

## **A PROSPECTIVE EXAMINATION OF DEPRESSIVE SYMPTOMOLOGY: UNDERSTANDING THE RELATIONSHIP BETWEEN NEGATIVE EVENTS, SELF-ESTEEM, AND NEUROTICISM**

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The current study examined whether self-esteem lability mediated the relationship between the occurrence of negative events and depressive symptoms and whether higher levels of neuroticism strengthened the association of the mediational pathways. The scar hypothesis was also explored to determine if depressive symptom levels impacted self-esteem lability. Results of idiographic, time-lagged

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hierarchical linear modeling indicated that self-esteem variability partially mediated the relationship between negative events and depressive symptoms. Further, while higher levels of neuroticism strengthened the association between (a) negative events and self-esteem and (b) self-esteem and depressive symptoms, it did not significantly moderate the relationship between negative events and depressive symptoms. Additionally, results indicated that higher levels of depressive symptoms did not mediate the relationship between negative events and self-esteem lability. The present findings suggest that self-esteem variability, as opposed to self-esteem level, plays a profound role in the temporal unfolding of depressive symptomatology.

Depression is one of the most prevalent mental health problems among youth, with up to 25% of adolescents experiencing at least one major depressive episode by the age of 18 (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993). Moreover, research suggests that depression has a chronic course, as individuals who experience a depressive episode in adolescence are two to four times more likely to experience a depressive episode in adulthood (Pine, Cohen, Cohen, & Brook, 1999). As depression negatively impacts the developmental trajectory of adolescents, researchers have begun to examine factors that may confer vulnerability.

A large corpus of research has indicated that the occurrence of negative events is a robust concurrent and prospective predictor of depression (e.g., Grant, Compas, Thurm, McMahon, & Gibson, 2004). However, not all individuals who experience negative events report depressive symptomatology (Ingram & Luxton, 2005). Thus, in order to better understand the etiology of depression, researchers have begun to examine transactional models that more clearly delineate the causal steps and vulnerability factors that lead to depression (e.g., Auerbach, Eberhart, & Abela, 2010). Such models posit that the occurrence of negative events triggers psychological vulnerabilities, which in turn contribute to the onset of depressive symptomatology. More specifically, transactional models delineate the temporal unfolding of symptomatology by examining the time-lagged relationship between negative events, underlying vulnerability predispositions, and subsequent depressive symptomatology.

## UNDERSTANDING THE ROLE OF SELF-ESTEEM

As the occurrence of negative events, especially achievement and interpersonal events, play a profound role in shaping self-esteem

(Kernis, 2005), it is likely that negative events exert their impact on depressive symptoms through the mediating role of self-esteem. Self-esteem is operationalized as the evaluative attitude toward the self that influences both moods and behavior (Baldwin & Hoffmann, 2002), and research has indicated that low self-esteem is a strong predictor of depression in adolescents (Kernis, 2005). More specifically, in a cross-sectional study results indicated that lower levels of self-esteem were associated with higher risk for major depression (Goodyer, Herbert, Tamplin, & Altham, 2000), and Southall and Roberts (2002) found that lower levels of self-esteem prospectively predicted higher levels of depressive symptoms in adolescents. While the vast majority of research to date has examined levels of self-esteem (i.e., low versus high), recent research has delineated three primary reasons to reconceptualize self-esteem as a state as compared to a trait variable (Block & Robins, 1993; Deihl, Vicary, & Deike, 1997). First, Kernis and colleagues (1993) posit self-esteem should be viewed as a dispositional quality, as it interacts with contextual factors to produce specific patterns of fluctuations. For example, adolescents may experience transient dips in their self-esteem if they display enhanced sensitivity to evaluative events or concern regarding their self-perception. Second, Baldwin and Hoffmann (2002) have found that self-esteem varies as a function of age. In a multi-wave longitudinal study examining the variability of self-esteem within adolescents, results of idiographic growth-curve analyses found that levels of self-esteem increased during early adolescence, decreased in mid-adolescence, and then increased as participants approached early adulthood (Baldwin, & Hoffmann, 2002). Last, Franck and De Raedt (2007) found that intraindividual variability in self-esteem, individuals who report levels of self-esteem below their own mean level of self-esteem, prospectively predicts higher levels of depressive symptoms and may be a more reliable predictor of such symptoms as compared to level of self-esteem.

While recent research has underscored the importance of examining self-esteem lability, to our knowledge, research has not examined the prospective relationship between negative events, self-esteem, and depressive symptomology. Therefore, in order to address a theoretical gap in the literature, the first goal of the present study is to examine whether the occurrence of negative events contributes to fluctuations in self-esteem and, subsequently, increases one's susceptibility to experience depressive symptomology.

