



Depression as a mediator of negative cognitive style and hopelessness in stress generation

Evan M. Kleiman^{1*}, Richard T. Liu², John H. Riskind¹ and Jessica L. Hamilton³

¹Department of Psychology, George Mason University, Fairfax, Virginia, USA

²Department of Psychiatry and Human Behavior, Brown University Alpert Medical School, Bradley Hospital, East Providence, Rhode Island, USA

³Department of Psychology, Temple University, Philadelphia, Pennsylvania, USA

Over the past 20 years, there has been considerable interest in the role of cognitive factors in the stress generation process. Generally, these studies find that depressed individuals, or individuals at cognitive risk for depression, are more likely to experience stressful life events that are in part influenced by their own characteristics and behaviours (i.e., negative dependent events). However, there is still much to be learnt about the mediators of these effects. For example, does the development of depression symptoms explain why individuals at cognitive risk for depression experience increased negative dependent events? Or, is it that increases in cognitive risk explain why depressed individuals experience increased negative dependent events? To explore these questions, a short-term prospective study was conducted with 209 college students who were given measures of depression, depressogenic risk factors (i.e., negative cognitive style and hopelessness), and negative dependent events at two time points 6 weeks apart. Support was found for three models: (1) depression symptoms mediated the relationship between negative cognitive style and negative dependent events; (2) depression symptoms mediated the relationship between hopelessness and negative dependent events; and (3) first hopelessness and then depression symptoms mediated the relationship between negative cognitive style and negative dependent events in a multiple-step model. In contrast, the reverse models were not confirmed, suggesting specificity in the direction of the mediational sequence.

The occurrence of stressful life events as a risk factor for depression symptoms is a well-established finding in the literature (Brown & Harris, 1978; Mazure, 1998). Consequently, an abundance of research has sought to identify characteristics that confer risk to depression following negative events, as well as factors that contribute to the occurrence of stressful events directly. Surprisingly, research into these questions has predominantly evolved independently. For instance, over the past 20 years, research on the *stress generation hypothesis* (Hammen, 1991) has accrued, suggesting that depressed individuals may have certain characteristics or behaviours that contribute to the occurrence of stressful events, which in turn perpetuate or exacerbate their depression (for reviews, see Liu, 2013; Liu & Alloy, 2010). According to the stress generation

*Correspondence should be addressed to Evan M. Kleiman, Department of Psychology, George Mason University, Mail Stop 3F5, Fairfax, VA 22030, USA (email: ekleiman@gmu.edu).

hypothesis, relative to their non-depressed counterparts, depressed individuals experience more stressful life events that are dependent upon their behaviour (i.e., negative dependent events, such as conflict with friends), but not events that are independent of their behaviour (i.e., negative independent events, such as the death of a loved one). Stress generation was initially studied in relation to depression and relatively recently has been extended to other predictors, such as cognitive risk factors, as generators of interpersonal stress. Despite considerable attention and support for certain cognitive risk factors for depression, particularly in the presence of negative events (See Scher, Ingram, & Segal, 2005 for a review), evidence supporting the role of cognitive risk factors in stress generation has only relatively recently emerged. Moreover, there is a recent push to move beyond single variable examinations of stress generation (i.e., direct effects only models) to models that examine mediational links between variables in the stress generation process (Liu, 2013). Thus, from this growing body of research, several important questions still remain. First, what factors account for (mediate) the relationship between these cognitive risk factors and negative dependent events? Second, can the findings on depression and cognitive risk factors be integrated into a mediational model of stress generation?

Although several cognitive risk factors have been explored in stress generation, such as rumination (Kercher & Rapee, 2009; McLaughlin & Nolen-Hoeksema, 2012) and self-criticism (Shahar & Priel, 2003; Shih, Abela, & Starrs, 2008), the risk factors featured in the hopelessness theory of depression – hopelessness and negative cognitive style – have received the most consistent support as stress generation predictors (Hamilton *et al.*, 2013, 2014; Joiner, Wingate, Gencoz, & Gencoz, 2005; Joiner, Wingate, & Otamendi, 2005; Safford, Alloy, Abramson, & Crossfield, 2007; Shih *et al.*, 2008; Simons, Angell, Monroe, & Thase, 1993). According to the hopelessness theory of depression (Abramson, Metalsky, & Alloy, 1989), individuals who interpret negative events as being caused by stable and global factors foresee negative implications for future events and infer negative characteristics about the self are said to have a negative cognitive style. This negative cognitive style (also called inferential, attributional, or explanatory style) is a cognitive risk factor that has been found to increase hopelessness (i.e., the general negative expectancy for future events and the feeling that there is nothing one can do to influence it), which in turn increases depression (Abramson *et al.*, 1989). Whereas a negative cognitive style is hypothesized to be a more distal risk factor for depression, hopelessness is theorized to be the more proximal risk factor for depression. Supporting this theory, research has found that negative cognitive style and hopelessness contribute to symptoms of depression (Hankin, 2008), and hopelessness has been found to mediate the relationship between negative cognitive style and depression (Metalsky, & Joiner, 1992).

More recently, the risk factors articulated in the hopelessness theory have been examined within the context of stress generation (Joiner, Wingate, Gencoz, & Gencoz, 2005; Joiner, Wingate, & Otamendi, 2005). Joiner, Wingate, Gencoz, and Gencoz (2005) extended the original hopelessness theory and proposed a stress generation model whereby hopelessness is considered the key aspect of depression that generates negative dependent events. Specifically, it was theorized that depression symptoms contribute to increases in negative dependent events inasmuch as levels of hopelessness increase. In partial support of this model, Joiner, Wingate, Gencoz, and Gencoz (2005) found that the extent to which hopelessness increased over time accounted for the relationship between initial level of depression symptoms and negative dependent events in college students. This suggests that depression symptoms contribute to generation of negative dependent

events in part because they lead to increased hopelessness. This model is summarized in the right side of Figure 1 (model 2). In contrast to the hopelessness theory (Abramson *et al.*, 1989), Joiner, Wingate, Gencoz, and Gencoz (2005) and Joiner, Wingate, and Otamendi (2005) considered hopelessness to be an aspect of depression symptoms rather than as an antecedent of depression. This raises an important question: do depression symptoms have an indirect link to negative dependent events through hopelessness, or does hopelessness have an indirect effect through depression symptoms?

