al., 2009). At the same time, to our knowledge, no study has examined rumination as moderator of the association between the negative events and increases in depression in a sample of individuals in early to middle adolescence.

Expanding on past research examining the response styles theory of depression from a vulnerability-stress perspective, in the current study, we used a multiwave longitudinal design and an idiographic, as opposed to a nomothetic, approach to analysis (i.e., see Abela & McGirr, 2007; Abela, Zuroff, Ho, Adams, & Hankin, 2006). More specifically, we examined whether the slope of the relationship between negative events and depressive symptoms within adolescents varied across adolescents as a function of rumination. One advantage of such an approach is that by obtaining repeated assessments within adolescents over time, we were able to gather a relatively reliable estimate of each adolescent's degree of stress reactivity (e.g., his or her slope of the relationship between negative events and depression). Given that vulnerability-stress theories are essentially theories of differential stress reactivity (Abela & Hankin, 2008), such an approach represents an ideal way to test their vulnerability-stress hypotheses.

Also expanding on research examining the response styles theory of depression from a vulnerability-stress perspective, we tested hypotheses using both contemporaneous and time-lagged analyses. The use of time-lagged analyses allowed for a powerful examination of the direction of the effects obtained in our contemporaneous analyses. In other words, such analyses allowed us to distinguish between (a) a vulnerability-stress model (Ingram & Luxton, 2005) in which rumination is posited to interact with the occurrence of negative events to predict subsequent increases in depression and (b) a differential exposure model (e.g., Bolger & Zuckerman, 1995) in which rumination is posited to lead to greater exposure to subsequent stressors, particularly when individuals with high rumination experience increases in depression.

Sex Differences in Adolescent Depression: A Response Styles Theory Perspective

Our third goal in the current study was to examine two possible models of the emergence of sex differences in depression during the transition from early to middle adolescence. The first model, consistent with the response styles theory, was a mediation model in which girls' higher levels of depression are due to their possessing higher levels of rumination and/or experiencing a greater frequency of negative events than boys. Providing support for such a model, prospective studies suggest that girls begin to encounter more negative events than do boys starting around 13 years of age (Ge, Lorenz, Conger, Elder, & Simons, 1994; 39Hankin, Mermelstein, & Roesch, 2007; Rudolph & Hammen, 1999). In addition, research with individuals in middle to late adolescence has confirmed the greater tendency of girls (as compared with boys) to ruminate in response to depressed mood and the mediating effect of rumination in the association between sex and depressive symptoms (Hankin, 2008; Schwartz & Koenig, 1996). Research with individuals in early adolescence, however, has not typically found sex differences in rumination (Abela et al., 2002, 2007; Abela, Vanderbilt, & Rochon, 2004; Broderick & Korteland, 2004; for exceptions, see Hankin, 2008, 2009; Ziegert & Kistner, 2002). Thus, it is unclear whether sex differences in rumination emerge as a consequence or serve as a potential cause of the sex difference in depression.

The second model we examined was a moderation model in which rumination was hypothesized to be more strongly associated with depression in girls than in boys. A few studies, to our

knowledge, have examined whether sex moderates the association between rumination and increases in depressive symptoms over time. Most of these studies have failed to report moderation effects (Abela et al., 2002, 2007, 2009; Hankin, 2008, 2009). In contrast, one study reported rumination was more strongly associated with increases in depressive symptoms over time in girls than in boys (Schwartz & Koenig, 1996). It is important to note that the mediation and moderation models examined are not necessarily mutually exclusive (Hankin & Abramson, 1999). Rather, sex differences in depression could be due to either or both of these explanations.

An important limitation of past research examining sex differences in adolescent depression from a response styles theory perspective is that such studies have simply examined whether sex differences in levels of rumination and/or the strength of the association between rumination and depression account for current sex differences in depression rather than explaining the emergence of sex differences in depression. An additional limitation of such studies is that they have been conducted with samples of either children (i.e., 8- to 12-year-olds; Abela et al., 2002, 2007) or individuals in middle to late adolescence (15- to 18-year-olds; Abela et al., 2009; Hankin, 2008, 2009; Schwartz & Koenig, 1996), which are age groups in which sex differences in depression are either not expected (i.e., children) or already well-established (i.e., those in middle to late adolescence). Expanding on past research, in the current study, we used a 2-year longitudinal design and followed youth through a developmentally meaningful transition period (the interval of development in which sex differences in depression first emerge; Angold et al., 2002; Costello et al., 2003; Twenge & Nolen-Hoeksema, 2002) to examine whether preexisting sex differences in rumination interact with subsequently emerging sex differences in levels of negative events to explain the emergence of sex differences in depression.

Current Study

Participants in the current study included 382 individuals in early adolescence (mean age = 12.58 years, $SD = 1.09$) recruited from the community. During an initial assessment, adolescents completed self-report measures assessing rumination and depressive symptoms. At this time, adolescents and one of their parents also completed a semistructured clinical interview that assessed current and past major depressive episodes. Every 3 months for the subsequent 2 years (for a total of eight waves of follow-up), adolescents completed self-report measures assessing depressive symptoms and negative events. Every 6 months (for a total of four waves of follow-up), adolescents and their participating parent also completed a semistructured clinical interview assessing the onset of major depressive episodes.

Our first set of hypotheses examined the vulnerability hypothesis of the response styles theory. More specifically, we hypothesized that higher levels of rumination would be associated with (a) a greater likelihood of exhibiting a past history of major depressive episodes, (b) a greater likelihood of exhibiting the onset of a future major depressive episode, and (c) a greater duration of future depressive episodes. Our second set of hypotheses examined whether rumination moderates the prospective association between the occurrence of negative events and depression. More specifically, we hypothesized that higher levels of rumination would interact with the subsequent occurrence of negative events during the 2-year follow-up interval to predict increases in depressive symptoms as well as the onset of major depressive episodes. Last, given the well-known sex difference in depression that emerges in early adolescence (Hankin, Wetter, & Cheely, 2008), we examined whether the emergence of sex differences in levels of depression were accounted for in part by girls exhibiting higher levels of rumination and greater exposure to stressors (mediation) and/or the association between rumination and depressive symptoms and episodes being stronger in girls than in boys (moderation).

Once again, expanding on past research examining the response styles theory in youth, in the current study, we used a 2-year multiwave longitudinal design as opposed to a cross-sectional or short-tem (i.e., 6-week) prospective design, depression was assessed using semistructured clinical interviews in addition to self-report measures, vulnerability–stress hypotheses were tested from an idiographic as opposed to nomothetic perspective using both contemporaneous and time-lagged analyses, and the emergence of sex differences in depression was examined prospectively as a large sample of youth were followed through the interval of development in which sex differences in depression first emerge.