## NEUROTICISM AS A DISTAL VULNERABILITY FACTOR

While self-esteem is a proximal vulnerability factor (Cheng & Furnham, 2003), neuroticism is thought to be a more distal vulnerability factor given that it is strongly linked to a genetic predisposition (e.g., Fullerton et al., 2003; Sen et al., 2003). Neuroticism, the tendency to experience negative affect and emotional instability as well as perceive the world as threatening and distressing, is associated with lower levels of life satisfaction (Fogle, Huebner, & Laughlin, 2002), lower levels of subjective well-being (Vitterso & Nilsen, 2002), and higher levels of anxious symptoms (Hayward, Killen, Kreamer, & Taylor, 2000; Millikan, Wamboldt, & Bihun, 2002). Cross-sectional and prospective studies have also found that higher levels of neuroticism are strongly associated with higher levels of both current and future depressive symptoms (e.g., Kuyken, Watkins, Holden, & Cook, 2006; Muris, Fokke, & Kwik, 2009). Further, research has indicated that a higher level of neuroticism moderates the relationship between negative events and depressive symptoms (Enns, Cox, & Clara, 2005).

At the same time, research has also indicated that neuroticism and self-esteem are strongly associated (e.g., Schmitz, Kugler, & Rollnik, 2003). For example, Cookson (1994) examined 604 convicted male offenders between the ages of 17 and 21, and results indicated that higher levels of neuroticism were strongly associated with lower levels of self-esteem (Cookson, 1994). Similarly, research with adolescent and university-aged samples has found that higher levels of neuroticism and lower levels of self-esteem were significantly correlated (Francis & James, 1996). Expanding on this research, a cross-sectional study with adults indicated that in addition to significant intercorrelations between neuroticism, self-esteem, and depressive symptoms, lower levels of self-esteem mediated the relationship between higher levels of both neuroticism and depressive symptoms (Cheng & Furnham, 2003). While these results suggest that neurotic tendencies are associated with low self-esteem, the study was cross-sectional and, thus, cannot examine how neuroticism contributes to self-esteem lability.

Consequently, the second aim of the present study is to examine the role that neuroticism plays in moderating the relationship between self-esteem lability and subsequent depressive symptoms. Kernis and colleagues (1993) assert that self-esteem is a dispositional quality and, therefore, it is likely impacted by both proximal

(e.g., negative events) and distal factors (e.g., neuroticism). In the context of our proposed mediation model, we hypothesized that whereas negative events would exert a more direct effect on self-esteem and symptom variability, higher levels of neuroticism would exert a more distal role in that it would moderate the mediational pathways. Such a view would be in line with past research indicating that higher levels of neuroticism moderate the pathway between negative events and depressive symptoms (Enns et al., 2005). Further, consistent with its more distal role, we also hypothesized that higher levels of neuroticism would moderate the mediational pathways between (a) negative events and self-esteem and (b) self-esteem and depressive symptoms.

### GOALS OF THE CURRENT STUDY

The current study aimed to address theoretical gaps in our understanding of self-esteem lability as well as the developmental unfolding of depressive symptomology. The study examined 160 adolescents using a multi-wave, longitudinal design. The first hypothesis examined whether self-esteem lability mediated the relationship between the occurrence of negative events and depressive symptoms. Second, we examined whether neuroticism strengthened the association (i.e., moderated) between (a) negative events and depressive symptoms, (b) negative events and depressive symptoms, and (c) self-esteem and depressive symptoms. Third, as research has indicated that female, as compared to male, adolescents report higher levels of depressive symptoms (Hankin, Abramson, Moffitt, Silva, McGee, & Angell, 1998), we examined whether females in the current study experienced a greater level of depressive symptoms. Last, past research examining the scar hypothesis (Rhode, Lewinsohn, & Seeley, 1990) suggests that depressive symptoms may shape personality predispositions (e.g., Shahar, Blatt, Zuroff, Kuperminc, & Leadbeater, 2004). More specifically, the scar hypothesis posits that the occurrence of depressive symptoms and/or a depressive episode may dramatically change an individual's personality development—similar to how a scar may materializes from a wound (Shahar et al., 2004). Thus, in accordance with the scar hypothesis, we examined whether depressive symptoms mediated the relationship between the occurrence of negative events and self-esteem lability.

## METHOD

### PARTICIPANTS

Participants in the current study were recruited from schools in the greater Montreal area. The final sample included 160 adolescents (54% females, 46% males) whose ages ranged between 12 and 18 years (mean 15.17,  $SD = 1.22$ ). The sample was 78.9% Caucasian, 5.6% Asian, 4.3% Black, 2.5% were First Nations' People and 8.7% reported "other" as their ethnicity. Participants' mother tongue included English (83.2%), French (13.7%), and other (3.1%).

### PROCEDURE

Prior to the initial assessment, letters were sent home to the parents describing the project and requesting consent for their child to participate in the present study. No student who received parental consent chose not to give personal consent. During the initial assessment, which occurred during class time on school grounds, participants completed a demographics form and the following questionnaires: (1) Center for Epidemiologic Studies Depression Scale (Radloff, 1977); (2) Multidimensional Anxiety Scale for Children (March, Parker, Sullivan, Stallings, & Conners, 1997); (3) NEO Five Factor Inventory neuroticism Subscale (Costa & McCrae, 1992); (4) Rosenberg Self-Esteem Questionnaire (Rosenberg, 1965) and (5) the Adolescent Life Event Questionnaire (Hankin & Abramson, 2002). Follow-up assessments occurred every six weeks (Times 2-4), and participants completed the self-report measures assessing depressive symptoms, anxious symptoms, self-esteem, and negative events.

