

PERSONALITY AND DEPRESSIVE SYMPTOMS: STRESS GENERATION AND COGNITIVE VULNERABILITIES TO DEPRESSION IN A PROSPECTIVE DAILY DIARY STUDY

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Personality and psychopathology have long been associated, however the mechanisms that account for this link are less understood. Stress generation was examined as a potential mechanism to explain the association between personality traits, especially negative emotionality, and depressive symptoms. In addition, the moderating influence of cognitive vulnerabilities to potentiate the relation between stressors and depressive symptoms was investigated. These hypothesized processes were evaluated in a prospective daily diary study in which young adults ($N = 210$) completed baseline measures of personality, dysfunctional attitudes, negative cognitive style, and depressive symptoms. The participants then recorded their levels of depressive symptoms and the occurrence of stressors daily for 35 days. Negative Emotionality-Stress Reaction (NEM-SR) predicted initial levels and trajectories of depressive symptoms and stressors over time. Daily stressors partially mediated the longitudinal association between baseline NEM-SR and trajectories of daily depressive symptoms. Both dysfunctional attitudes and negative cognitive style interacted with these additional stressors to predict prospective fluctuations of daily depressive symptoms.

Since the fourth century B.C., philosophers and scientists have postulated an association between one's personality and the propensity to experience emotional suffering (Kagan, 1997). However, despite the wealth of evidence showing that personality traits may serve as a vulnerability to psychopathology, few studies have examined the mechanisms and etiology of the relationship. Thus, there is surprisingly little knowledge on the prospective mechanisms that explain

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how personality traits contribute to emotional distress. The current research examined the mechanisms through which personality is associated with depressive symptoms prospectively by investigating hypotheses from the elaborated cognitive vulnerability-transactional stress theory of depression (Hankin & Abramson, 2001). In particular, this study evaluated whether negative emotionality predicts prospective generation of additional stressors over time, and whether cognitive vulnerabilities interact with these additional stressors to predict prospective elevations of depressive symptoms.

PERSONALITY AS A VULNERABILITY TO DEPRESSION

As personality psychologists have largely agreed on the existence of broad-based, stable, individual difference personality characteristics (Goldberg, 1992; Tellegen, 1991), the scientific inquiry into the relation between personality and emotional distress has been reawakened. Although the precise number and structure of higher-order personality traits (e.g., Big 5 versus Big 3) is still debated (Watson, Clark, & Harkness, 1994), theory and evidence suggests that meaningful connections can be made between these two dominant personality approaches (Clark, 2005; Tackett & Krueger, 2005). In this integrative, hierarchical model of personality, Neuroticism, or Negative Emotionality (NEM) is represented similarly across five-trait and three-trait models, the Big 5 traits of Extraversion and Openness are best represented at a subordinate level to a broad Positive Emotionality (PEM) trait factor, and the Big 5 traits of Agreeableness and Conscientiousness appear at a subordinate level to the third trait of Constraint. The role of two of these broad personality trait factors, specifically NEM and PEM, and how they are linked with depressive symptoms is the focus of the present research.

Negative emotionality, or neuroticism, reflects the extent to which an individual perceives and experiences the world as threatening or distressing (Watson et al., 1994). Individuals who score highly on this trait are more likely to report feeling negative emotions (e.g., anxiety, depression, anger, shame, and guilt) more intensely and frequently, suffer from a wide variety of problems, feel inadequate or inferior, and experience higher levels of stress (Watson et al., 1994). Positive Emotionality refers to traits that describe cheerfulness, dominance, excitement, vigor, and states of positive engagement. In addition, these broad-trait factors can be separated meaningfully into narrower-band traits that are subsumed under the super-factor

trait. Specifically, in this hierarchical model of personality (Tellegen, 1985, 1991), Negative Emotionality can be broken down into Stress Reaction (negative emotional dispositions, which is most similar to Neuroticism as traditionally defined), Alienation (estrangement), and Aggression (confrontation). Positive Emotionality can be separated into Social Closeness (communion), Well-Being (positive emotional dispositions), and Achievement/Social Potency (agency).