Method

Participants

Participants were recruited for the current study at two sites: Montreal, Quebec, Canada, and Chicago, Illinois. Participants were recruited through ads placed in local newspapers and the greater community seeking participants for a study of adolescent development. The final sample consisted of 382 adolescents (225 girls and 157 boys) drawn from 327 families, along with one parent (300 mothers and 27 fathers) from each family. Demographic variables, presented separately for each site, are presented in Table 1. Adolescents' ages at the initial assessment ranged from 11 to 15 years with a median age of 13 years. The Montreal and Chicago samples were comparable in terms of adolescent gender composition, $\chi^2(1) = 0.42$, *ns*; adolescent age, $t(380) = 0.62$, *ns*; adolescent grade, $t(380) = 0.47$, *ns*; highest level of education completed by mother, $F(1, 380) = 2.10$, *ns*; highest level of education completed by father, $F(1, 330) = 0.62$, *ns*; and family income, $F(1, 380) = 0.24$, *ns*. At the same time, the Chicago sample consisted of a greater proportion of ethnic minority youth, $\chi^2(1) = 17.36$, $p < .001$, and youth from single-parent households, $\chi^2(1) = 8.84$, $p < .01$. At the initial assessment, 34 adolescents met diagnostic criteria for a lifetime history of a clinically significant depressive episode. Six of these adolescents met criteria for a current major depressive episode. Twenty-eight of these adolescents met criteria for a past major depressive episode.

Procedure

Phase 1 of the study involved an initial laboratory assessment. Two research assistants met with one adolescent–parent pair at a time. Parents completed a consent form for themselves and their child; the adolescent completed an assent form. Parents also completed a demographics form. A research assistant verbally administered the Children's Depression Inventory (CDI; Kovacs, 2003) and the Children's Response Styles Questionnaire (CRSQ; Abela

Table 1
Demographic Variables by Site

Variable	Montreal (n = 276)	Chicago (n = 106)
Child gender		
Girl	57.6%	62.1%
Boy	42.4%	37.9%
Child age in years (*SD*)	12.55 (1.05)	12.63 (1.20)
Child grade		
Fifth	1.8%	7.5%
Sixth	29.3%	25.5%
Seventh	30.8%	31.1%
Eighth	26.8%	22.6%
Ninth	11.2%	13.2%
Child ethnicity		
Caucasian	76.8%	54.7%
African American	5.8%	29.2%
Hispanic	2.2%	10.4%
Asian	14.5%	3.8%
Native American	0.7%	1.9%
Parent marital status		
Married	72.1%	65.1%
Divorced	16.6%	11.3%
Widowed	1.1%	1.9%
Single	10.1%	21.7%
Mother's education		
Elementary school	1.8%	4.7%
High school	16.0%	15.1%
Community college	32.2%	18.9%
University	32.6%	30.2%
Graduate school	17.4%	31.1%
Father's education		
Elementary school	2.8%	7.2%
High school	14.0%	16.8%
Community college	30.2%	15.6%
University	32.5%	31.3%
Graduate school	20.5%	36.1%
Family income		
Less than $15,000	1.1%	3.8%
$15,000–$29,999	14.1%	11.3%
$30,000–$44,999	10.9%	9.4%
$45,000–$59,999	16.7%	17.9%
$60,000–$74,999	14.5%	17.9%
$75,000–$89,999	10.1%	12.3%
$90,000–$99,999	9.1%	6.6%
$100,000+	23.6%	20.8%

et al., 2002) aloud to the adolescent while the adolescent followed along and responded to questions using his or her own copy. A diagnostician interviewed the child and parent separately to ascertain the adolescent's current and past depressive symptoms using the Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present Version (K-SADS; Kaufman, Birmaher, Brent, Rao, & Ryan, 1996).

Phase 2 of the study involved a series of eight telephone follow-up assessments. Assessments occurred every 3 months during the 2 years following the initial assessment. At each assessment, a research assistant verbally administered the CDI and the Adolescent Life Events Questionnaire (ALEQ; Hankin & Abramson, 2002) to adolescents. At the 6-, 12-, 18-, and 24-month follow-up assessments, a diagnostician obtained information regarding the adolescent's depressive symptoms during the past 6 months from both the parent and the adolescent using the K-SADS. If a parent–adolescent pair missed one of the follow-up assessments in which the K-SADS was administered, information pertaining to that time interval was obtained in the subsequent K-SADS administration. Parents and adolescents were compensated $200 for participating in the current study.

The average number of follow-up assessments completed by participants was 6.74 (*SD* = 1.61). The number of follow-up assessments completed by participants was distributed as follows: 0.8% (n = 3) completed none, 1.6% (n = 6) completed one, 1.8% (n = 7) completed two, 1.0% (n = 4) completed three, 3.1% (n = 12) completed four, 6.0% (n = 23) completed five, 15.7% (n = 60) completed six, 30.4% (n = 116) completed seven, and 39.5% (n = 151) completed eight. The number of follow-up assessments completed was not significantly associated with any of the following variables at Time 1: age (r = −.02, *ns*), gender (r = −.02, *ns*), depressive symptoms (r = .02, *ns*), or level of rumination (r = .05, *ns*).

Measures

K-SADS (Kaufman et al., 1996). The K-SADS is a semistructured clinical interview designed to arrive at *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*) and research diagnostic criteria diagnoses. The K-SADS is administered separately to the adolescent and the parent. A summary diagnosis is based on both sets of information. The K-SADS has been shown to yield reliable diagnoses of depressive disorders (Chambers et al., 1985) and is frequently used in clinical studies of depression in youth. In the current study, we assessed both current and past histories of major depressive episodes. For adolescents who experienced a past major depressive episode, offset was operationalized as no longer exhibiting clinically significant depressive symptoms (i.e., full remission).

Diagnostic interviewers completed an intensive training program for administering the K-SADS and for assigning *DSM–IV* and research diagnostic criteria diagnoses. The training program consisted of attending approximately 80 hr of didactic instruction, listening to audiotaped interviews, conducting practice interviews, and passing regular exams (with scores of 85% correct or above). The principal investigators (PIs) at each site held weekly supervision sessions for the interviewers. The PIs also reviewed interviewers' notes and tapes to confirm the presence or absence of a diagnosis. Discrepancies were resolved through consensus meetings and best estimate procedures.

CDI (Kovacs, 2003). The CDI is a 27–item self-report questionnaire that measures the cognitive, affective, and behavioral symptoms of depression. For each item, children were asked whether it described how they were thinking and feeling in the past week. Items are scored from 0 to 2, with a higher score indicating greater symptom severity. Total CDI scores range from 0 to 52. When one uses CDI raw scores, as we did in the current study, a cutoff score of 13 has been suggested to indicate mild depression and a cutoff score of 19 to indicate severe depression. CDI scores possess a high level of internal consistency and distinguish children with major depressive disorders from nondepressed children (Saylor, Finch, Spirito, & Bennett, 1984). In the current study, coefficient alpha ranged from .87 to .91 across administrations, indicating strong internal consistency.