### MEASURES

*Center for Epidemiologic Studies Depression Scale* (CES-D; Radloff, 1977). The CES-D is a 20-item self-report measure designed to assess levels of depressive symptoms. Examples of questions include: "I felt sad," "I enjoyed life," and "I felt I was just as good as other people." Items on the scale range from 0 to 3 and higher scores reflect greater depressive symptomology. The CES-D was administered on a monthly basis, however, respondents reported how they felt during the past week using the following scale: rarely (< 1 day),

some or a little of the time (1-2 days), occasionally or a moderate amount of time (3-4 days), and most or all of the time (5-7 days). The CES-D has been shown across numerous studies to have strong test-retest reliability and high correlations with other measures of depressive symptoms (Geisser, Roth, & Robinson, 1997). In the current study, Cronbach's alpha ranged from .91 to .94, indicating high internal consistency.

*Multidimensional Anxiety Scale for Children* (MASC; March, Parker, Sullivan, Stallings, & Conners, 1997). MASC is a 39-item self-report measure that assesses anxious symptoms. Examples of questions include "I feel tense or uptight," "I worry about what other people think of me," and "I feel restless or on edge." Items on the scale range from 0 (never) to 3 (often), and higher scores reflect greater levels of anxiousness. Past research has found that the MASC possesses strong test-retest reliability and high internal consistency as well as convergent validity with other self report measures of anxiety (March et al., 1997). In the present study, Cronbach's alpha ranged from .90 to .93, which indicates high internal consistency.

*NEO Five Factor Inventory Neuroticism Subscale* (FFI-N; Costa & McCrae, 1992). The FFI-N is a 12-item self-report measure that assesses neuroticism. Examples of questions include: "I often feel inferior to others," "I am seldom sad or depressed," and "Sometimes I feel completely worthless." Items are rated on a 5-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree), with higher scores indicating higher levels of neuroticism. Previous research suggests that the FFI-N possesses strong validity and test-retest reliability (Costa & McCrae 1992; Jang & Livesley, 1999). In the current study, Cronbach's alpha was .83, indicating high internal consistency.

*Rosenberg Self-Esteem Questionnaire* (SEQ; Rosenberg, 1965). The SEQ is a 10-item self-report questionnaire which asks participants to rate their feelings about the self. Examples of questions include: "I certainly feel useless at times," "I feel I do not have much to be proud of," and "I take a positive attitude towards myself." Items are rated on a 4-point Likert scale ranging from 1 (strongly agree) to 4 (strongly disagree), with higher scores reflecting greater levels of self-esteem. Past research utilizing the SEQ has found that it possesses both convergent and discriminant validity as well as strong test-retest reliability (Allgood-Merten, Lewinsohn, & Hops, 1990;

Silber & Tippet, 1965). In the current study, the Cronbach's alpha ranged from .90 to .93, indicating high internal consistency.

*Adolescent Life Events Questionnaire* (ALEQ; Hankin & Abramson, 2002). The ALEQ is a 57-item self-report measure that was developed to assess a broad range of negative life events (e.g., academic, peer, and family problems). Examples of items include: "A close friend moved away," "You got a bad report card," and "You got into a fight or argument with your girlfriend/boyfriend. Participants were asked to indicate how often such events occurred on a Likert scale ranging from 0 (never) to 4 (always), with higher scores reflecting a greater number of negative life events. Past research has found that the ALEQ is both reliable and valid (Hankin & Abramson, 2002). In the present study, Cronbach's alpha ranged from .92 to .93, indicating strong internal consistency.

#### OVERVIEW OF DATA ANALYTIC APPROACH

To examine our proposed mediation models, we utilized idiographic, time-lagged multilevel modeling, in which individuals were nested over time and followed the guidelines set forth by Bauer, Preacher, and Gil (2006). Such an approach is ideal for examining mediation models that include repeated measures, and given that the model is estimated in a single equation, one can directly estimate the covariance of the random effects that are encompassed in different Level 1 and Level 2 models. Consequently, Bauer and colleagues' (2006) data-analytic approach is preferable to mediation models that utilize a step-by-step process, which makes the implicit assumption that each of the steps is independent from one another (e.g., Baron & Kenny, 1986; Kenny, Korchmaros, & Bolger, 2003). In order to examine our lower-level mediation model with a single equation, it was necessary to use a selection variable,  $Z$ , by stacking  $Y$  and  $M$  (i.e., the dependent variable and mediator) for each unit  $i$  (i.e., individuals) within  $j$  (i.e., time) (Bauer, Preacher, & Gil, 2006). By using a single outcome variable, we can then fit a multivariate model using a univariate model approach. However, given that  $Z$  may represent different outcome variables (i.e., self-esteem and depressive symptoms), it is also necessary to create two separate selection variables,  $S_M$  and  $S_Y$ . Thus, when  $Z$  represents the mediator (i.e.,



self-esteem),  $S_M$  is set to equal 1 while  $S_Y$  is set to equal 0. In contrast, if  $Z$  is the outcome variable (i.e., depressive symptoms), then  $S_Y$  is equal to 1 and  $S_M$  is 0. An example of the single, simultaneous model is below.<sup>1</sup>

$$Z_{ij} = S_{Mij}(d_{Mij} + a_j X_{ij}) + S_{Yij}(d_{Yij} + b_j M_{ij} + c'_j X_{ij}) + \text{error}_{Zij}$$