Based on the original framework of the hopelessness theory of depression (Abramson *et al.*, 1989), it could be that depression symptoms mediate the relationship between depressogenic risk factors, such as hopelessness and negative cognitive styles, and negative dependent events (pictured on the left side of Figure 1; models 1 and 3). Surprisingly, this important question about the mediating sequence between cognitive risk factors and negative dependent events has received minimal attention. However, it is important to determine whether (1) the stress generation effects are actually because depression induces hopelessness; (2) the reverse is true and hopelessness (or negative cognitive style) induces depression; or (3) both are true. However, an additional alternative possibility is that hopelessness or depression symptoms have direct (partially independent) effects that are not mediated by the other. Suggestive of the latter possibility, negative cognitive style, the more distal risk factor for depression in the hopelessness model, has been found to predict negative dependent events, even controlling for depression symptoms (Hamilton *et al.*, 2014; Safford *et al.*, 2007; Shih *et al.*, 2008). Earlier research finds that individuals with a negative cognitive style are more likely to experience stressful life events, which are probably related to their own behaviour, such as poorer academic performance (Peterson & Barrett, 1987), risky gambling (Atlas & Peterson, 1990) and negative health outcomes (Lin & Peterson, 1990; Peterson, Seligman, & Vaillant, 1988).

Although these studies provide preliminary support for the independent role of negative cognitive style in stress generation, these studies have limited generalizability because the samples were selected based on cognitive risk to depression or included samples of children and early adolescents. More specifically, the study by Safford *et al.* (2007) selected participants based on having high or low cognitive risk for, and no current or past symptoms of, depression. Thus, this study excluded participants in the middle range of risk or with any past depression symptoms by design. The studies by Shih *et al.*

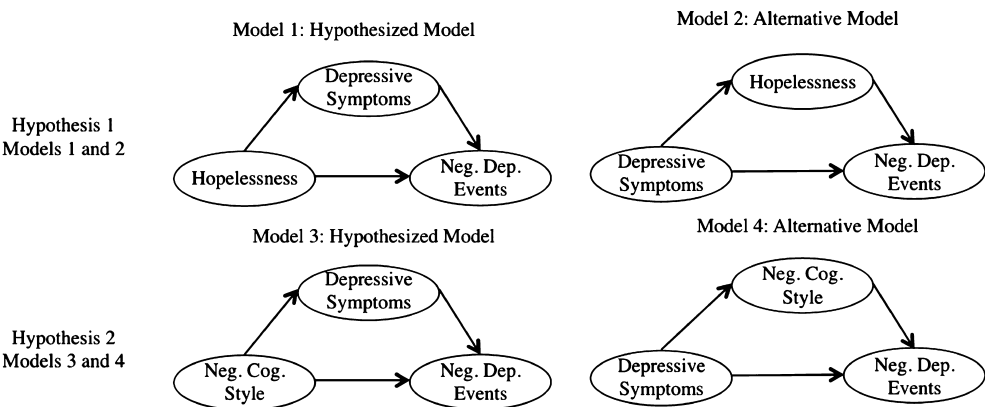


Figure 1. Conceptual single-mediator models tested in the present study.

(2008) and Hamilton *et al.* (2013, 2014) were conducted among a sample of early adolescents, which is a developmental period during which cognitive risk factors have not yet coalesced and may not yet be stable risk factors for depression (Cole *et al.*, 2008). Thus, no study to date has examined if negative cognitive style predicts negative dependent events because it contributes to higher levels of depression symptoms, or even hopelessness. This leaves the important question still open as to whether negative cognitive styles typically have direct effects on negative dependent events in a normal population, or whether negative cognitive styles contribute to the generation of negative dependent events through other factors, such as depression symptoms.

Clarifying the sequence through which individuals generate negative dependent events, which subsequently exacerbate depression symptoms, is crucial to target the appropriate point of intervention. For instance, identifying whether cognitive risk factors precede or succeed depression symptoms in the stress generation process would benefit resiliency programmes to focus on pre-cognitive risk factors, prevention (post-cognitive risk factors – pre- depression), or depression treatments in an effort to reduce stress generation, and ultimately depression (Haefel & Grigorinko, 2007). Furthermore, given research indicating that individuals with a history of depression are at greater risk of recurrent episodes of depression (Kessler, 2002), understanding whether individual characteristics play a role in stress generation, particularly the extent to which this is independent of depression symptoms, has important implications in preventing the first onset of depression.

Figure 1 describes the two general conceptual models discussed thus far that will be examined in this study. The left side of the figure (models 1 and 3) illustrates a model in which depression symptoms mediate the relationship between cognitive risk factors (i.e., hopelessness and negative cognitive style) and negative dependent events. In this model, hopelessness is the antecedent of depression symptoms, such that hopelessness contributes to negative dependent events through depression symptoms. The right side of the figure (models 2 and 4) illustrates an alternative set of models in which cognitive risk factors mediate the depression symptom-negative dependent event relationship. In these models, hopelessness may be considered a product of depression symptoms, such that depression symptoms contribute to negative dependent events because they lead to increases in hopelessness. Although these views may seem incompatible, hopelessness can be both a causal factor and product of depression symptoms and, by extension, negative dependent events. The same is not true for negative cognitive style, which is more trait-like and is only found to predict depression symptoms, and not to be a product of depression. That is, a negative cognitive style precedes onset of depression and not vice versa (Alloy *et al.*, 2000).