CRSQ (Abela et al., 2002). The CRSQ consists of 25 items, each describing a particular response to symptoms of depression.

The items are grouped into three scales: (a) Ruminative Response subscale (CRSQ–Rumination); (b) Distracting Response subscale; and (c) Problem-Solving subscale. As the current study examined the effect of rumination on depressed mood, only the CRSQ–Rumination was used. The CRSQ–Rumination includes 13 items describing responses to depressed mood that are self-focused (e.g., "Think about how alone you feel"). For each item, children are asked to indicate how often they respond in this way when they are feeling sad (*almost never* = 0, *sometimes* = 1, *often* = 2, or *almost always* = 3). Scores range from 0 to 39, with higher scores indicating a greater tendency to ruminate in response to depressed mood. Past research using the CRSQ has reported high levels of internal consistency (Abela et al., 2002, 2004, 2007, 2009). CRSQ–Rumination scores have been found to exhibit strong test–retest reliability over a 1-month interval (r = .78; Abela et al., 2007). Regarding validity, CRSQ–Rumination scores have been found to positively correlate with depressive symptoms as well as predict increases in depressive symptoms over time in both children and adolescents (Abela et al., 2002, 2004, 2007, 2009). In this study, we obtained an alpha of .89, indicating strong internal consistency.

ALEQ (Hankin & Abramson, 2002). The ALEQ is designed to assess the occurrence of a broad range of negative events typically reported by adolescents, including school problems (i.e., "You got into trouble with the teacher or principal"), relationship difficulties (i.e., "You found out your boyfriend/girlfriend was cheating on you"), and family problems (i.e., "You had an argument with a close family member [parent, sibling]"). Each of the 57 events is rated for frequency in the past 3 months on a Likert-type scale ranging from A (*never*) to E (*always*). Reliability and validity for the ALEQ has been established (e.g., Hankin, 2008; Hankin, Stone, & Wright, 2010).

Results

Sex Differences in Levels of Variables

A sex difference in the prevalence of major depressive episodes emerged during the course of the study. Although at the time of the initial assessment, girls and boys were equally likely to report a past history of major depressive episodes, $\chi^2(1) = 2.13$, $p = .14$, girls were more likely than boys to experience a major depressive episode during the 2-year follow-up interval, $\chi^2(1) = 4.04$, $p < .05$. More specifically, 18.0% ($n = 34$) of girls experienced one or more major depressive episode during the 2-year follow-up interval as opposed to 9.1% ($n = 13$) of boys. Such a sex difference, however, was not reflected in self-reported levels of depressive symptoms. Although girls reported higher CDI scores than boys at the 24-month follow-up assessment, $t(315) = 2.10$, $p < .05$, there were no sex differences in CDI scores at the initial assessment, $t(370) = 1.74$, $p = .08$, or at any of the follow-up assessments occurring during the first 21 months of the study (p values of .86, .95, .63, .06, .21, .83, and .56 for Follow-Ups 1–7, respectively).

Regarding predictor variables, contrary to hypotheses, girls and boys did not differ in the tendency to ruminate in response to depressed mood, $t(364) = 1.46$, $p = .14$. Similarly, there were no sex differences in negative event frequency at any of the eight follow-up assessments (p values of .19, .64, .67, .40, .65, .34, .37, and .43 for Follow-Ups 1–8, respectively).

Association Between Rumination and Past History of Major Depressive Episodes

To examine whether higher rumination was associated with a greater likelihood of exhibiting a past history of major depressive episodes, we conducted logistic regression analyses. The dependent variable was whether the adolescent had a past history of major depressive episodes.[1] Site, sex, age, and current level of depressive symptoms were entered first into the regression equation. Rumination scores were entered second. Adolescents currently experiencing a major depressive episode ($n = 6$) were excluded from this and all subsequent analyses involving major depressive episodes that appear in this article. Preliminary analyses indicated that none of the hypothesized associations were moderated by either site or sex.[2] Therefore, results are presented in the upper panel of Table 2 for the entire sample. In line with hypotheses, higher levels of rumination were associated with a past history of major depressive episodes after controlling for site, sex, age, and current depressive symptoms.

To examine this finding further, we used the model summarized in the upper panel of Table 2 to calculate the likelihood of having experienced a past major depressive episode for adolescents possessing either high or low levels of rumination (± 1 *SD*). Adolescents with high levels of rumination exhibited a greater likelihood of having experienced a past major depressive episode (likelihood = .12) than adolescents with low levels of rumination (likelihood = .03).

Rumination as a Predictor of Future Occurrence of Major Depressive Episodes

To examine whether higher rumination was associated with a greater likelihood of experiencing the onset of a future major depressive episode, we conducted logistic regression analyses. The dependent variable was whether the adolescent experienced the onset of a major depressive episode during the 2-year follow-up interval. Site, sex, age, initial level of depressive symptoms, and past history of major depressive episodes were entered first into

[1] All analyses in which major depressive episodes is the outcome variable were also conducted with clinically significant depressive episodes (i.e., major depressive episodes, minor depressive episodes, and mixed-anxiety depressive episodes) as the outcome variable. Results were similar to those reported in the current article in terms of the direction, magnitude, and significance level of effects. Details of these specific analyses are available by contacting Benjamin L. Hankin.

[2] In examining site as a moderator of the hypothesized associations between our predictor variables (i.e., rumination or the interaction between rumination and negative events) and our outcome variables (i.e., depressive symptoms and major depressive episodes), we set the significance level at $p < .05$. None of the interactions involving site were significant at the $p < .05$ level. Obtained significance levels ranged from .08 to .95 ($\mu = .44$, $SD = .40$). In examining sex as a moderator of the hypothesized associations between our predictor variables (i.e., rumination or the interaction between rumination and negative events) and our outcome variables (i.e., depressive symptoms and major depressive episodes), we set the significance level at $p < .05$. None of the interactions involving sex were significant at the $p < .05$ level. Obtained significance levels ranged from .08 to .84 ($\mu = .55$, $SD = .29$). Details of these specific analyses are available by contacting Benjamin L. Hankin.