To examine whether self-esteem<sub>(Time T-1)</sub> mediated the relationship between the occurrence of negative events<sub>(Time T-1)</sub> and depressive symptoms<sub>(Time T)</sub>, analyses were carried out using SAS (version 9.1) mixed procedure and maximum likelihood estimation. Given that we examined within-person changes, participants were required to complete a minimum of three assessments in order to establish reliable within person mean levels for negative events, self-esteem, and symptomology. It is important to note that no participant's data was excluded. Our dependent variable was within-subject fluctuations in depressive symptoms, which is a Level 1 variable. The primary predictor of depressive symptoms was negative events, a within-subject predictor and Level 1 variable, and the mediator was within-subject fluctuations of self-esteem (i.e., examining one's self-esteem score at a given assessment in comparison to his/her own mean level of self-esteem), a Level 1 variable. Four additional effects were also included in this initial mean structure. First, in order to control for individual differences in baseline levels of depressive symptoms, participant's initial depressive symptoms were included in the model. Second, in order to provide a more conservative examination of our hypotheses, we controlled for anxious symptoms throughout the follow-up period when predicting depressive symptoms. Third, in order to account for individual variability in the average level of depressive symptoms at his/her mean level of self-esteem, a random effect for intercept was included in the model. Last, given that self-esteem is a within-subject predictor whose effect is expected to vary from participant to participant, a random effect for slope was included in the model.

As the strength of any mediating model often depends on the moderator, we also examined whether neuroticism, a more distal vulnerability factor (Muller, Judd, & Yzerbyt, 2005), strengthened the mediational pathways. More specifically, we estimated models

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1. The example of the single, simultaneous models is drawn from Bauer, Preacher, and Gil (2006, p. 146).

in which neuroticism, a between-subject predictor and Level 2 variable, moderated the following pathways: (a) negative events to self-esteem, (b) negative events to depressive symptoms, and (c) self-esteem to depressive symptoms. Similar to the mediation model described above, the models utilized initial depressive symptoms and follow-up anxious symptoms as covariates. Additionally, random effects for intercept and slope were included.

## RESULTS

Means, standard deviations, and intercorrelations between all Time 1 measures are included in Table 1. Throughout the follow-up period, our retention rates were excellent. More specifically, the retention rates were as follows: (a) follow-up 1 = 94% ( $n = 151$ ), (b) follow-up 2 = 84% ( $n = 134$ ), and (c) follow-up 3 = 88% ( $n = 141$ ).

### PREDICTING DEPRESSIVE SYMPTOMS: IDIOGRAPHIC, TIME-LAGGED MEDIATION MODEL

Preliminary analyses indicated that none of the reported associations were moderated by either age or gender, and thus, analyses are presented for the entire sample as a whole. When examining the covariance structure, the best fit was first-order autoregressive. After choosing the covariance structure, we next examined the random-effects component of our model. The random intercept and random slope were significant and thus, retained in the model. The final results with respect to the fixed-effects component of the model are presented in Table 2. Of primary importance, a significant mediation model emerged. More specifically, when controlling for the proportion of variance accounted for by self-esteem<sub>(Time T-1)</sub> in predicting changes in depressive symptoms<sub>(Time T)</sub> ( $b = -0.27$ ,  $SE = 0.08$ ,  $t(713) = 3.42$ ,  $p < 0.001$ ), self-esteem variability<sub>(Time T-1)</sub> partially mediated the relationship between the occurrence of negative events<sub>(Time T-1)</sub> and depressive symptoms<sub>(Time T)</sub> ( $b = 0.07$ ,  $SE = 0.02$ ,  $t(713) = 3.93$ ,  $p < 0.001$ ) (see Figure 1). As the 95% confidence interval (0.01, 0.03) does not include 0 within the interval, it suggests that the mediation effect is significant.