An extensive corpus of research consistently links depression with negative emotionality (for reviews, see: Clark, 2005; Clark, Watson, & Mineka, 1994; Widiger, Verheul, & Van den Brink, 1999). To date, Krueger has provided some of the best evidence that various broad- and narrow-band personality traits operate as a predisposition to predicting depressive symptoms prospectively. In particular, he found that the broad-band trait of negative emotionality and the narrow-band traits of Stress Reactivity and Alienation at age 18 prospectively predicted depression at age 21, even after controlling for mental disorders at age 18 (Krueger, 1999). Additionally, the narrow-band factors of PEM—Well-Being, Aggression, and Harm Avoidance—predicted depression, whereas Social Potency, Social Closeness, Control, and Traditionalism did not. In addition, other theory (e.g., Clark, 2005) and evidence (e.g., Durbin, Klein, Hayaen, Buckley, & Moerk, 2005; Hayden, Klein, Durbing, & Olino, 2006) highlight the potential role of positive emotionality as a temperamental/trait vulnerability to depression. Given this background, the current study focuses primarily on PEM and NEM and their narrower-band traits that capture a wide range of individual differences and have been shown to prospectively predict depressive symptoms.

Despite the evidence linking personality to depression, very few studies have examined the processes by which individual difference personality characteristics lead to later depressive symptoms. The few etiological studies to explore processes mediating the personality and psychopathology association have mostly used cross-sectional designs, yet cross-sectional studies lack the methodological strengths needed to understand the complex dynamics that may be involved in explaining the processes linking personality to depressive symptoms over time. The existence of few prospective studies, and even fewer studies examining theoretically motivated mediating mechanisms and etiology of this association, leave much of the relationship between personality and depressive symptoms unknown. This has resulted in a literature with many gaps and inconsistencies (Klein, Durbin, Shankman, & Santiago, 2002). The pri-

mary goal of the current study is to address this gap and examine whether generation of relatively objective stressors can explain how personality traits contribute to the prospective maintenance and course of depressive symptoms.

MEDIATING MECHANISMS FOR THE PERSONALITY-DEPRESSION ASSOCIATION

Hankin and Abramson (2001) proposed an elaborated cognitive vulnerability-transactional stress model of depression that conceptualizes personality as a pre-existing distal vulnerability that increases the likelihood for experiencing later depressive symptoms. They posit that the relationship between personality, especially NEM, and depressive symptoms may be explained by an increased likelihood of encountering more negative events (i.e., stress generation). Moreover, individuals with higher trait levels of NEM are hypothesized to exhibit greater cognitive vulnerability to depression, and this greater cognitive vulnerability potentiates the stress-depressive symptoms association. In the sections that follow, the components in this process are introduced, and the available evidence that has examined independent aspects of this model is reviewed.

Stressors. Interpersonal theories of depression suggest that some individuals are more prone to create more stressors in their lives (Hammen, 1991, 1999). This stress generation process is hypothesized to occur because individuals, due to stable characteristics (e.g., personality traits) or temporary state (e.g., dysphoria), interact socially with others in ways that increase the likelihood of their experiencing further negative life events. Consistent with the stress generation process, people exhibiting elevated depressive symptom levels (e.g., Adrian & Hammen, 1993; Daley, Hammen, Burge, & Davila, 1997) and insecure attachment (Hankin, Kassel, & Abela, 2005) prospectively encounter more stressors over time (see Hammen, 2005, for a review of various factors that predict stress generation). Initial evidence also suggests that stress generation transpires for individuals high on trait-negative emotionality as they report encountering more negative events over time (Van Os & Jones, 1999). Kendler, Gardner, and Prescott (2003) found that self-reported negative emotionality prospectively predicted the occurrence of stressful life events, such as marital problems, job loss, financial difficulties, and problems getting along with others in their social network. Among adolescents, Wetter and Hankin (2009) showed the youth high in NEM reported more dependent stressors over time.

Cognitive Vulnerabilities to Depression. Cognitive vulnerability theories of depression seek to capture the processes by which individuals explain and interpret stressful negative environmental experiences, and as such, explain how people will experience elevations of depressive symptoms. Negative cognitive style (Abramson, Metalsky, & Alloy, 1989) and dysfunctional attitudes (Beck, 1987) are two prominent cognitive vulnerabilities that predict depressive symptoms. A negative cognitive style consists of an individual's propensity to make the following kinds of negative inferences given the occurrence of negative events: causal inferences (i.e., inferences about why the event occurred, including stable and global attributions), inferred consequences, and inferences about the self. Dysfunctional attitudes involve themes of loss, inadequacy, failure, and worthlessness. Cognitive vulnerability theories of depression approach the study of depression from a vulnerability-stress perspective and hypothesize that individuals with greater cognitive vulnerability are more likely to become depressed following the occurrence of a negative event (Abramson et al., 1989; Beck, 1987). Both negative cognitive style and dysfunctional attitudes have been shown to be associated with depressive symptoms in cross-sectional research (Ingram, Miranda, & Segal, 1998; Abramson, Alloy, Hankin, Haefel, MacCoon, & Gibb, 2002, for reviews) and prospective cognitive vulnerability-stress studies (e.g., Hankin, Abramson, Miller & Haefel, 2004; Joiner, Metalsky, Lew, & Klocek, 1999; Metalsky & Joiner, 1992). Thus, the cognitive vulnerability-stress interaction precedes and predicts depressive symptoms.