Table 2
Logistic Regression Analyses: Rumination Predicting Past History and Future Occurrence of Major Depressive Episodes

Predictor	Odds ratio	95% CI for odds ratio		Wald
		Lower	Upper	
Likelihood of experiencing a past major depressive episode (K-SADS past MDE)				
Site	0.45	0.15	1.34	2.05
Sex	2.03	0.82	5.02	2.35
Age	1.01	0.70	1.47	0.00
Time 1 CDI	1.09	1.03	1.15	9.32**
Rumination	2.13	1.03	4.43	4.12*
Likelihood of experiencing a future major depressive episode (K-SADS future MDE)				
Site	0.75	0.31	1.81	0.41
Sex	1.32	0.64	2.75	0.56
Age	1.40	1.01	1.94	4.02*
Time 1 CDI	1.03	0.98	1.08	1.22
K-SADS past MDE	4.40	1.98	9.96	13.07***
Rumination	1.99	1.03	3.81	4.25*

Note. K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children; CDI = Children's Depression Inventory; Rumination = Children's Response Styles Questionnaire, Rumination subscale. Site, sex, age, current level of depressive symptoms, and past history of major depressive episodes were entered into the regression equation first, and Rumination scores were entered second.
* $p < .05$. ** $p < .01$. *** $p < .001$.

the regression equation. Rumination scores were entered second. Once again, preliminary analyses indicated none of the hypothesized associations were moderated by either site or sex. Therefore, results are presented in the lower panel of Table 2 for the entire sample. In line with hypotheses, higher levels of rumination were associated with a greater likelihood of experiencing the onset of a major depressive episode during the 2-year follow-up interval after controlling for site, sex, age, initial depressive symptoms, and past history of major depressive episodes.

To examine this finding further, we used the model summarized in the lower panel of Table 2 to calculate the predicted likelihood of experiencing the onset of a major depressive episode during the 2-year follow-up interval for adolescents possessing either high or low levels of rumination (± 1 *SD*). Adolescents with high levels of rumination exhibited a greater likelihood of experiencing the onset of a major depressive episode during the 2-year follow-up interval (likelihood = .20) than did adolescents with low levels of rumination (likelihood = .05).

Rumination as a Predictor of Self-Reported Depressive Symptoms Following Negative Events

To examine whether higher levels of rumination were associated with greater elevations in self-reported depressive symptoms following the occurrence of negative events, we used multilevel modeling. Analyses were conducted using the SAS (Version 9.2) MIXED procedure and maximum-likelihood estimation. Our dependent variable was follow-up CDI scores. Our primary predictors of follow-up CDI scores were rumination and follow-up ALEQ scores. As follow-up ALEQ scores is a within-subject predictor, ALEQ scores were centered at each adolescent's mean prior to analyses such that follow-up ALEQ scores reflects upward or downward fluctuations in an adolescent's level of negative events compared with his or her mean level of negative events. Site, sex, age, initial depressive symptoms, and past history of major depressive episodes were included as covariates in the model. In addition, to control for prior depressive symptoms, we also included CDI scores at Time $n - 1$ in the model. Preliminary analyses indicated none of the hypothesized associations were moderated by either site or sex. Thus, results are presented for the entire sample.

Model specification was achieved using a sequential strategy, which involved first examining random effects and then examining fixed effects (see Snijders & Bosker, 1999). Models initially included random effects for adolescents (RE-adolescent; random intercept) nested within families (RE-family; random intercept) and a random effect for slope (RE-slope). Nonsignificant random effects were deleted from the model prior to examining the fixed-effects. In all analyses, RE-adolescent ($p < .001$) and RE-slope ($p < .001$) were significant and thus were retained in the model. RE-family, however, was not significant and consequently was deleted from the models prior to examining the fixed effects.

Results with respect to the fixed effects component of the model are presented in the upper left panel of Table 3. Of primary importance, a significant two-way cross-level interaction emerged between rumination and follow-up ALEQ scores. To examine the form of this interaction, we used the model summarized in the upper left panel of Table 3 to calculate predicted CDI scores for adolescents possessing either high or low levels of rumination (± 1 *SD*) who are reporting either low or high ALEQ scores in comparison to their own average ALEQ score ($\pm 1 \times$ Mean Within-Subject Standard Deviation). The results of such calculations are presented in the left panel of Figure 1. As both follow-up CDI scores and follow-up ALEQ scores are within-subject variables, slopes are interpreted as the increase in an adolescent's CDI score that would be expected if he or she scored 1 point higher on the ALEQ.

Follow-up analyses indicated that adolescents reported higher levels of depressive symptoms when experiencing high levels of negative events than when experiencing low levels of negative events irrespective of whether they possessed high, $t(1856) = 12.50$, $p < .001$, or low, $t(1856) = 8.34$, $p < .001$, levels of rumination. At the same time, a planned comparison of the slopes of the relationship between ALEQ scores and self-reported depressive symptoms revealed that the slope was significantly greater in adolescents exhibiting high levels of rumination (slope = 0.15) than in adolescents exhibiting low levels of rumination (slope = 0.11), $t(1856) = 2.25$, $p < .05$.

To provide a more stringent test of our hypothesis, we also examined two additional models using time-lagged analyses. Time-lagged analyses allowed for a powerful examination of the direction of the effects obtained in our contemporaneous analyses. More specifically, such analyses allowed us to distinguish between (a) a vulnerability–stress model in which rumination moderates the association between negative events at time $n - 1$ and depressive symptoms at time n and (b) a differential exposure model in which rumination moderates the association between depressive symp-

Table 3
Hierarchical Linear Modeling Analyses: Rumination Predicting Self-Reported (Top Panel) and Clinician-Rated (Bottom Panel) Depressive Symptoms Following Negative Events

Predictor	Contemporaneous				Lagged			
	B	*SE*	*F*	*df*	*B*	*SE*	*F*	*df*
Predicting self-reported depressive symptoms								
Site	−1.11	0.45	5.98*	1, 349	−2.35	0.55	18.28***	1, 345
Sex	−0.11	0.39	0.08	1, 349	−0.20	0.48	0.18	1, 345
Age	0.43	0.19	4.77*	1, 349	0.44	0.24	3.46	1, 345
Time 1 CDI	1.31	0.22	34.28***	1, 349	1.55	0.28	31.05***	1, 345
K-SADS past MDE	0.16	0.61	0.07	1, 349	−0.10	0.74	0.02	1, 345
Rumination	0.66	0.23	8.13**	1, 349	0.51	0.27	3.61	1, 345
Follow-up CDI (Time $n - 1$)	0.18	0.02	101.05***	1, 1856	0.07	0.02	8.47**	1, 1744
Follow-up ALEQ	0.13	0.01	208.58***	1, 1856	0.01	0.01	3.14	1, 1744
Rumination × Follow-Up ALEQ	0.02	0.01	5.06*	1, 1856	0.02	0.01	7.23**	1, 1744
Predicting clinician-rated depressive symptoms								
Site	−0.05	0.08	2.44	1, 354	0.04	0.07	0.38	1, 352
Sex	−0.11	0.07	2.56	1, 354	−0.08	0.06	1.54	1, 352
Age	0.04	0.04	1.09	1, 354	0.05	0.03	2.72	1, 352
Time 1 K-SADS severity	0.04	0.04	0.69	1, 354	0.06	0.03	2.96	1, 352
K-SADS past MDE	0.43	0.08	27.62***	1, 354	0.40	0.07	31.05***	1, 352
Follow-up K-SADS Severity (Time $n - 1$)	0.03	0.03	1.09	1, 984	0.05	0.03	2.59	1, 862
Rumination	0.16	0.04	17.94***	1, 354	0.13	0.03	13.64***	1, 352
Follow-up ALEQ	0.01	0.00	16.37***	1, 982	0.01	0.00	8.74**	1, 859
Rumination × Follow-Up ALEQ	0.01	0.00	6.09*	1, 982	0.01	0.00	9.03**	1, 859