**TABLE 1. Means, Standard Deviations, and Pearson Correlations for Initial Depressive Symptoms, Initial Anxious Symptoms, Neuroticism, Initial Self-Esteem, Initial Stress, Age, and Gender**

|                        | 1.      | 2.      | 3.      | 4.      | 5.     | 6.    | 7.   |
|------------------------|---------|---------|---------|---------|--------|-------|------|
| 1. Depressive Symptoms | —       |         |         |         |        |       |      |
| 2. Anxious Symptoms    | .57***  | —       |         |         |        |       |      |
| 3. Neuroticism         | .71***  | .66***  | —       |         |        |       |      |
| 4. Self-Esteem         | -.62*** | -.42*** | -.73*** | —       |        |       |      |
| 5. Negative Events     | .66***  | .42***  | .60***  | -.57*** | —      |       |      |
| 6. Age                 | .04     | -.05    | .03     | -.004   | .08    | —     |      |
| 7. Gender              | .13     | .25**   | .28***  | -.09    | .12    | .23** | —    |
| Mean                   | 13.84   | 77.58   | 33.50   | 19.84   | 104.30 | 15.17 | 0.45 |
| SD                     | 10.44   | 15.97   | 8.64    | 5.90    | 25.35  | 1.22  | 0.50 |

Note. Gender = coded variable (0 = Male and 1 = Female); \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

TABLE 2. Predicting Depressive Symptoms: Estimates of the Fixed Effects Component

| Predictor                                      | Parameter Estimate (b) | Standard Error | t-Value | Degrees of Freedom (df) |
|--|------------------------|----------------|---------|-------------------------|
| Self-Esteem Model:                             |                        |                |         |                         |
| Age  | -0.16                  | 0.28           | -0.56   | 713                     |
| Gender   | 0.12                   | 0.71           | 0.17    | 713                     |
| Initial Depressive Symptoms                    | -2.32                  | 0.38           | 6.03*** | 713                     |
| Anxious Symptoms                               | -0.02                  | 0.01           | 1.51    | 713                     |
| Negative Events                                | -0.05                  | 0.01           | 4.96*** | 713                     |
| Depressive Symptom Model <sub>(Time T)</sub> : |                        |                |         |                         |
| Age  | 0.21                   | 0.41           | 0.51    | 713                     |
| Gender   | 1.77                   | 1.03           | 1.72    | 713                     |
| Initial Depressive Symptoms                    | 3.71                   | 0.60           | 6.21*** | 713                     |
| Anxious Symptoms                               | 0.07                   | 0.02           | 2.77**  | 713                     |
| Negative Events(Time T-1)                      | 0.07                   | 0.02           | 3.93*** | 713                     |
| Self-Esteem(Time T-1)                          | -0.27                  | 0.08           | 3.42*** | 713                     |

Note. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

PREDICTING DEPRESSIVE SYMPTOMS: IDIOGRAPHIC, TIME-LAGGED MODERATED-MEDIATION MODEL

In our next set of analyses, we utilized the same data analytic approach outlined above (i.e., single, simultaneous model). However, we also explored whether neuroticism<sup>2</sup> moderated the mediational pathways. More specifically, we examined whether: (a) higher levels of neuroticism were associated with greater increases in depressive symptoms<sub>(Time T)</sub> following increases in negative events<sub>(Time T-1)</sub> (b) higher levels of neuroticism were associated with self-esteem variability<sub>(Time T-1)</sub> following increases in negative events<sub>(Time T-1)</sub> and (c) higher levels of neuroticism strengthened the association between self-esteem variability<sub>(Time T-1)</sub> and higher levels of depressive symptoms<sub>(Time T)</sub>. It is important to note that, prior to analyses, neuroticism scores, a between subject variable, were standardized. When examining the covariance structure, the best fit was first-order autoregressive. The random intercept and random slope

2. As one item on the neuroticism self-report measure assessed self-esteem, the item was omitted prior to estimating the moderated-mediation models. More specifically, the item "I often feel inferior to others" has been removed in order to provide a more conservative examination of our hypotheses.

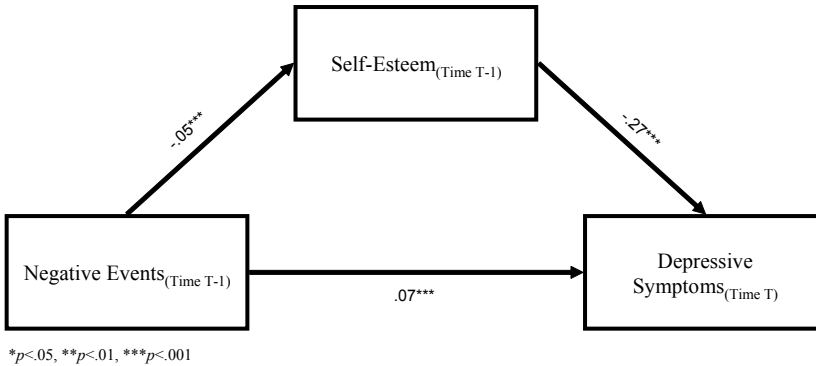
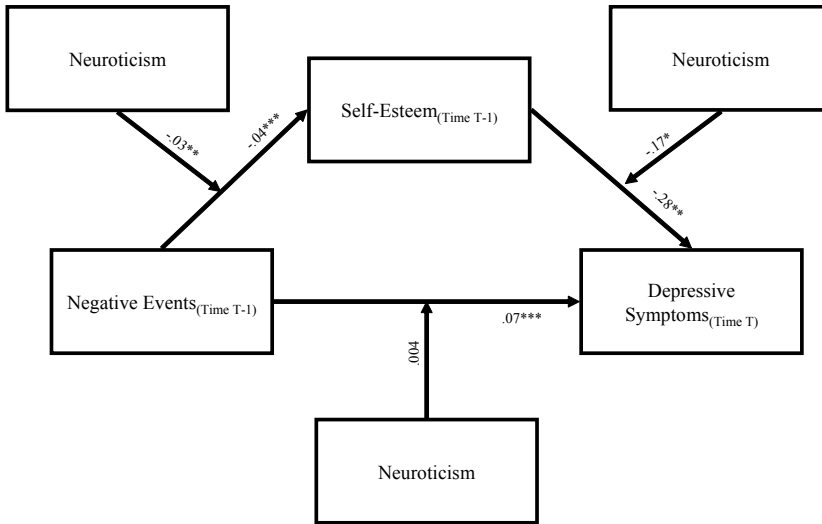