In addition to functioning as a potent predictor of depressive symptoms, theory and initial evidence suggest that cognitive vulnerability is associated with negative emotionality. Clark and colleagues (1994) reviewed evidence linking a negative attributional style to negative emotionality. Importantly, NEM and cognitive vulnerabilities, specifically a negative cognitive style and dysfunctional attitudes, are moderately correlated but factorially distinct and independent constructs (Hankin et al., 2007).

THE PRESENT RESEARCH

In summary, Hankin and Abramson's (2001) model suggests that individuals who score highly on negative emotionality trait scales may be more likely to create additional stressors in their environ-

ment, are more likely to exhibit cognitive vulnerabilities, and are more likely to interpret such negative events in a depressogenic manner. In order to examine these hypotheses, first this study¹ explored how individuals' scores on trait scales contribute to the likelihood of experiencing depressive symptoms, both initial levels and prospective trajectories, after controlling for prior levels of depressive symptoms. Second, it was hypothesized that individuals with higher scores on NEM would encounter more negative events prospectively (i.e., stress generation). Third, it was hypothesized that these additional stressors would mediate, at least partially, the prospective negative emotionality-depressive symptoms link. Other personality factors, specifically Positive Emotionality (i.e., the subscales of Well-Being and Social Closeness), were also examined as predictors of depressive symptoms and as an investigation of specificity between personality dimensions and depression. For example, stressors mediated the NEM link with later depressive symptoms among adolescents, whereas reduced social support, but not stressors, mediated the PEM association with later depressive symptoms (Wetter & Hankin, 2009). Finally, the interaction of cognitive vulnerability and these additional negative events was examined to evaluate if cognitive vulnerability interacted with these additional stressors to predict prospective fluctuations in depressive symptoms above and beyond the influence of NEM, a robust predictor of depressive symptoms.

1. The data from this study come from a daily diary study. Some findings from this dataset were published elsewhere (Hankin, Fraley, & Abela, 2005), yet the results from that report were substantially distinct from the hypotheses and goals of the present study. The primary aim of the prior publication (Hankin, Fraley, et al., 2005) was to examine daily negative cognitions. Results showed that daily negative cognitions are structured in a trait-like manner and are associated with prospective fluctuations in daily depressive symptoms. The present study addressed unique and distinct questions and included novel data that were separate from the prior paper. Specifically, this study sought to understand the dynamic mechanisms, based on the elaborated cognitive vulnerability-transactional stress theory, through which negative and positive emotionality contribute to depressive symptoms over time. In particular, this study uniquely focused on the role that objective stressors, assessed daily over a month, operate as mediators of the personality-depressive symptoms association. Thus, the present study makes a distinct contribution and includes new data (i.e., objectively coded daily stressors) not reported in the previous publication. In particular, the inclusion of daily reported stressors as well as other baseline personality traits (e.g., positive emotionality), the examination of cognitive vulnerabilities interacting with these daily reports of stressors to predict depressive symptoms beyond baseline personality traits, in concert with the different theoretical framework guiding the questions and hypotheses, make the present study a distinct and substantive contribution beyond the prior report.

METHOD

PARTICIPANTS

Participants were undergraduate students who volunteered for extra credit in an Introductory Psychology class. There were 217 (62 male) participants who completed the baseline questionnaire assessment. Participants' ages ranged from 18 to 23 ($M = 18.7$, $SD = .96$); over 85% of the sample was Caucasian.