Note. CDI = Children's Depression Inventory; K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children; MDE = major depressive episode; Rumination = Children's Response Styles Questionnaire, Rumination subscale; Follow-up CDI = within-subject fluctuations in CDI scores; Follow-up ALEQ = within-subject fluctuations in Adolescent Life Events Questionnaire scores; Follow-up K-SADS Severity = within-subject fluctuations in K-SADS severity scores.
* $p < .05$. ** $p < .01$. *** $p < .001$.

toms at time $n - 1$ and negative events at time n (Bolger & Zuckerman, 1995).

First, consistent with a vulnerability–stress model, we examined whether rumination moderated the relationship between ALEQ scores at time $n - 1$ and CDI scores at time n. Results with respect to the fixed-effects component of the model are presented in the upper right panel of Table 3. Similar to our contemporaneous analyses, a significant two-way cross-level interaction was obtained between rumination and follow-up ALEQ scores. Follow-up analyses indicated that adolescents possessing high levels of rumination reported higher levels of depressive symptoms after experiencing high levels of negative events than after experiencing low levels of negative events (slope = .04), $t(1744) = 3.42$, $p < .001$. At the same time, depressive symptoms at time n did not vary as a function of ALEQ scores at time $n - 1$ for adolescents possessing low levels of rumination (slope = .00), $t(1744) = -0.45$, *ns*. The slope of the relationship between ALEQ scores at time $n - 1$ and depressive symptoms at time n was significantly greater in adolescents possessing high levels of rumination than in adolescents possessing low levels of rumination, $t(1744) = 2.69$, $p < .01$.

Second, consistent with a differential exposure model, we examined whether rumination moderated the relationship between CDI scores at time $n - 1$ and ALEQ scores at time n. Results with respect to the fixed-effects component of the model are presented the upper panel of Table 4. Consistent with a stress generation model, higher levels of rumination were associated with the occurrence of a greater number of negative events during the follow-up interval. At the same time, contrary to a differential exposure model, rumination did not moderate the association between CDI scores at time $n - 1$ and ALEQ scores at time n.

Rumination as a Predictor of Clinician-Rated Depressive Symptoms Following Negative Events

Similar analyses were conducted to examine whether higher levels of rumination were associated with greater elevations in clinician-rated depressive symptoms (follow-up K-SADS severity) after elevations in negative events. Once again, preliminary analyses indicated none of the hypothesized associations were moderated by either site or sex. Thus, results are presented in the lower left panel of Table 3 and the right panel of Figure 1 for the entire sample. Of primary importance, a significant two-way, cross-level interaction emerged between rumination and follow-up ALEQ scores. Follow-up analyses indicated that adolescents possessing high levels of rumination were rated by clinicians as exhibiting higher levels of depressive symptoms when reporting high ALEQ scores than when reporting low ALEQ scores (slope = .02), $t(982) = 4.83$, $p < .001$. At the same time, clinician-rated depressive symptoms did not vary as a function of ALEQ scores for adolescents possessing low levels of rumination (slope = .01), $t(982) = 1.14$, *ns*. The slope of the relationship between ALEQ scores and clinician-rated depressive symptoms was significantly greater in adolescents exhibiting high levels of rumination than in

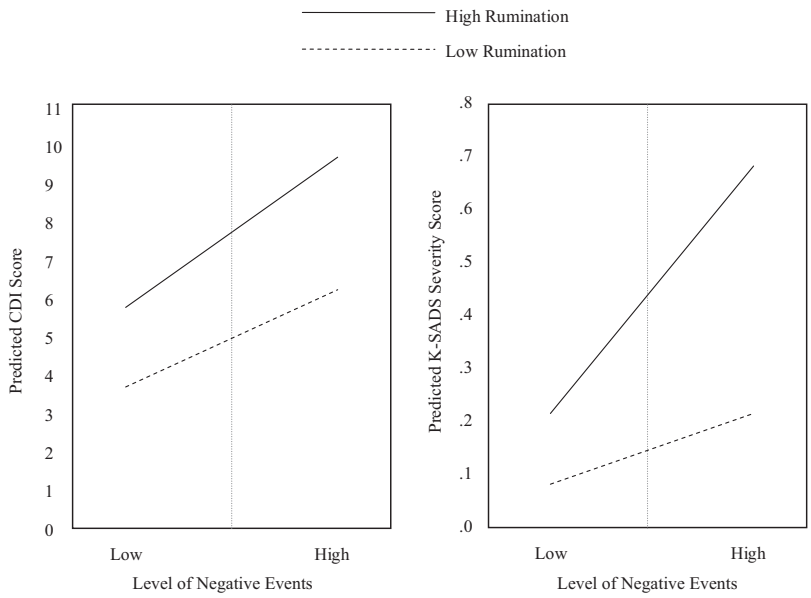

Figure 1. Within-subject fluctuations in self-reported (left panel) and clinician-rated (right panel) depressive symptoms as a function of rumination and within-subject fluctuations in negative events. CDI = Children's Depression Inventory; K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children.

adolescents exhibiting low levels of rumination, $t(982) = 2.47$, $p < .05$.

We next conducted time-lagged analyses examining whether, consistent with a vulnerability–stress model, rumination moderated the relationship between ALEQ scores at time $n - 1$ and K-SADS severity scores at time n. Results with respect to the fixed-effects component of the model are presented in the lower right panel of Table 3. Similar to our contemporaneous analyses, a significant two-way cross-level interaction was obtained between rumination and follow-up ALEQ scores. Follow-up analyses indicated that adolescents possessing high levels of rumination were rated as exhibiting higher levels of depressive symptoms after experiencing high levels of negative events than after experiencing low levels of negative events (slope = .02), $t(859) = 4.38$, $p < .001$. At the same time, clinician ratings of depressive symptoms at time n did not vary as a function of ALEQ scores at time $n - 1$ for adolescents possessing low levels of rumination (slope = .00), $t(859) = -0.01$, *ns*. The slope of the relationship between ALEQ scores at time $n - 1$ and clinician ratings of depressive symptoms at time n was significantly greater in adolescents possessing high levels of rumination than in adolescents possessing low levels of rumination, $t(859) = 3.00$, $p < .01$.