FIGURE 1. Mediation model examining the time-lagged relationship between the occurrence of negative events, self-esteem, and depressive symptoms.

were significant and retained in the model. The final results with respect to the fixed-effects component of the model are presented in Table 3. Of primary importance, a significant mediation model emerges. More specifically, when controlling for the proportion of variance accounted by self-esteem<sub>(Time T-1)</sub> predicting changes in depressive symptoms<sub>(Time T)</sub> ( $b = -0.27$ ,  $SE = 0.08$ ,  $t(708) = 3.27$ ,  $p < 0.01$ ), self-esteem variability<sub>(Time T-1)</sub> partially mediated the relationship between the occurrence of negative events<sub>(Time T-1)</sub> and depressive symptoms<sub>(Time T)</sub> ( $b = 0.07$ ,  $SE = 0.02$ ,  $t(708) = 3.51$ ,  $p < 0.001$ ) (see Figure 2). Further, while higher levels of neuroticism strengthened the relationship between (a) negative events<sub>(Time T-1)</sub> and self-esteem<sub>(Time T-1)</sub> ( $b = -0.03$ ,  $SE = 0.01$ ,  $t(708) = 3.03$ ,  $p < 0.01$ ) and (b) self-esteem<sub>(Time T-1)</sub> and depressive symptoms<sub>(Time T)</sub> ( $b = -0.16$ ,  $SE = 0.08$ ,  $t(708) = 2.20$ ,  $p < 0.05$ ), it did not significantly moderate the relationship between negative events<sub>(Time T-1)</sub> and depressive symptoms<sub>(Time T)</sub> ( $b = 0.004$ ,  $SE = 0.02$ ,  $t(708) = 0.23$ ,  $ns$ ). The 95% confidence interval (0.01, 0.02) suggests that the mediation effect is significant.

#### PREDICTING SELF-ESTEEM VARIABILITY: EXAMINING THE SCAR HYPOTHESIS

When examining the scar hypothesis, we conducted analyses using the same data analytic approach outlined above, with the exception being that our dependent variable was self-esteem variability during the follow-up period. Thus, we examined whether depres-



\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

FIGURE 2. Moderated-mediation model examining the impact of neuroticism on the time-lagged relationship between the occurrence of negative events, self-esteem, and depressive symptoms.

sive symptoms<sub>(Time T-1)</sub> mediated the relationship between negative events<sub>(Time T-1)</sub> and self-esteem variability<sub>(Time T)</sub>. As none of the reported associations were moderated by either age or gender, analyses are presented for the entire sample as a whole. When examining the covariance structure, the best fit was first-order autoregressive. After choosing the covariance structure, we next examined the random-effects component of our model. The random intercept and random slope were significant and thus, retained in the model. When controlling for the proportion of variance accounted for by depressive symptoms<sub>(Time T-1)</sub> predicting self-esteem lability<sub>(Time T)</sub> ( $b = -0.01$ ,  $SE = 0.03$ ,  $t(719) = -0.39$ ,  $ns$ ), depressive symptoms<sub>(Time T-1)</sub> did not mediate the relationship between the occurrence of negative events<sub>(Time T-1)</sub> and self-esteem variability<sub>(Time T)</sub> ( $b = 0.04$ ,  $SE = 0.01$ ,  $t(719) = 3.28$ ,  $p < .01$ ). Such findings suggest that the model is unidirectional.