Design Considerations. To provide a relatively more rigorous test of our hypotheses, a daily diary design was used with multiple waves of assessing depressive symptoms and stressors. The two time point design of some prior research (e.g., Lakdawalla & Hankin, 2008; Ormel & Wohlfarth, 1991; Van Os & Jones, 1999) may not provide as rigorous an investigation as a multi-wave prospective study (Curran & Willoughby, 2003). Still, the most powerful design for testing personality and depression interplay would include assessing risk factors prior to onset of major depression (Klein et al., 2002). The present multi-wave daily diary design enabled an in-depth examination of the dynamic associations among stressors and depressive symptoms over time and how those vary and can be predicted by baseline NEM and cognitive vulnerabilities.

Stress in many past studies was often assessed using a self-report measure of negative life events (Monroe, 2008; see Adrian & Hammen, 1993; Daley et al., 1997; Kendler et al., 2003 for important exceptions). This methodology may be particularly problematic for research examining the effects of personality and depressive symptoms because individuals who score highly on neuroticism trait scales may be more likely to perceive and appraise events as threats rather than challenges, and as a result, experience more depressive symptoms (Lazarus & Folkman, 1984; Suls, 2001). Neurotic individuals may be more likely to recall more negative life events and remember these events as being more stressful (Larsen, 1992). Thus, stress checklists cannot be used to determine whether the report of additional stressors is a reflection of psychological processes, such as perception and recall biases, or if individuals with higher levels of NEM truly encounter more objective negative life events over time, as predicted by a stress generation model.

Given these potential methodological limitations, hypotheses were tested in a daily diary design over 35 consecutive days. This enabled a more rigorous investigation of the dynamics of personality traits,

cognitive vulnerability, and objective naturalistic stressors as predictors of individual trajectories of depressive symptoms over time. The increased number of assessments (i.e., 35 days) allows for a systematic analysis of the proposed causal pathway by examining daily depressive symptoms and objective stressors in the flow of daily life over one month. In addition, a more objective measure of stressors was obtained by using an investigator-based coding approach adapted from contextual stress research methods (e.g., Brown & Harris, 1978; Hammen, 1991, 2005; Monroe, 2008) versus the appraisal based and potentially more subjective self-report method of a checklist of negative events as used in many stress studies. The use of objectively coded stressors, as experienced daily over a typical "slice of life," enabled a more careful test of the hypothesis that stress generation partially mediates the negative emotionality-depressive symptoms association because stressors above an objectively rated minimal threat level were examined rather than more subjective appraisal-based events. Moreover, assessing depressive symptoms and stressors at the daily level over time in a multi-wave design permits a more fine-grained examination of prediction of depressive symptoms and enables an important preliminary step in understanding the dynamic nature between stress and depressive symptoms over time.

PROCEDURES

Complete details can be found in Hankin, Fraley and colleagues (2005). Briefly, individual participants were instructed how to complete the daily diaries for the 35 days after the baseline assessment phase. A total of 210 participants received instructions on how to complete the diaries. These are the participants for this study. They were told to complete the diary every day and to turn in their daily diaries regularly (at least every Monday, Wednesday, and Friday). A research assistant received the diaries and checked completeness. Participants regularly completed the diaries: 88%, on average, returned a completed diary. No significant differences were noted in the attrition analyses for dispositional measures (i.e., personality and cognitive vulnerability) or depressive symptoms for those who completed all diaries from those who did not.

MEASURES

Cognitive Style Questionnaire (CSQ; Haeffel et al., 2008). The CSQ assesses cognitive vulnerability, including negative inferences for cause, consequence, and self. As featured in Hopelessness Theory (Abramson et al., 1989), the CSQ consists of 12 hypothetical scenarios (six interpersonal and six achievement) relevant to young adults, each of which presents the participant with a hypothetical negative event and allows the participant to write down one cause for the event. Respondents then rate the degree to which the cause of the hypothetical negative event is stable and global (negative events for causal attributions; 24 items). They rate the likelihood that further negative consequences will result from the occurrence of the negative event (negative inferences for consequences; 12 items) and the degree to which the occurrence of the event signifies that the person's self is flawed (negative inferences for the self; 12 items). The CSQ was scored by summing participants' responses for the negative inferences for causes (stable and global attributions), consequence, and self, and then dividing by the total items. This results in average item scores on the CSQ ranging from 1 to 7; higher scores indicate a more negative cognitive style. Coefficient alpha was .92 (48 items). Validity is provided by research showing that the CSQ, alone or in interaction with negative events, predicts depressive symptoms and episodes (Haeffel et al., 2008). The CSQ was given at Table 1.

Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978). The DAS is a 40-item questionnaire designed to measure the cognitive vulnerability featured in Beck's theory (1987). Higher scores reflect more dysfunctional attitudes. The DAS's validity has been supported by studies finding that the DAS, as a main effect or in interaction with negative events, predicts depressive symptoms (e.g., Hamilton & Abramson, 1983; Illardi & Craighead, 1999). Overall coefficient alpha was .89 (40 items). The DAS was given at Table 1.

Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979). The BDI assesses levels of depressive symptoms with 21 items that are rated on a scale from 0-3 with scores ranging from 0-63; higher scores reflect more depressive symptoms. The BDI is a reliable and well-validated measure of depressive symptomatology (Beck, Steer, & Garbin, 1988), but it does not enable clinical diagnoses of depression. It was given at Time 1. Consistent with other short-term prospective studies (e.g., Hankin et al., 2004), participants were in-

TABLE 1. Descriptive Statistics and Correlations among Main Measures

	1	2	3	4	5	6	7
1.) CSQ							
2.) DAS	0.45**						
3.) BDI	0.38**	0.31**					
4.) PEM- Well Being	-0.28***	-0.35***	-0.46***				
5.) PEM- Social Closeness	-0.17**	-0.32**	-0.18**	0.26**			
6.) NEM- Stress Reaction	0.46**	0.45**	0.57**	-0.45***	-0.25**		
7.) NEM- Alienation	0.22**	0.38**	0.26**	-0.23**	-0.42***	0.36**	
Mean	3.90	3.08	14.19	8.41	15.63	7.28	3.43
SD	0.72	0.66	8.31	3.02	3.17	3.58	2.84

Note. CSQ= Cognitive Style Questionnaire; DAS = Dysfunctional Attitudes Scale; BDI = Beck Depression Inventory; PEM = Positive Emotionality; NEM= Negative Emotionality. $N = 217$. * $p < .05$, ** $p < .01$, *** $p < .001$.

structed to answer the BDI items for the past 5 weeks prior to the start of the study. Coefficient alpha for the BDI was .88.

Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982). A 60-item version of the MPQ, based on the version used in Krueger (1996; MPQ-NZ) was used to assess a broad range of individual differences in affective and behavioral style. The specific subscales used in this study were those shown by Krueger (1999) to predict prospective increases in affective and anxiety problems. The Constraint factor from the MPQ was not included for this study. The Negative Emotionality (NEM) factor subsumes the scales labeled Alienation and Stress Reaction (also includes aggression, which was not included in this version of the MPQ). Individuals who score high on this factor tend to break down under stress and have a low threshold for negative emotions (fear, anxiety, and anger). The Positive Emotionality (PEM) factor subsumes subscales labeled Well-Being and Social Closeness. Internal consistency reliabilities for the scales were: PEM-WB = .87 (11 items), PEM-SC = .80 (18 items), NEM-SR = .82 (14 items), NEM-AL = .77 (17 items).

Daily Diary Form. A daily diary form was created for use in the present 35-day diary study. No minimum number of diaries was required to be completed for participants' data to be included because most participants completed the majority of diaries (see Hankin, Fraley, et al., 2005, for details). The fewest number of completed diaries included in the data analyzed for this study was 15 out of 35 days. The diary form consisted of two parts.

Depressive Symptoms. The nine depressive symptoms that comprise depressive disorder, as defined by DSM-IV (APA, 1994), were listed on the front page of the diary form, and participants rated how much they had experienced each of the nine depressive symptoms on that particular day using a 1-5 Likert scale. Example items include "felt sad," "felt slowed down," and "had problems concentrating." Participants' responses were summed such that scores could range from 9-45. Reliability for daily depressive symptoms scores was calculated by a three level multilevel model in which the nine items were nested within the 35 days within the 210 participants (Bryk & Raudenbush, 1992; see Nezlek & Gable, 2001 for an example). Reliability was estimated to be .86.