We next conducted time-lagged analyses examining whether, consistent with a differential exposure model, rumination moderated the relationship between K-SADS severity ratings at time $n - 1$ and ALEQ scores at time n. Results with respect to the fixed-effects component of the model are presented the lower panel of Table 4. Consistent with a stress generation model, higher levels of rumination were associated with the occurrence of a greater number of negative events during the follow-up interval. At the same time, contrary to a differential exposure model, rumination did not moderate the association between K-SADS severity ratings at time $n - 1$ and ALEQ scores at time n.

Rumination Predicting Diagnostic Status Following Negative Events

To examine whether higher levels of rumination were associated with a greater likelihood of experiencing the onset of a major depressive episode following elevations in negative events, we used multilevel modeling. Analyses were conducted using the SAS (Version 9.2) GLIMMIX procedure and maximum pseudolikelihood estimation (Molenberghs & Verbeke, 2005). Our dependent variable was diagnostic status during the follow-up interval (follow-up K-SADS MDE). Our primary predictors of follow-up K-SADS MDE were rumination and follow-up ALEQ scores. Site, sex, age, initial depressive symptoms, and past history of major depressive episodes were included as covariates in the model. In addition, to control for prior diagnostic status, diagnostic status at time $n - 1$ (follow-up K-SADS MDE time $n - 1$) was also included in the model. Preliminary analyses indicated none of the hypothesized associations were moderated by either site or sex. Thus, results are presented for the entire sample.

Models initially included random effects for adolescents (RE-adolescent; random intercept) nested within families (RE-family; random intercept) and a random effect for slope (RE-slope). In all analyses, RE-adolescent ($p < .001$) and RE-slope ($p < .001$) were significant and thus were retained in the model. RE-family, however, was not significant and consequently was deleted from the models prior to examining the fixed effects.

Results with respect to the fixed effects component of the model are presented in the right panel of Table 5 and in Figure 2. Of primary importance, a significant two-way cross-level interaction emerged between rumination and follow-up ALEQ scores. Follow-up analyses indicated that adolescents possessing high levels of rumination were more likely to experience the onset of a major depressive episode when reporting high ALEQ scores than

Table 4
Hierarchical Linear Modeling Analyses: Rumination Predicting Negative Events Following Increases in Self-Reported and Clinician-Rated Depressive Symptoms

Predictor	*B*	*df*	*SE*	*F*
Self-reported depressive symptoms				
Site	−5.17	1.65	9.85**	1, 341
Sex	0.27	1.41	0.04	1, 341
Age	0.81	0.71	1.31	1, 341
Time 1 ALEQ	3.94	0.84	21.99***	1, 341
K-SADS past MDE	1.15	2.18	0.28	1, 341
Rumination	1.60	1.60	4.35*	1, 341
Follow-up ALEQ (Time $n - 1$)	0.26	0.02	134.03***	1, 1815
Follow-up CDI (Time $n - 1$)	−0.31	0.10	8.88**	1, 1815
Rumination × Follow-UP CDI (Time $n - 1$)	0.03	0.03	0.14	1, 1815
Clinician-rated depressive symptoms				
Site	−6.61	1.96	11.40***	1, 342
Sex	−0.07	1.70	0.00	1, 342
Age	0.96	0.85	1.26	1, 342
Time 1 ALEQ	5.57	1.00	30.87***	1, 342
K-SADS past MDE	0.24	1.86	0.02	1, 342
Rumination	1.99	0.91	4.79*	1, 342
Follow-up ALEQ (Time $n - 1$)	0.10	0.02	18.11***	1, 932
Follow-up K-SADS Severity (Time $n - 1$)	−0.48	0.46	1.08	1, 932
Rumination × Follow-Up K-SADS Severity (Time $n - 1$)	0.20	0.42	0.22	1, 932

Note. ALEQ = Adolescent Life Events Questionnaire; K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children; MDE = major depressive episode; Rumination = Children's Response Styles Questionnaire, Rumination subscale; Follow-up ALEQ = within-subject fluctuations in ALEQ scores; Follow-up CDI = within-subject fluctuations in Children's Depression Inventory Scores; Follow-up K-SADS Severity = within-subject fluctuations in K-SADS severity scores.
* $p < .05$. ** $p < .01$. *** $p < .001$.

when reporting low ALEQ scores (slope = .003), $t(970) = 3.75$, $p < .001$. At the same time, the likelihood of experiencing the onset of a major depressive episode did not vary as a function of ALEQ scores for adolescents possessing low levels of rumination (slope = .000), $t(970) = 0.15$, *ns*. The slope of the relationship between ALEQ scores and the probability of experiencing the onset of a major depressive episode was significantly greater in adolescents exhibiting high levels of rumination than in adolescents exhibiting low levels of rumination, $t(970) = 2.46$, $p < .05$.

We next conducted time-lagged analyses examining whether, consistent with a vulnerability–stress model, rumination moderated the relationship between ALEQ scores at time $n - 1$ and K-SADS diagnostic status at time n. Results with respect to the fixed-effects component of the model are presented in the left panel of Table 5. Similar to our contemporaneous analyses, a significant two-way cross-level interaction was obtained between rumination and follow-up ALEQ scores. Follow-up analyses indicated that adolescents possessing high levels of rumination were

Table 5
Hierarchical Linear Modeling Analyses: Rumination Predicting Diagnostic Status (0 = No Major Depressive Episode, 1 = Major Depressive Episode) Following Negative Events

	Contemporaneous				Lagged			
Predictor	β	*SE*	*F*	*df*	β	*SE*	*F*	*df*
Site	−.001	.015	0.01	1, 348	.012	.014	0.70	1, 346
Sex	−.008	.013	0.40	1, 348	−.009	.012	0.55	1, 346
Age	.006	.007	0.81	1, 348	.005	.006	0.65	1, 346
Time 1 CDI	.007	.001	0.01	1, 348	.003	.007	0.19	1, 346
K-SADS past MDE	−.138	.026	27.52***	1, 348	−.117	.024	23.25***	1, 346
Follow-up K-SADS MDE (Time $n - 1$)	−.045	.032	1.94	1, 970	−.028	.033	0.73	1, 848
Rumination	.017	.008	5.11*	1, 348	.013	.007	3.40	1, 346
Follow-up ALEQ	.001	.001	6.82***	1, 970	.001	.001	3.87*	1, 848
Rumination × Follow-Up ALEQ	.001	.001	6.03*	1, 970	.002	.001	11.79***	1, 848

Note. CDI = Children's Depression Inventory; K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children; MDE = major depressive episode; Follow-up K-SADS MDE = within-subject fluctuations in K-SADS diagnostic status; Rumination = Children's Response Styles Questionnaire, Rumination subscale; Follow-up ALEQ = within-subject fluctuations in Adolescent Life Events Questionnaire scores.
* $p < .05$. *** $p < .001$.