## DISCUSSION

The current study provides support for our hypothesis that intraindividual variability of self-esteem mediates the relationship be-

TABLE 3. Predicting Depressive Symptoms in the Context of a Moderated-Mediation Model: Estimates of the Fixed Effects Component

| Predictor                                       | Parameter Estimate (b) | Standard Error | t-Value | Degrees of Freedom (df) |
|---|------------------------|----------------|---------|-------------------------|
| Self-Esteem Model:                              |                        |                |         |                         |
| Age   | -0.03                  | 0.24           | -0.11   | 708                     |
| Gender  | -1.17                  | 0.63           | -1.86   | 708                     |
| Initial Depressive Symptoms                     | 0.22                   | 0.43           | 0.50    | 708                     |
| Anxious Symptoms                                | 0.003                  | 0.01           | 0.25    | 708                     |
| Neuroticism                                     | 0.47                   | 0.99           | 0.48    | 708                     |
| Negative Events                                 | -0.04                  | 0.01           | 3.67*** | 708                     |
| Negative Events × Neuroticism                   | -0.03                  | 0.01           | 3.03**  | 708                     |
| Depressive Symptom Model <sub>(Time T1)</sub> : |                        |                |         |                         |
| Age   | 0.22                   | 0.40           | 0.56    | 708                     |
| Gender  | 1.57                   | 1.04           | 1.52    | 708                     |
| Initial Depressive Symptoms                     | 3.25                   | 0.72           | 4.54*** | 708                     |
| Anxious Symptoms                                | 0.07                   | 0.02           | 2.67**  | 708                     |
| Neuroticism                                     | -3.06                  | 1.78           | -1.72   | 708                     |
| Negative Events(Time T-1)                       | 0.07                   | 0.02           | 3.51*** | 708                     |
| Self-Esteem(Time T-1)                           | -0.28                  | 0.08           | 3.27**  | 708                     |
| Negative Events(Time T-1) × Neuroticism         | 0.004                  | 0.02           | 0.23    | 708                     |
| Self-Esteem(Time T-1) × Neuroticism             | -0.16                  | 0.08           | 2.20**  | 708                     |

Note. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

tween the occurrence of negative events and subsequent depressive symptoms. These effects were examined using a multi-wave, longitudinal design in a sample of adolescents. Several findings warrant additional attention.

#### SELF-ESTEEM AS A MEDIATOR OF NEGATIVE EVENTS AND DEPRESSIVE SYMPTOMS

The vast majority of research examining the relationship between negative events, self-esteem, and depressive symptoms has examined the impact of an individual's level (i.e., low versus high) as compared to the variability of self-esteem. At the same time, recent research has found that level of self-esteem likely varies in response to one's successes and failures (e.g., Block & Robins, 1993; Kernis, 2005; Zimmerman, Copeland, Shope, & Dielman, 1997), and, further, such "ebbs and flows of self-esteem are probably felt most keenly during the adolescent years" (Baldwin & Hoffman, 2002, pp. 101-102). In light of these findings, research has begun to examine the role that intraindividual variability of self-esteem plays in predicting depressive symptomology. More specifically, research has found that unstable self-esteem may be a more reliable predictor of depression as compared to examining lower levels of self-esteem (e.g., Franck & De Raedt, 2007). To date, no research has examined the prospective relationship between the occurrence of negative events, unstable self-esteem, and depressive symptoms in adolescent samples.

In line with our hypothesis, results indicate that unstable self-esteem partially mediates the relationship between the occurrence of negative events and depressive symptoms. These findings are consistent with past research examining cognitive vulnerability models of depression as they suggest that unstable self-esteem may reflect heightened reactivity to negative events as well as greater vulnerability to experience depressive symptoms (Greenier et al., 1999; Kernis, 2005). More specifically, such models posit the occurrence of negative events activates maladaptive cognitions in vulnerable individuals (Beck, 1983; Young, 1990). Once activated, maladaptive beliefs that are associated with unstable self-esteem trigger a pattern of negatively biased, self-referent information processing that ultimately culminates in the onset of depressive symptoms.



## EXAMINING THE DISTAL ROLE OF NEUROTICISM

Presently, many researchers are skeptical of the role that neuroticism plays in the manifestation of psychopathology (e.g., Westen, 1996). More specifically, while Costa and McCrae (1992) purport that neuroticism is an enduring and underlying personality predisposition, other researchers have questioned whether neuroticism and depressive symptoms are truly independent constructs given the high correlation between them (e.g., Block, 2001). In response to these concerns, researchers have begun to examine whether neuroticism provides incremental predictive validity when examining etiological models of depression. For example, Dunkley, Sanislaw, Grilo, and McGlashan (2006) demonstrated that both self-critical perfectionism and neuroticism provide unique contributions when predicting depressive symptomology. Such findings are particularly germane to the present study as self-esteem and self-criticism are overlapping self-concept attributes. When examining the role that neuroticism plays within the moderated-mediation model, the results indicate that there are multiple pathways, both direct and indirect, in which neuroticism may exert its impact. More specifically, higher levels of neuroticism significantly moderate the relationship between (a) negative events and unstable self-esteem and (b) unstable self-esteem and depressive symptoms. At the same time, as higher levels of neuroticism do not strengthen the association between negative events and depressive symptoms, neuroticism does not appear to directly influence depressive symptom levels following negative events.

These findings suggest that neuroticism may exert a more distal, indirect effect. One possibility may be that individuals who report higher levels of neuroticism have a tendency to perseverate about negative events while at the same time devaluing positive life experiences (Osorio, Cohen, Escobar, Salkowski-Bartlett, & Compton, 2003). The selective abstraction of information may result in lower levels of self-esteem as one's assessment of self-worth will be contingent upon a biased array of negative cognitions (Leung & Wong, 1998). Such instability may then increase the likelihood of experiencing depressive symptoms.