Stressors. On the back page of the diary form, there was space for participants to list up to five negative events that occurred on that particular day. Coders were trained to rate reliably the objective

threat of the stressors based on the participants' written description of the event. An objective, investigator-based coding system was used for this study, and it was modeled after the "contextual threat" method used with adults (Brown & Harris, 1978; Hammen, 1991, 2005; Monroe, 2008). Raters decided whether the event written in the diary counted as an objectively stressful negative event using established criteria based on the stressor coding system. For example, objective stressors included events such as, "fought with roommate," "did badly on a test," and "got fired from my job," whereas non-objective events included events such as "did not like how I looked today," "I missed my parents," and "got mad at my roommate." Of all the events written, 86% were categorized as objective and 14% as non-objective. This coding system included a systematized written manual with specific descriptions of numerous events that were used to rate the objective stressfulness/threat of events. Raters received extensive training (> 40 hours), which included, for example, education about the definition of objective stressor assessment, differentiating actual, significant negative events from less significant events that did not pass threshold to be counted as objectively stressful, rating numerous practice diary events, and demonstrating reliability and convergence (> 80%) with the primary investigator and each other. All of the negative events that participants recorded in the diary booklets for the 35 consecutive days were coded twice by independent coders. The coders were reliable in their ratings of the objectiveness coding of each event (> 85% agreement; kappa = .68) for the objective stressors. Validity for coding of daily events via these contextual threat methods is good (Hankin, Mermelstein, & Roesch, 2007). Discrepancies were resolved through consensual team meetings. Analyses used the sum of the objective stressors encountered on a particular day as the coded variable.

RESULTS

PRELIMINARY ANALYSES

Descriptive statistics and correlations for the main variables from the initial assessment are presented in Table 1. All measures were significantly correlated with each other.

ANALYTIC PLAN

Hierarchical linear modeling (HLM; Bryk & Raudenbush, 1992) was used to address the primary hypotheses: (1) Do baseline personality traits predict initial levels and trajectories of daily depressive symptoms and objective stressors over time?; (2) Do daily objective stressors mediate the personality trait and daily depressive symptoms association?, and (3) Does baseline cognitive vulnerabilities interact with generated stressors over time to predict prospective fluctuations in depressive symptoms above and beyond the effect of baseline personality traits, especially NEM? The analyses were conducted with the program (HLM - 5.04; Raudenbush, Bryk, Cheong, & Congdon, 2001). In daily diary studies such as this, it is expected that there would be some missing data over the 35 days, as there was in this study. There were 6,577 total observations for the participants over the 35 days.

The analysis of multiple levels of data is accomplished in HLM by constructing Level 1 and 2 equations (see Kreft & de Leeuw, 1998 and Nezlek, 2007, for overviews). At level 1, regression equations are constructed that model separately the variation in the repeated measure (i.e., depressive symptoms, objective stressors) over the 35 days. The Level 1 (within subjects portion of the HLM analysis) describes the association between fluctuations in depressive symptoms and stressors over time for each participant. Individuals' stressors were centered around their own mean over the 35 days (i.e., group-mean centered; see Enders & Tofighi, 2007, and Nezlek, 2007, for a discussion of centering options and rationale for group-mean centering Level 1 variables). In addition to these statistical reasons for group-mean centering, stressors were group mean centered based on past theory and research testing cognitive vulnerability-stress interactions with multi-wave data within HLM (e.g., Abela & Hankin, 2008; Gibb, Beevers, Andover, & Holleran, 2007). At Level 2, equations are specified that model individual differences in the Level 1 parameters as a function of between-subjects' variables (e.g., HT's cognitive style, BT's dysfunctional attitudes, personality trait factors). Cross-level interactions test the vulnerability-stress hypothesis from cognitive theories of depression.

Unconditional Level 1 models were analyzed first. The Level 1 model was:

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{Time}) + r_{ij}$$

where y_{ij} is the daily assessment for individual i on day j , β_{0j} is a random coefficient for the intercept of y for individual j , β_{1j} is a random coefficient for the linear rate of change of y for individual j , and r_{ij} is the error for each measure with the variance of r_{ij} being the daily level error variance.

The basic Level 2 model was:

$$\begin{aligned}\beta_{0j} &= \gamma_{00} + \mu_{0j} \\ \beta_{1j} &= \gamma_{10} + \mu_{1j}\end{aligned}$$

where γ_{00} is the overall mean of individual level means from the level 1 model, γ_{10} is the overall linear slope of individual rates of change from the level 1 model, and the variances of μ_{0j} and μ_{1j} are the Level 2 error variance.

Results from this unconditional model showed that both fixed and random effects for depressive symptoms (between person variance for intercept = 11.15, between person variance for slopes = 5.37, and within person variance = 13.16) and stressors (between person variance = .06, between person variance for slopes = .06, and within person variance = .32) were significant. Individual level means for depressive symptoms and stressors were 17.56 and .50, respectively. Individual level slopes were -.45 for depressive symptoms and -.20 for stressors. The random effects were retained in the remaining HLM analyses.