The variables discussed so far may lend themselves well to an integrated model (model 5), which is detailed in Figure 2. Previous research has established the temporal links of negative cognitive style preceding hopelessness (Abramson *et al.*, 1989), hopelessness preceding depression symptoms (Beck, 1963), and depression symptoms preceding

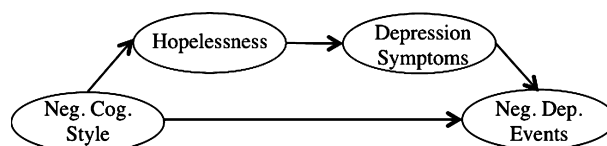


Figure 2. Multiple mediator model tested in the present study (Model 5).

negative dependent events (Hammen, 1991). Thus, an integrated model may involve negative cognitive style as the most distal predictor of negative dependent events, followed by hopelessness and then depression symptoms.

The present study

In the present short-term, prospective study, we sought to integrate the findings on negative cognitive styles and hopelessness in stress generation (e.g., Safford *et al.*, 2007; Shih *et al.*, 2008; Joiner, Wingate, Gencoz, & Gencoz, 2005; Joiner, Wingate, & Otamendi, 2005) into a mediational framework. Thus, three hypothesized mediational models were examined to test the specificity of direction in which depression symptoms mediated the relationship between hopelessness and negative dependent events (model 1) and negative cognitive style and negative dependent events (model 3). We also tested the reverse of these two models where hopelessness and negative cognitive style mediated the relationship between depression symptoms and negative dependent events (models 2 and 4), respectively. Finally, we tested a mediational model that involved all variables in the same model (model 5) pictured in Figure 2. Specifically, we tested whether the relationship between negative cognitive style and negative dependent events was mediated by (1) hopelessness followed by (2) depression symptoms.

Consistent with the hopelessness theory of depression (Abramson *et al.*, 1989), we hypothesized that depression symptoms would mediate the relationship between hopelessness and negative dependent events, but did not expect to find the reverse model of stress generation, where hopelessness mediates the relationship between depression symptoms and negative dependent events. Although we propose a different pathway from that proposed by Joiner, Wingate, Gencoz, and Gencoz (2005), we suggest this pathway as complementary to the original findings. It is important to consider that there are likely multiple pathways to the generation of negative dependent events. The present study will add to this body of literature by providing additional pathways in stress generation.

Second, building upon this first hypothesis, we tested a model where depression symptoms would mediate the relationship between negative cognitive style and negative dependent events. Negative cognitive style is a more distal predictor of depression symptoms and negative dependent events than hopelessness in the expanded hopelessness theory of depression. Thus, examining depression symptoms as a mediator in the relationship between negative cognitive style and negative dependent events would be a more stringent test of the theory. Third, we examined an integrated model combining the first two hypotheses along with the expanded hopelessness theory of depression. In a final integrated model, we hypothesized that in which negative cognitive style would contribute to hopelessness. This hopelessness, in turn, would lead to depression symptoms, which finally would predict greater negative dependent events.

Method

Participants

A total of 209 undergraduates from George Mason University, a large and diverse suburban university in the United States (84.2% female, mean age = 20.58 years, $SD = 4.08$, range 17–50) participated in a two- time point IRB-approved online study. Our university has a relatively high amount of non-traditional students (e.g., students who are older than 22 and have a role in addition to student, such as mother or husband; Morris, Brooks, & May,

2003), which contributed to the wide age range. Approximately 54% of the sample was Caucasian, 20% Asian, 12% African American, and the rest were another ethnicity.

Procedure

Participants were recruited from our university's psychology participant pool and received course credit for their participation in the study. Participants were assessed at two time points separated by approximately 4 weeks. Participants completed their second time point (T2) an average of 26.28 days ($SD = 3.45$ days) after completion of their first time point (T1). At T1, participants completed measures of hopelessness (BHS), cognitive style (CSQ), and current depression symptoms (BDI-II). At T2, participants completed a measure of life events (CLSI) that had occurred during the past 4 weeks (events that had occurred since T1). That is, we assessed all variables with the exception of life events at time 1, and then assessed events 4 weeks later at time 2 to establish temporal precedence of the cognitive risk variables.

Measures

Hopelessness

The Beck Hopelessness Scale (BHS; Beck, Weissman, Lester, & Trexler, 1974) is a 20-item true/false self-report measure that assesses negative expectations for the future. Higher scores indicate greater hopelessness. The internal consistency was found to be good in the current sample ($\alpha = .89$).

Negative cognitive style

The Cognitive Style Questionnaire (CSQ; Haeffel *et al.*, 2008) assesses inferences for 12 hypothetical negative and 12 hypothetical positive events. Participants are asked to imagine themselves in a situation ("A person you'd really like to develop a close friendship with does not want to be friends with you.") and then write one cause for the event. Participants then rate the cause for this event on dimensions of stability and globality on a seven-point Likert-type scale. The present study used a composite of all negative items to create an index of negative attributional style, with higher scores reflecting a more negative cognitive style. The CSQ demonstrated good internal consistency ($\alpha = .85$).

Depression symptoms

The Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996) is a 21-item self-report measure of current depression symptoms. The internal consistency was found to be excellent in the current sample ($\alpha = .90$).

Negative events

The College Life Stress Inventory (CLSI; Kohn, Lafreniere, & Gurevich, 1990) is a 75-item self-report measure of the occurrence of 32 positive and 43 negative life events. We chose this measure as it is specifically geared towards college students and includes events that are especially relevant to this population (e.g., "failed an important exam"). In contrast, other life events measures do not include as many college-relevant items, as they are meant for a general population. For the current study, the CLSI assessed the occurrence of life

events between the initial time point and the 4-week follow-up, and only negative dependent events were included in the analyses. Two raters (the first and second author) individually rated each event as either dependent or independent, and discordant ratings were resolved by consensus between the raters. We rated events based on guidelines using the criteria established in other studies of stress generation (e.g., Hammen, 1991). Dependent events were those that could be seen as at least partly a consequence of one's own behaviour (e.g., "difficulties with a roommate"). Independent events are those that are "fateful," or causes outside of one's own behaviour (e.g., "family member got in a car accident"). Excellent inter-rater reliability was found ($\kappa = .89$). The final set of items consisted of 18 dependent events and 12 independent events. The 13 items that relied heavily on subjective interpretation (e.g., "felt let down by friends") or were too high occurring in the sample (e.g., "felt overload in school work" was endorsed by almost everyone) were excluded.