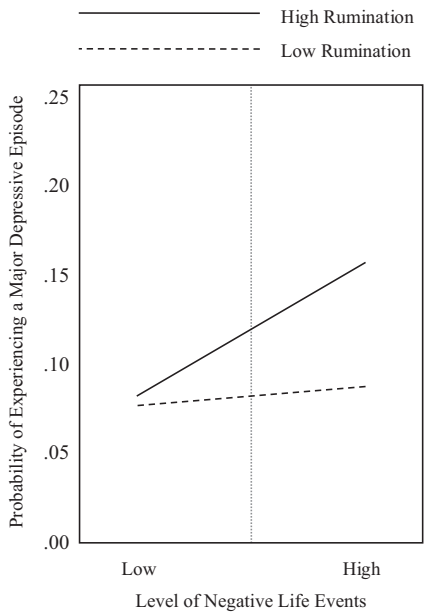

Figure 2. Probability of experiencing a major depressive episode as a function of rumination and within-subject fluctuations in negative events.

more likely to experience the onset of a depressive episode after experiencing high levels of negative events than after experiencing low levels of negative events (slope = .003), $t(848) = 3.97$, $p < .001$. At the same time, the probability of experiencing the onset of a depressive episode did not vary as a function of ALEQ scores at time $n - 1$ for adolescents possessing low levels of rumination (slope = −.001), $t(848) = -0.98$, *ns*. The slope of the relationship between ALEQ scores at time $n - 1$ and probability of exhibiting a depressive episode at time n was significantly greater in adolescents possessing high levels of rumination than in adolescents possessing low levels of rumination, $t(848) = 3.43$, $p < .001$.

Last, consistent with a differential exposure model, we conducted time-lagged analyses examining whether rumination moderated the relationship between K-SADS diagnostic status at time $n - 1$ and ALEQ scores at time n. Significant effects were obtained for site ($\beta = -6.77$, $SE = 1.97$), $F(1, 338) = 11.80$, $p < .001$; Time 1 ALEQ scores ($\beta = 0.23$, $SE = 0.04$), $F(1, 338) = 33.17$, $p < .001$; follow-up ALEQ scores at time $n - 1$ ($\beta = 0.08$, $SE = 0.02$), $F(1, 927) = 11.78$, $p < .001$; and rumination ($\beta = 2.06$, $SE = 0.91$), $F(1, 338) = 5.11$, $p < .05$. No other effects were significant, including, contrary to a differential exposure model, the Rumination × K-SADS MDE interaction ($\beta = -3.21$, $SE = 3.11$), $F(1, 927) = 1.01$, *ns*.

Rumination Predicting Duration of Future Clinician-Rated Depressive Symptoms

To examine whether rumination was associated with a greater duration of future clinician-rated depressive symptoms, we conducted linear regression analyses.[3] To avoid confounding the likelihood of experiencing future depressive symptoms with the duration of future depressive symptoms, we included only adolescents ($n = 101$) rated by clinicians as exhibiting depressive symptoms during the 2-year follow-up interval in analyses. In addition, to avoid confounding the severity of future depressive symptoms with the duration of future depressive symptoms, (a) we included adolescents exhibiting both subthreshold (i.e., minor depressive episode) and threshold (i.e., major depressive episode) levels of depressive symptoms in analyses and (b) we controlled for K-SADS severity scores for the interval for which duration was being examined. The dependent variable was the number of weeks the depressive symptoms lasted (K-SADS duration). To meet the assumptions of linear regression, we performed a logarithmic transformation on K-SADS duration prior to analyses. If adolescents reported multiple experiences of depressive symptoms during the follow-up interval, the duration of the longest interval was used in analyses. Site, sex, age, initial level of depressive symptoms, past history of major depressive episodes, and severity of depressive symptoms in the interval being reported were entered first into the regression equation. Rumination scores were entered second. Results of such analyses are presented in Table 6. Consistent with hypotheses, higher levels of rumination were associated with greater duration of future clinician-rated depressive symptoms after controlling for site, sex, age, initial depressive symptoms, and severity of depressive symptoms experienced during the reported episode.

Discussion

The results of the current study provide strong support for the applicability of the response styles theory (Nolen-Hoeksema, 1991) to understanding the development of depression during the transition from early to middle adolescence. Consistent with hypotheses, higher levels of rumination were associated with a greater likelihood of having experienced a past history of major depressive episodes. Higher levels of rumination were also associated with a greater likelihood of experiencing the onset of a future major depressive episode. A closer examination of the current data indicated that adolescents exhibiting high levels of rumination were approximately four times more likely than adolescents exhibiting low levels of rumination either to have experienced a past major depressive episode or to experience the onset of a future major depressive episode. Rumination was not only associated with an increased likelihood of experiencing the onset of a depressive episode but was also associated with greater duration of future depressive episodes. It is important to note that, proving a particularly conservative test of our hypotheses, these findings held even after controlling for both current depressive symptoms and past history of major depressive episodes. The current results expand on past research examining the applicability of the response styles theory of depression in youth samples (Abela et al., 2002, 2004, 2007, 2009; Broderick & Korteland, 2004; Burwell & Shirk, 2007; Hankin, 2008; Schwartz & Koenig, 1996), as depressive symptoms were assessed in the current study with a multimethod (self-report and semistructured interview) and multi-informant (adolescent and parent) approach. In addition, the

[3] Similar analyses examining duration of past clinician-rated depressive symptoms were not conducted, as an insufficient number of adolescents ($n = 45$) experienced past clinician-rated depressive symptoms to provide a powerful examination of hypotheses.

Table 6
Linear Regression Analyses: Rumination Predicting Duration of Future Clinician-Rated Depressive Symptoms

Predictor	Cm R^2	F	df	t	β
Covariates	.44	12.19***	6, 90		
Site			90	4.35***	.42
Sex			90	0.69	.06
Age			90	−1.15	−.10
Time 1 CDI			90	1.91	.18
K-SADS Past MDE			90	−0.53	−.05
K-SADS Severity			90	3.20**	.29
Rumination	.49	5.56*	1, 89	2.26*	.21

Note. Cm = cumulative; CDI = Children's Depression Inventory; K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children; MDE = major depressive episode; Rumination = Children's Response Styles Questionnaire, Rumination subscale. All predictors except for Rumination were entered into the regression equation first, and Rumination was entered into the equation second.
* $p < .05$. ** $p < .01$. *** $p < .001$.

current study is the first connecting a ruminative response style to the onset of major depressive episodes in an unselected sample of early adolescents recruited from the community.