DO DISPOSITIONAL PERSONALITY TRAITS PREDICT PROSPECTIVE TRAJECTORIES OF DAILY DEPRESSIVE SYMPTOMS?

HLM was used to examine the hypothesis that baseline personality traits predict either initial levels of trajectories of daily depressive symptoms. The Level 1 equation to examine depressive symptoms over time was:

$$y_{it} = \beta_{0j} + \beta_{1j}(\text{Time}) + r_{ij}$$

where β_{0j} represents the intercept of depressive symptoms score for person j at baseline, and β_{1j} indicates the slope of the rate of linear change across time.

Then, the MPQ scales for each of the personality measures were entered at Level 2:

TABLE 2. Personality Traits and Prediction of Daily Depressive Symptoms Over Time

		Coefficient	S.E.	t	tES(r)
Fixed Effects					
Initial status	Intercept	18.02	.94	19.29***	.79
	NEM-SR	.39	.04	9.44***	.55
	NEM-AL	.06	.05	1.24	.03
	PEM-SC	-.04	.04	-.95	.06
	PEM-WB	-.36	.05	-7.52***	.46
Rate of change	Intercept	-.03	1.18	-.03	.002
	NEM-SR	.09	.04	2.06*	.14
	NEM-AL	.04	.06	.65	.05
	PEM-SC	.02	.06	.40	.03
	PEM-WB	.01	.06	.02	.002
Variance Components					
Level 1	Within-person	12.35			
Level 2	Initial Status	6.90***			
	Rate of Change	.84***			

Note. NEM-SR= Negative Emotionality-Stress Reaction; NEM-AL= Negative Emotionality-Alienation; PEM-SC= Positive Emotionality Social Closeness; PEM-WB Positive Emotionality Well-Being. $N = 210$. * $p < .05$, ** $p < .01$, *** $p < .001$.

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{NEMSR}) + \gamma_{02}(\text{NEMAL}) + \gamma_{03}(\text{PEMSC}) + \gamma_{04}(\text{PEMWB}) + \mu_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{NEMSR}) + \gamma_{12}(\text{NEMAL}) + \gamma_{13}(\text{PEMSC}) + \gamma_{14}(\text{PEMWB}) + \mu_{1j}$$

Table 2 (see step 1) shows these results, and Figure 1 graphically displays the linear growth curve analyses for depressive symptoms over time as a function of baseline NEM-SR and PEM-WB. Effect sizes, in terms of r (Rosenthal & Rosnow, 1991), are included in the Tables and can be interpreted as a small ES = .10, medium ES = .30, and large ES = .50. The Stress Reaction factor of the Negative Emotionality scale and the Positive Emotionality-Well-Being scale (inversely) at Table 1 predicted intercepts of daily levels of depressive symptoms, but only NEM-SR predicted trajectories of symptoms over the 35 days.²

TEST OF DAILY STRESSORS AS A PREDICTOR OF NEXT DAY'S LEVEL OF DEPRESSIVE SYMPTOMS

The next analysis examined the role of daily stressors and their association with daily depressive on the following day. The day Level 1 model was:

$$y_{it} = \beta_{0j} + \beta_{1j}(\text{Stressors}_{t-1}) + \beta_2(\text{Symptoms}_{t-1}) + r_{ij}$$

β_{0j} is the score for depressive symptoms for participant j at baseline; β_{1j} represents the slope testing the strength of the relationship between the objectively coded daily stressors, analyzed one day (Time T-1) before the outcome of depressive symptoms at Time T, and daily depressive symptoms; β_2 adjusts for the prior day's level of symptoms so that prospective fluctuations in symptoms are examined; and r_{ij} is the error. Results showed that daily stressors occurring the day j before were significantly associated with prospective fluctuations in daily depressive symptoms ($\beta_{1j} = .87$, $SE = .08$, $t = 10.22$, $p < .01$, $r = .57$).