Analytic strategy

To test the study hypotheses, we tested mediation using a robust bootstrapping approach (Hayes, 2009). Bootstrapping allows estimation of indirect effects in a manner that does not assume normal distribution of the dependent variable and is generally recommended as a stronger methodological test of mediation (Hayes, 2009). Bootstrapping produces a set of point estimates similar to Structural Equation Modeling, including a point estimate of total effects and 95% confidence interval for total indirect effects in a mediation model. Confidence effects that do not include zero are considered significant.

Results

Means, standard deviations, and intercorrelations between study variables are reported in Table 1. With the exception of hopelessness and T2 negative dependent life events ($r = .10, p = .15$), all variables were significantly and positively correlated.

Hypothesis 1: Depression symptoms mediate the hopelessness–negative dependent events relationship

To test our first hypothesis that depression symptoms would mediate the relationship between hopelessness and negative dependent events (model 1), we conducted analyses

Table 1. Means, standard deviations, and intercorrelations between study variables

	1	2	3	4
1. Hopelessness (BHS)	–			
2. Negative cognitive style (CSQ)	.26***	–		
3. Depression symptoms (BDI-II)	.70***	.22***	–	
4. T2 negative dependent events (CLSI)	.10	.14*	.20***	–
Mean	4.48	8.52	7.22	1.25
Standard deviation	2.21	1.97	7.86	1.30

Note. BHS = Beck Hopelessness Scale; CSQ = Cognitive Style Questionnaire; BDI-II = Beck Depression Inventory-II; CLSI = College Life Stress Inventory.

* $p < .05$; *** $p < .001$.

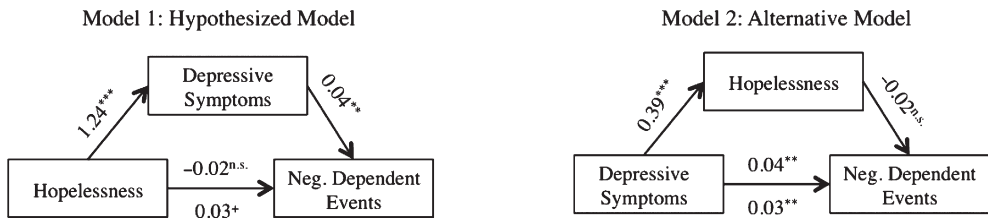


Figure 3. Mediation analyses testing hypothesis 1 (models 1 and 2): depression symptoms as a mediator of the hopelessness–negative dependent events relationship. Note. + $p < .15$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 2. Summary of indirect effects

Model	Point estimate	95% CI	
		Lower	Upper
1. Hopelessness → depression → neg. dep. events	0.0527	0.0121	0.1002
2. Depression → hopelessness → neg. dep. events	−0.0092	−0.0355	0.0142
3. Neg. style → depression → neg. dep. events	0.0258	0.0049	0.0562
4. Depression → neg. style → neg. dep. events	0.0038	−0.0011	0.0104
5. Neg. style → hopelessness → depression → events	0.0239	0.0043	0.0523

Note. Confidence intervals that include zero are non-significant. CI = confidence interval.

using bootstrapping (Hayes, 2009). The results of these analyses confirmed our hypothesis.¹

The left panel of Figure 3 shows the unstandardized regression coefficients from the analysis. In this model, there was no significant direct effect of hopelessness on negative dependent events ($b = 0.03$, $p = .15$). Nevertheless, it has been argued in several previous studies and theoretical papers that a significant direct effect is not a necessary criterion to examine total indirect effects (Hayes, 2009; MacKinnon, Krull, & Lockwood, 2000; Shrout & Bolger, 2002). In other words, it is still possible to have a meaningful indirect (mediated) effect even under conditions where the predictor does not have a direct effect on the outcome variable. There was a significant direct effect for hopelessness to depression symptoms ($b = 1.24$, $p < .001$) and for depression symptoms to negative dependent events ($b = 0.04$, $p < .01$), controlling for hopelessness. The effect of hopelessness on negative dependent events was reduced to non-significance when controlling for the effects of depression symptoms ($b = -0.02$, $p = .40$).

The test of indirect effects using bootstrapping analysis is shown in Table 2. Confidence intervals of the point estimates of indirect effects that do not include zero are considered significant. This analysis indicated that there was an indirect effect of hopelessness on negative dependent events through depression symptoms (point estimate = 0.0527, 95% CI: 0.0121–0.1002).

¹ Note. Incidentally, we conducted analyses for all predictor variables as predictors of negative independent events. Consistent with the stress generation theory, we found no significant prospective relationship with negative independent events for hopelessness ($b = 0.01$, $p = .469$), negative cognitive style ($b = 0.03$, $p = .273$), or depression symptoms ($b = 0.02$, $p = .199$). Given that there were no direct effects (as would be expected), we did not consider any further models using negative independent events.

In the right panel of Figure 3 (model 2), we tested the opposite model where hopelessness mediated the relationship between depression symptoms and negative dependent events (i.e., demonstration of specificity of the directionality of the models). We found no evidence for this model. When controlling for the indirect effects of hopelessness, the relationship between depression symptoms and negative dependent events actually got slightly stronger, rather than being reduced to non-significance. Furthermore, the 95% confidence interval for the bootstrapping analysis included zero (point estimate = -0.0092 , 95% CI: -0.0355 to 0.0124).

Hypothesis 2: Depression symptoms mediate the negative cognitive style–negative dependent events relationship

Our second hypothesis was that depression symptoms would also mediate the relationship between negative cognitive style and negative dependent events (model 3). We conducted the same set of analyses as in Hypothesis 1, but switched negative cognitive style with hopelessness as the predictor variable. The left panel of Figure 4 shows the unstandardized regression coefficients. There were significant direct effects of negative cognitive style to negative dependent events ($b = 0.09$, $p < .05$), negative cognitive style to depression symptoms ($b = 0.88$, $p < .001$), and depression symptoms to negative dependent events ($b = 0.03$, $p < .01$). The effect of negative cognitive style on negative dependent events was reduced to non-significance when controlling for the indirect effects of depression symptoms ($b = 0.07$, $p = .14$). Just as with Hypothesis 1, bootstrapping analyses also confirmed an indirect effect of negative cognitive style and negative dependent events through depression symptoms (point estimate = 0.0258 , 95% CI: 0.0049 – 0.0562).