Alternatively, research has indicated that neuroticism is a significant predictor of stress generation (Hammen, 2005; Kendler, Karkowski, & Prescott, 1999) as higher levels of neuroticism predispose individuals to "stressful life events and depression, or to sensitivity to respond to stressors with depression" (Hammen, 2005, p. 306). Research has typically examined whether neuroticism directly

moderates the relationship between negative events and depression without accounting for indirect pathways to depression (e.g., Kendler, Karkowski, & Prescott, 1999). At the same time, it may be that a greater tendency to experience negative events, specifically dependent, interpersonal stressors, may have adverse effects on individuals' self-esteem, which subsequently increases the likelihood of experiencing depressive symptoms over time. In line with this view, the results from the current study suggest that the higher levels of neuroticism affect the stability of individuals' self-esteem, and such instability then interacts with higher levels of neuroticism to predict increased depressive symptom scores.

### THE SCAR HYPOTHESIS

The scar hypothesis suggests that the occurrence of depressive episodes and/or depressive symptomology has the capacity to shape one's personality (e.g., Shahar & Davidson, 2003; Shahar, Scotti, Rudd, & Joiner, 2008). For example, Shahar and Davidson (2003) examined the cross-lagged relationship between self-esteem and depressive symptoms amongst a psychiatric population, and results indicated that participants' baseline depressive symptoms predicted lower levels of self-esteem during the subsequent four months. Such findings are consistent with scar models of depression in which the deleterious effects of depression negatively impact personality attributes over time (Rhode, Lewinson, & Seeley, 1990). In contrast, the present study found that the scarring effects of depressive symptoms did not significantly impact self-esteem lability. Thus, the present findings are more consistent with vulnerability models as they posit underlying personality characteristics are "causative forces in depression" (Shahar & Davidson, 2003, p. 890). Despite these empirical differences, it is important to note that the current study examined symptom fluctuation in a non-clinical sample, and, thus, the scar model of depression may be more applicable for individuals who have a history of clinically significant depression.

### GENERAL COMMENTS

The proposed mediation and moderated-mediation models highlight the mechanism through which negative events lead to depressive symptomology and, thus, have important clinical implications.

More specifically, the presence of negative events activates dysfunctional cognitive processes related to negative self-evaluations (e.g., "I am a failure" or "I am worthless") which then amplifies an individual's depression. Consequently, researchers and clinicians have begun to explore more effective ways to improve and stabilize an individual's self-esteem as many view this as the key to reduce the depressive symptomology (Shirk, Burwell, & Harter, 2003; Wallis, 2005). As Shirk and colleagues (2003) found that low levels of self-esteem are associated with schematic processing biases and cognitive distortions, cognitive behavioral interventions are targeting maladaptive cognitions of the "self" that underlie excessive self-criticism, magnification of failures, minimization of personal resources, and unfavorable comparisons with peers. Thus far the results have been favorable as recovered patients who report more stable and higher levels of self-esteem following treatment have a lower likelihood of experiencing recurrent depressive symptoms (Taylor & Montgomery, 2007; Wallis, 2005).

Several limitations of the current study should be noted. First, self-report measures were utilized to assess depressive symptoms. While the CES-D possesses strong validity and reliability, one cannot determine whether individuals would satisfy criteria for clinically significant disorders based upon self-report questionnaires. Consequently, future research should use more sophisticated assessment techniques, such as semi-structured clinical interviews (e.g., Kiddie-Schedule for Affective Disorders and Schizophrenia), to examine whether the current findings generalize to the onset of clinically diagnosed depressive disorders. Second, self-report measures were also used to measure the occurrence of life events. As the life-events measure only requires participants to indicate whether or not an event occurred, we cannot determine the subjective impact of the stressors. Additionally, we cannot disentangle whether the stressors were dependent or independent in nature. As past research has found that gender differences in depression may emerge based on the type of stressors adolescence experience (Hankin, Mermelstein, & Roesch, 2007; Shih, Eberhart, Hammen, & Brennan, 2006), such a distinction may prove to be important. Consequently, future research should utilize more comprehensive diagnostic interviews. Last, participants in the current study were predominantly Caucasian. The homogeneity of this sample may pose some limitations as to the generalizability of our results to other populations, and, thus, future research should replicate our findings in more culturally diverse, community-based samples.

In sum, the present study provides a deeper understanding of the relationship between neuroticism, self-esteem, negative events, and depressive symptoms. By examining self-esteem as a state as opposed to a trait measure, it more clearly delineates the temporal unfolding of depressive symptoms. As a result, clinicians can target self-esteem as a central focus of intervention and treatment programs by helping adolescents develop more stable and healthier levels of self-esteem. In doing so, they may prevent adolescents from experiencing clinically significant levels of depressive symptoms as well as associated problems that may stem from diagnoses of depression.

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