The results of the current study also provide powerful support for our conceptualization of the association between rumination and depressive symptoms and episodes from a vulnerability–stress perspective (i.e., see also Nolen-Hoeksema, Parker, & Larsen, 1994). More specifically, results from our contemporaneous analyses indicated that higher rumination was associated with greater increases in depressive symptoms after increases in negative event frequency. Similarly, results from our time-lagged analyses indicated that higher levels of rumination were associated with greater increases in depressive symptoms at time n following increases in negative event frequency at time $n - 1$. Last, results from our time-lagged analyses failed to provide support for the alternative model in which rumination is associated with greater increases in negative event frequency at time n following increases in depressive symptoms at time $n - 1$. It is important to note that results from our vulnerability–stress analyses replicated across the various methods in which depressive symptoms were assessed (i.e., self-reported and clinician ratings of depressive symptoms). In addition, results extended to the onset of major depressive episodes. Such a pattern of findings is important in that it delineates a specific set of conditions under which a ruminative response style is particularly likely to lead to deleterious emotional and behavioral outcomes. Such a pattern of findings also provides indirect support for one possible explanation for increases in depression levels during adolescence. More specifically, boys and girls begin to encounter more stressors starting around the age of 13 years (Ge et al., 1994; Hankin et al., 2007; Rudolph & Hammen, 1999), and puberty, as a developmental transition, is associated with an increase in negative life events (Caspi & Moffitt, 1991; Ge, Conger, & Elder, 2001; Graber, Brooks-Gunn, & Petersen, 1996). Thus, rumination may interact with increasing levels of stressors to explain, in part, the increase in overall depression rates for both boys and girls during the transitions from early to middle adolescence and from middle to late adolescence (Hankin & Abramson, 2001).

The results of the current study provided no support for either our mediation or our moderation models of the emergence of sex differences in adolescent depression. Contrary to our mediation model, girls and boys did not significantly differ in terms of either levels of rumination or the frequency with which they experienced negative events. Contrary to our moderation model, the strength of the association between rumination and depression did not vary as a function of sex. Such findings are surprising given that, consistent with previous research examining the development of depression during the transition from early to middle adolescence (Hankin et al., 1998), sex differences in clinically significant depression did emerge during the course of the current study, with girls being approximately twice as likely as boys to experience the onset of a depressive episode during the 2-year follow-up interval.[4] Integrating the current findings with those obtained in past research (Abela et al., 2002, 2004, 2007, 2009; Broderick & Korteland, 2004; Schwartz & Koenig, 1996) suggests that sex differences in rumination may emerge as a consequence, rather than as a cause, of sex differences in depression. At the same time, because of the limited amount of prospective research to date examining this topic, additional research is needed before any firm conclusions can be drawn. For example, to our knowledge, the only other multiwave study investigating rumination and stress as explanations for the sex difference in depressive symptoms over time (Hankin, 2009) found that rumination interacting with stress explained much of the sex difference in symptoms at baseline but little in trajectories over time.

Several limitations of the current study should be noted. First, self-report measures were used to assess negative events. Although measures of negative events that require participants only to indicate whether an event occurred are probably less likely to be influenced by informant bias than are those that ask subjects to rate the subjective impact of each event, more sophisticated methods of analysis, such as interviewing procedures that assess contextual threat, may provide better assessments of stress. Second, the current study only examined the relationship between rumination and

[4] It is unclear why sex differences emerged in the prevalence of major depressive episodes during the 2-year follow-up interval but not in self-reported levels of depressive symptoms. One possible explanation is that the K-SADS exhibits greater sensitivity in detecting sex differences in depression than does the CDI. This may be because the K-SADS and CDI assess different types of depressive symptoms, the K-SADS not only assesses the presence of depressive symptoms but also the impairment and distress caused by symptoms, or the K-SADS exhibits greater specificity in assessing depression as opposed to nonspecific distress. Consistent with this possibility, sex differences in the prevalence of major depressive episodes as assessed by semistructured clinical interviews are typically large in magnitude (i.e., 2:1 ratio; Hankin & Abramson, 2001; Hankin et al., 2008), whereas sex differences in levels of depression as assessed via self-report measures are typically small in magnitude (i.e., mean difference of 1–2 points; Twenge & Nolen-Hoeksema, 2002). Additional explanations, however, also exist. For example, girls and boys may have differed in the manner in which they reported depressive symptoms during the K-SADS, with girls' reports being more likely than boys' reports to result in threshold ratings by clinicians. Alternatively, girls and boys may have reported depressive symptoms similarly in the K-SADS, but clinicians may have been more apt to rate girls' reports than boys' reports as threshold because of expectancy biases. Future research is needed to examine each of these possibilities.

depressive symptoms and episodes. Thus, we were unable to identify whether rumination serves as a vulnerability factor specifically to depression rather than to other types of symptoms (i.e., anxiety). Future research should assess a broader range of psychological symptoms to examine the specificity of rumination to depressive symptoms (e.g., see Hankin, 2008; Nolen-Hoeksema et al., 2007). Third, the current study only examined the conditions under which rumination is associated with increases in depressive symptoms and the onset of depressive episodes in early adolescents. Future research should expand on the current study by examining the factors that mediate this relationship. Research and theory suggest multiple potential mediators: increases in negative cognitions (e.g., Sarin, Abela, & Auerbach, 2005), engagement in risky behaviors (e.g., Nolen-Hoeksema et al., 2007; Skitch & Abela, 2008), and stress generation processes (e.g., Shih, Abela, & Starrs, 2009). Last, the current study did not control for additional variables that could potentially account for the relationship between rumination and depressive symptoms and episodes. Consequently, we cannot rule out the possibility that a third variable (e.g., neuroticism, generalized anxiety disorder) could account for the pattern of findings obtained. At the same time, past research has obtained support for the relationship between rumination and depressive symptoms even after controlling for negative cognitive style (e.g., Abela et al., 2009) and neuroticism (Abela et al., 2010).

In sum, the results of the current study provide powerful support for the applicability of the response styles theory to understanding the development of depressive symptoms and major depressive episodes during the transition from early to middle adolescence. In addition, results provide insight into potential mechanisms that may underlie the increasing rates of depression that are observed during early through middle adolescence.

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