Finally, as depicted in the right panel of Figure 4, we examined the reverse model where negative cognitive style mediated the relationship between depression symptoms and negative life events (model 4). Similar to Hypothesis 1, there were no significant indirect effects. When controlling for the indirect effects of negative cognitive style, the relationship between depression symptoms and negative dependent events was unaffected. The 95% confidence interval for bootstrapping included zero (point estimate = 0.0038 , 95% CI: -0.0022 to 0.0104).

Hypothesis 3: Multiple mediator model

Our third hypothesis was a multiple mediator model in which negative cognitive style would predict hopelessness, which would then predict depression symptoms, and finally,

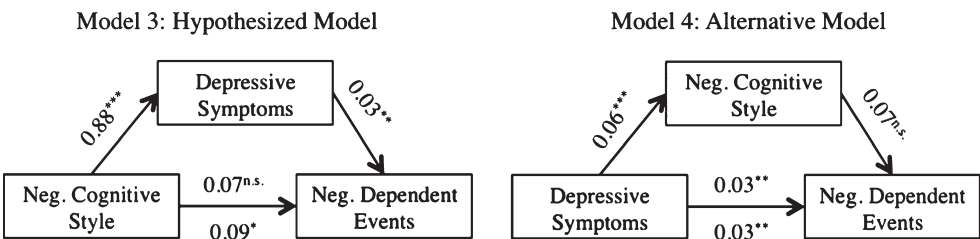


Figure 4. Mediation analyses testing hypothesis 2 (models 3 and 4): depression symptoms as a mediator of the negative cognitive style–negative dependent events relationship. Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

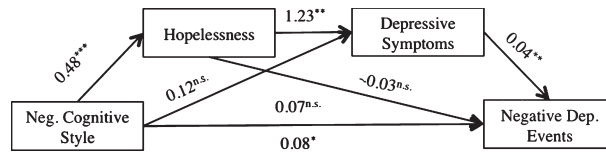


Figure 5. Multiple mediator analysis testing hypothesis 3 (model 5). Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

negative dependent events (model 5). This model integrates the first two hypotheses along with the hopelessness theory of depression where a negative cognitive style predicts hopelessness, which in turn predicts depression symptoms. To examine this model, we used another SPSS macro created by Hayes (2012). Figure 5 below shows the results of the multiple mediator analysis.

There were significant direct effects from negative cognitive style to negative dependent events ($b = 0.08$, $p < .05$), from negative cognitive style to hopelessness ($b = 0.48$, $p < .001$), from hopelessness to depression symptoms ($b = 1.23$, $p < .01$), and from depression symptoms to life events ($b = 0.04$, $p < .01$). In support of the mediation hypothesis, the relationship between negative cognitive style and negative dependent events was reduced to non-significance when controlling for the indirect effects of hopelessness and depression symptoms. Furthermore, bootstrapping confirmed the full mediation effect (point estimate = 0.0239, 95% CI: 0.0043–0.0523). Table 2 presents a summary of the findings of all hypotheses.²

Summary of findings

In the present study, we tested three sets of models. The first two sets of models contained a hypothesized model and an alternative model to examine the specificity of directionality between the risk factors (i.e., hopelessness and negative cognitive style) and depression symptoms. Thus, the independent variable and mediator from the hypothesized model were switched in the alternate model. The third model integrated the findings from the first two models. We found support for all three hypothesized models (models 1, 3, and 5) and did not find support for the two alternate models (models 2 and 4). Specifically, testing our first hypothesis, we found that depression symptoms mediated the relationship between hopelessness and negative dependent events (model 1). We did not find support for the reverse model where hopelessness mediated the relationship between depression symptoms and negative dependent events (model 2). In testing our second hypothesis, we found that depression symptoms mediated the relationship between negative cognitive style and negative dependent events (model 3), but we did not find support for the reverse model where negative cognitive style mediated the relationship between depression symptoms and negative dependent events (model 4). In testing our third hypothesis, we found that the relationship between negative cognitive style and negative dependent events was mediated first by hopelessness and then by depression symptoms (model 5).

² Note. Although not specifically hypothesized, we tested the multiple mediator model, switching the location of negative cognitive style and hopelessness. The indirect relationship between hopelessness and life events through negative cognitive style and depression symptoms was non-significant (point estimate = .0007, 95% CI: -0.0014 to 0.0039), and thus we do not discuss this model further.

Discussion

Although past research (e.g., Joiner, Wingate, Gencoz, & Gencoz, 2005; Joiner, Wingate, & Otamendi, 2005; Safford *et al.*, 2007) has shown that negative cognitive style and hopelessness are associated with stress generation (i.e., the generation of negative dependent events) over time, we demonstrated that such effects are mediated at least in part by depression symptoms. In other words, individuals who are cognitively at risk of depression may experience difficulties in interpersonal relationships in part because they are depressed. Thus, such cognitive risk factors may influence stress generation in large part through their effect on depression. We tested this theory in three related hypotheses. First, we found that depression symptoms mediated (1) the hopelessness–negative dependent event relationship (model 1) and (2) the negative cognitive style–negative dependent event relationship (model 3). However, we did not find evidence for the alternate models, in which hopelessness and negative cognitive style mediated the relationship between depression symptoms and negative dependent events (models 2 and 4). Finally, we found support for a model that integrated the first and second hypotheses, finding that first hopelessness and then depression symptoms mediated the negative cognitive style–negative dependent event relationship (model 5).

The current study provides a novel contribution to the literature by finding evidence that depression symptoms mediate the effects of depressogenic risk factors and negative dependent events. These findings suggest that individuals who have negative cognitive styles and experience hopelessness are more likely to experience negative dependent events in large part because of the depression engendered by these cognitive risk factors. Moreover, the study provides evidence for the specific temporal sequence of cognitive risk factors being mediated by depression, rather than the opposite sequence. That is, we found no support for the reverse sequence where the effect of depression on negative independent events was mediated by hopelessness and negative cognitive style. Overall, these findings are consistent with the hopelessness theory of depression and our hypothesized models in which depression mediates the impact of cognitive factors with stress generation.

In one light, the present findings might seem partly contradictory to previous studies that negative cognitive style predicted negative dependent events, even controlling for depression symptoms (e.g., Safford *et al.*, 2007). However, as previously noted, one feature of these studies is that the sample was selected based on high or low negative cognitive style and were excluded if they had a prior history of depression. Moreover, a surprising aspect of the findings by Safford *et al.* (2007) is that depression symptoms were uncorrelated with negative dependent events. This could be due to a sample with no past history of depression that may result in a restricted range of depression symptoms. It is important that future studies examine the relationship between cognitive factors, stress generation, and depression in clinical samples. Such findings will help shed more light on whether negative cognitive styles typically have direct effects or whether their influence on stress generation is mediated by depression symptoms.

The non-significant direct association between hopelessness and negative dependent events is somewhat surprising, given that previous studies, regardless of directionality, have found a relationship between the two variables (e.g., Joiner, Wingate, Gencoz, & Gencoz, 2005; Joiner, Wingate, & Otamendi, 2005). Although this non-significant relationship does not preclude our ability to test mediation (MacKinnon *et al.*, 2000),

future studies may be needed to replicate the non-significant finding. It may be that we found no relationship because while hopelessness may lead to depression and stress generation in some individuals, it may lead others to withdraw from situations when they are more likely to generate stressful events. That is, an individual may believe that others do not like him or her because he or she is unworthy of friends. Thus, this individual may avoid social contact, which would also reduce the possibility of generating stress with others (e.g., engaging in excessive reassurance seeking from others, which may lead to conflict). Consequently, it might be worth independently evaluating whether these findings replicate when evaluating events that are dependent, but not necessarily interpersonal in nature.

A strength of the current study is that it tested mediators of the stress generation effect using a short-term (4-week) prospective design. The benefit of such a design, as compared with a cross-sectional design, is that it permits stronger tests of temporal sequences that are assumed by mediational models. The current study also had a relatively large, ethnically diverse, sample that may make the findings more generalizable. Furthermore, although technically an undergraduate sample, the sample contained a large number of non-traditional students.

Nonetheless, there were several limitations to the present study that should be noted. Most importantly, it did not use an interview-based assessment of stress, which is considered the “gold standard” in life stress research (Hammen, Mayol, DeMayo, & Marks, 1986). Future studies should use an interview measure of life events, such as the Life Events Difficulties Schedule (Brown & Harris, 1978) or the UCLA Life Stress Interview (Hammen, 1991), which would strengthen these findings. Another limitation of the present study is that it only used levels of self-reported symptoms of depression in college students, and thus it would be useful for future studies to examine these effects in a clinical population. Next, we only assessed negative dependent events over a brief period of time. It will be important for future studies to examine the relationships between cognitive factors, depression, and negative dependent events over longer time intervals as well as using assessments at multiple points in time.

One direction for future research may be to examine other cognitive variables that have been found to be associated with stress generation within the model framework we have presented. For example, trait-like variables, such as neuroticism, have recently received attention within stress generation (Uliaszek *et al.*, 2012) and may function similarly to negative cognitive style as a distal predictor of stress generation. Additionally, more malleable variables that have been associated with stress generation, such as rumination (Kercher & Rapee, 2009; McLaughlin & Nolen-Hoeksema, 2012), may take the role of hopelessness as a more proximal mediator of depression symptoms and stress generation.

Another future direction would be to examine recursive effects within our framework. Although not specifically tested in the present study, our findings may be part of a recursive chain where the negative events that are generated by negative cognitive style and hopelessness by way of depressive symptoms act to generate further depression symptoms. For example, in our framework, an individual may interpret rejection from their romantic partner in a way that contributes to feelings of hopelessness or depression, which then causes them to start an argument with their partner. In a recursive framework, this argument with a romantic partner might lead to further feelings of hopelessness and depression, which perpetuate even more negative dependent events, such as a break-up of the relationship. Several recent daily and weekly diary studies have found support for this recursive models (Auerbach & Ho, 2012; Eberhart, Auerbach, Bigda-Peyton, & Abela,

2011). As these models require multiwave data (e.g., diary data or three or more prospective follow-up points), we were unable to assess recursive effects in the present study. Thus, recursive effects within our model should be examined in subsequent studies.

Despite these limitations, the present study has several clinical implications. Modifying one's negative cognitive style may serve to reduce hopelessness, which then reduces symptoms of depression. A recent study (Kleiman, Liu, & Riskind, 2013) finds that the tendency to give global and stable attributions to positive events (i.e., having a so-called *enhancing attributional style*) predicts decreased negative dependent events over time. This supports the idea that interventions that can increase positive cognitive styles (e.g., Riskind, Sarampote, & Mercier, 1996) may serve to reduce the generation of negative dependent events. Furthermore, the reduction of depression symptoms may reduce the occurrence of negative dependent events that may prevent subsequent symptoms of depression. Seligman *et al.* (1988) argued that modifying negative cognitive style is a key factor in the efficacy of cognitive behavioural therapy (CBT) for depression. Indeed, there are a variety of CBT interventions that may indirectly modify cognitive styles including cognitive restructuring or reattribution training (Beck, 1979; Hollon, DeRubeis, & Seligman, 1992). For instance, there are an increasing number of cognitive restructuring interventions that can be conducted with minimal resources over the internet (see Griffiths & Christensen, 2006 for a review). There are versions of these interventions that can be self-administered, providing a more accessible treatment (Fresco, Moore, Walt, & Craighead, 2009). Furthermore, another key component of CBT is reducing hopelessness, which reduces depression (Beck, 1963). Taken together, one of the reasons why CBT may be so effective at treating depression is through its reduction of these mechanisms (negative cognitive style and hopelessness) that contribute to the generation of negative life events. Clinicians may wish to target cognitive factors, specifically negative cognitive style and hopelessness, in therapy for clients who present with depression as the result of recent negative events, as it may be that these cognitive factors created both the negative events and the resulting depression.

References

- Abramson, L. Y., Metalsky, G. I., & Alloy, L. B. (1989). Hopelessness depression: A theory-based subtype of depression. *Psychological Review*, 96, 358–372. doi:10.1037/0033-295X.96.2.358
- Alloy, L. B., Abramson, L. Y., Hogan, M. E., Whitehouse, W. G., Rose, D. T., Robinson, M. S., ... Lapkin, J. B. (2000). The Temple-Wisconsin Cognitive Vulnerability to Depression Project: Lifetime history of Axis I psychopathology in individuals at high and low cognitive risk for depression. *Journal of Abnormal Psychology*, 109, 403–418. doi:10.1037/0021-843X.109.3.403
- Atlas, G. D., & Peterson, C. (1990). Explanatory style and gambling: How pessimists respond to losing wagers. *Behaviour Research and Therapy*, 28, 523–529. doi:10.1016/0005-7967(90)90139-A
- Auerbach, R. P., & Ho, M.-H. R. (2012). A cognitive-interpersonal model of adolescent depression: The impact of family conflict and depressogenic cognitive styles. *Journal of Clinical Child & Adolescent Psychology*, 41, 792–802. doi:10.1080/15374416.2012.727760
- Beck, A. T. (1963). Thinking and depression: I. Idiosyncratic content and cognitive distortions. *Archives of General Psychiatry*, 9, 324–333. doi:10.1001/archpsyc.1963.01720160014002
- Beck, A. T. (1979). *Cognitive therapy of depression*. New York: Guilford Press.

- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck depression inventory* (2nd ed.). San Antonio, TX: Psychological Corporation.
- Beck, A. T., Weissman, A., Lester, D., & Trexler, L. (1974). The measurement of pessimism: The hopelessness scale. *Journal of Consulting and Clinical Psychology*, 42, 861. doi:10.1037/h0037562
- Brown, G. W., & Harris, T. (1978). Social origins of depression: A reply. *Psychological Medicine*, 8, 577–588. doi:10.1017/S0033291700018791
- Cole, D. A., Ciesla, J. A., Dallaire, D. H., Jacquez, F. M., Pineda, A. Q., LaGrange, B., . . . Felton, J. W. (2008). Emergence of attributional style and its relation to depressive symptoms. *Journal of Abnormal Psychology*, 117(1), 16–31.
- Eberhart, N. K., Auerbach, R. P., Bigda-Peyton, J., & Abela, J. R. Z. (2011). Maladaptive schemas and depression: Tests of stress generation and diathesis-stress models. *Journal of Social and Clinical Psychology*, 30, 75–104. doi:10.1521/jscp.2011.30.1.75
- Fresco, D. M., Moore, M. T., Walt, L., & Craighead, L. W. (2009). Self-administered optimism training: Mechanisms of change in a minimally supervised psychoeducational intervention. *Journal of Cognitive Psychotherapy*, 23, 350–367. doi:10.1891/0889-8391.23.4.350
- Griffiths, K. M., & Christensen, H. (2006). Review of randomised controlled trials of Internet interventions for mental disorders and related conditions. *Clinical Psychologist*, 10, 16–29. doi:10.1080/13284200500378696
- Haefel, G. J., Gibb, B. E., Metalsky, G. I., Alloy, L. B., Abramson, L. Y., Hankin, B. L., . . . Swendsen, J. D. (2008). Measuring cognitive vulnerability to depression: Development and validation of the Cognitive Style Questionnaire. *Clinical Psychology Review*, 28, 824–836. doi:10.1016/j.cpr.2007.12.001
- Haefel, G. J., & Grigorinko, E. L. (2007). Cognitive vulnerability to depression: Exploring risk and resilience. *Child and Adolescent Psychiatric Clinics of North America*, 16, 435–448. doi:10.1016/j.chc.2006.11.005
- Hamilton, J. L., Stange, J. P., Kleiman, E. M., Hamlat, E. J., Abramson, L. Y., & Alloy, L. B. (2014). Cognitive Vulnerabilities Amplify the Effect of Early Pubertal Timing on Interpersonal Stress Generation During Adolescence. *Journal of Youth and Adolescence*, 43, 824–833. doi:10.1007/s10964-013-0015-5
- Hamilton, J. L., Stange, J. P., Shapero, B. G., Connolly, S. L., Abramson, L. Y., & Alloy, L. B. (2013). Cognitive vulnerabilities as predictors of stress generation in early adolescence: Pathway to depressive symptoms. *Journal of Abnormal Child Psychology*, 41, 1027–1039. doi:10.1037/0021-843X.95.2.114
- Hammen, C. (1991). Generation of stress in the course of unipolar depression. *Journal of Abnormal Psychology*, 100, 555–561. doi:abn/100/4/555
- Hammen, C., Mayol, A., DeMayo, R., & Marks, T. (1986). Initial symptom levels and the life-event-depression relationship. *Journal of Abnormal Psychology*, 95, 114–122. doi:10.1037/0021-843X.95.2.114
- Hankin, B. L. (2008). Stability of cognitive vulnerabilities to depression: A short-term prospective multiwave study. *Journal of Abnormal Psychology*, 117(2), 324.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, 76, 408–420. doi:10.1080/03637750903310360
- Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. Retrieved from <http://www.afhayes.com/public/process2012.pdf>
- Hollon, S. D., DeRubeis, R. J., & Seligman, M. E. P. (1992). Cognitive therapy and the prevention of depression. *Applied and Preventive Psychology*, 1, 89–95. doi:10.1016/S0962-1849(05)80149-0
- Joiner, T. E., Wingate, L. R., Gencoz, T., & Gencoz, F. (2005). Stress generation in depression: Three studies on its resilience, possible mechanism, and symptom specificity. *Journal of Social and Clinical Psychology*, 24, 236–253. doi:10.1521/jscp.24.2.236.62272

- Joiner, T. E., Wingate, L. R., & Otamendi, A. (2005). An interpersonal addendum to the hopelessness theory of depression: Hopelessness as a stress and depression generator. *Journal of Social and Clinical Psychology, 24*, 649–664. doi:10.1521/jscp.2005.24.5.649
- Kercher, A., & Rapee, R. M. (2009). A Test of a cognitive diathesis—Stress generation pathway in early adolescent depression. *Journal of Abnormal Child Psychology, 37*, 845–855. doi:10.1007/s10802-009-9315-3
- Kessler, R. C. (2002). Epidemiology of depression. In I. H. Gotlib & C. L. Hammen (Eds.), *Handbook of depression* (pp. 22–37). New York: Guilford.
- Kleiman, E. M., Liu, R. T., & Riskind, J. H. (2013). Enhancing attributional style as a resiliency factor in depressogenic stress generation. *Anxiety, Stress and Coping, 26*, 467–474. doi:10.1080/10615806.2012.684381
- Kohn, P. M., Lafreniere, K., & Gurevich, M. (1990). The Inventory of College Students' Recent Life Experiences: A decontaminated hassles scale for a special population. *Journal of Behavioral Medicine, 13*, 619–630. doi:10.1007/BF00844738
- Lin, E. H., & Peterson, C. (1990). Pessimistic explanatory style and response to illness. *Behaviour Research and Therapy, 28*, 243–248. doi:10.1016/0005-7967(90)90007-6
- Liu, R. T. (2013). Stress generation: Future directions and clinical implications. *Clinical Psychology Review, 33*, 406–416. doi:10.1016/j.cpr.2013.01.005
- Liu, R. T., & Alloy, L. B. (2010). Stress generation in depression: A systematic review of the empirical literature and recommendations for future study. *Clinical Psychology Review, 30*, 582–593. doi:10.1016/j.cpr.2010.04.010
- MacKinnon, D. P., Krull, J. L., & Lockwood, C. M. (2000). Equivalence of the mediation, confounding and suppression effect. *Prevention Science, 1*, 173–181. doi:10.1023/A:1026595011371
- Mazure, C. M. (1998). Life stressors as risk factors in depression. *Clinical Psychology: Science and Practice, 5*(3), 291–313.
- McLaughlin, K. A., & Nolen-Hoeksema, S. (2012). Interpersonal stress generation as a mechanism linking rumination to internalizing symptoms in early adolescents. *Journal of Clinical Child & Adolescent Psychology, 41*, 584–597. doi:10.1080/15374416.2012.704840
- Metalsky, G. I., & Joiner, T. E. (1992). Vulnerability to depressive symptomatology: A prospective test of the diathesis-stress and causal mediation components of the hopelessness theory of depression. *Journal of Personality and Social Psychology, 63*(4), 667–675.
- Morris, E. A., Brooks, P. R., & May, J. L. (2003). The relationship between achievement goal orientation and coping style: Traditional vs. nontraditional college students. *College Student Journal, 37*, 3–8.
- Peterson, C., & Barrett, L. C. (1987). Explanatory style and academic performance among university freshman. *Journal of Personality and Social Psychology, 53*, 603–607. doi:10.1037/0022-3514.53.3.603
- Peterson, C., Seligman, M. E., & Vaillant, G. E. (1988). Pessimistic explanatory style is a risk factor for physical illness: A thirty-five-year longitudinal study. *Journal of Personality and Social Psychology, 55*, 23–27. doi:10.1037/0022-3514.55.1.23
- Riskind, J. H., Sarampote, C. S., & Mercier, M. A. (1996). For every malady a sovereign cure: Optimism training. *Journal of Cognitive Psychotherapy, 10*, 105–117. doi:10.1891/0889-8391.23.4.350
- Safford, S. M., Alloy, L. B., Abramson, L. Y., & Crossfield, A. G. (2007). Negative cognitive style as a predictor of negative life events in depression-prone individuals: A test of the stress generation hypothesis. *Journal of Affective Disorders, 99*, 147–154. doi:10.1016/j.jad.2006.09.003
- Scher, C. D., Ingram, R. E., & Segal, Z. V. (2005). Cognitive reactivity and vulnerability: Empirical evaluation of construct activation and cognitive diatheses in unipolar depression. *Clinical Psychology Review, 25*, 487–510. doi:10.1016/j.cpr.2005.01.005
- Seligman, M. E., Castellon, C., Cacciola, J., Schulman, P., Luborsky, L., Ollrove, M., & Downing, R. (1988). Explanatory style change during cognitive therapy for unipolar depression. *Journal of Abnormal Psychology, 97*, 13–18. doi:10.1037/0021-843X.97.1.13

- Shahar, G., & Priel, B. (2003). Active vulnerability, adolescent distress, and the mediating/suppressing role of life events. *Personality and Individual Differences*, 35, 199–218. doi:10.1016/S0191-8869(02)00185-X
- Shih, J. H., Abela, J. R. Z., & Starrs, C. (2008). Cognitive and interpersonal predictors of stress generation in children of affectively ill parents. *Journal of Abnormal Child Psychology*, 37, 195–208. doi:10.1007/s10802-008-9267-z
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, 7, 422. doi:10.1037/1082-989X.7.4.422
- Simons, A. D., Angell, K. L., Monroe, S. M., & Thase, M. E. (1993). Cognition and life stress in depression: Cognitive factors and the definition, rating, and generation of negative life events. *Journal of Abnormal Psychology*, 102, 584–591. doi:10.1037/0021-843X.102.4.584
- Uliaszek, A. A., Zinbarg, R. E., Mineka, S., Craske, M. G., Griffith, J. W., Sutton, J. M., Epstein, A., *et al.* (2012). A longitudinal examination of stress generation in depressive and anxiety disorders. *Journal of Abnormal Psychology*, 121, 4–15. doi:10.1037/a0025835

Received 27 March 2012; revised version received 28 October 2013