TEST OF DAILY STRESSORS MEDIATING THE PERSONALITY-DAILY DEPRESSIVE SYMPTOMS LINK

Given the study hypothesis that daily stressors would partially mediate the association between baseline personality traits and daily depressive symptoms, and the evidence showing that personality traits predict daily depressive symptoms and daily stressors predict prospective fluctuations in daily depressive symptoms, mediation analyses were conducted to more formally examine this hypothesis. Unfortunately, as noted by Nezlek (2007), "evaluating mediation in multilevel models is particularly challenging" (p. 516), so testing the mediation hypothesis was done in accordance with Nezlek's (2007) recommendation to follow Baron and Kenny's (1986) mediation logic. This approach has three criteria: 1) the personality traits predict depressive symptoms (already shown above); 2) the personality traits predict daily stressors; and 3) the association between daily stressors and daily depressive symptoms is maintained while the association between baseline personality and daily depressive symptoms is reduced (for partial mediation) or eliminated entirely (full mediation).

2. In addition to a single multi-level model that included all personality scales, I conducted independent HLM analyses for each MPQ scale to explore whether any particular trait would predict depressive symptoms when not accounting for overlapping variance among the MPQ scales, given that these personality factors are not orthogonal. A similar pattern of results was found as reported in the main text: only Stress Reaction and Well-Being scales were associated prospectively with daily fluctuations in depressive symptoms.

To examine criterion 2, that personality traits predict daily stressors, the following equation was used:

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{Time}) + r_{ij}$$

where y_{ij} is the daily assessment of stressors for individual i on day j , β_{0j} is a random coefficient for the mean of y for individual j , β_{1j} indicates the slope of the rate of linear change across time, and r_{ij} is the error.

The basic Level 2 model was:

$$\begin{aligned} \beta_{0j} &= \gamma_{00} + \gamma_{01}(\text{NEM-SR}) + \gamma_{02}(\text{NEM-AL}) + \gamma_{03}(\text{PEM-WB}) + \gamma_{04}(\text{PEM-SC}) + \gamma_{05}(\text{BDI}) + \mu_{0j} \\ \beta_{1j} &= \gamma_{10} + \gamma_{11}(\text{NEM-SR}) + \gamma_{12}(\text{NEM-AL}) + \gamma_{13}(\text{PEM-WB}) + \gamma_{14}(\text{PEM-SC}) + \gamma_{15}(\text{BDI}) + \mu_{1j} \end{aligned}$$

Baseline BDI was included given that initial depressive symptoms have been shown to predict stress generation (Hammen, 2005). Results, shown in Table 3, indicated that both NEM-SR and PEM-SC were associated with greater stressors at baseline. Only NEM-SR significantly predicted slopes of objectively coded daily stressors over time. Thus, only NEM-SR was included in the remaining mediation analyses.

Finally, to examine the third criterion for mediation, the personality trait of NEM-SR was entered at Level 2 to predict prospective fluctuations in daily depressive symptoms after adjusting for prior day's depressive symptoms (Time T-1). Objectively coded daily stressors, occurring at Time T-1, continued to significantly predict prospective fluctuations in daily depressive symptoms ($\beta_{1j} = .87$, $SE = .08$, $t = 10.17$, $p < .001$), whereas NEM-SR no longer significantly predicted depressive symptoms slopes ($\beta_{2j} = .01$, $SE = .04$, $t = .31$, $p = .75$).³

Last, analyses were conducted to explore whether any of the personality traits or initial depressive symptoms moderated the associ-

3. Usually, one examines how much the direct effect (i.e., NEM-SR predicting daily depressive symptoms) decreases after inclusion of the indirect effect (i.e., daily stressors) in the model as one way to address mediation. Unfortunately, using the Baron and Kenny (1986) logic and approach, it is presently difficult to ascertain the percent of mediation that stressors account for in the personality-depressive symptoms association using multilevel modeling (Nezlek, 2007). As a result and given cautions in the MLM literature (e.g., Kreft & de Leeuw, 1998; Nezlek, 2007), neither the reduction in variance estimates (e.g., Holmbeck, 2002) nor a Sobel test was used to evaluate the strength of mediation. Presently, the MLM literature has not settled on an accepted approach to examining the percent of mediation, although promising approaches have been reported (e.g., Bauer, Preacher, & Gil, 2006).

TABLE 3. Personality Traits and Prediction of Daily Objective Stressors Over Time

		Coefficient	S.E.	t	ES(r)
Fixed Effects					
Initial status	Intercept	.20	.17	1.13	.08
	NEM-SR	.02	.01	1.99*	.14
	NEM-AL	.01	.007	1.27	.09
	PEM-SC	.01	.007	2.14*	.15
	PEM-WB	-.008	.01	-.82	.06
BDI	.001	.003	.49	.03	
Rate of change					
Rate of change	Intercept	.25	.17	1.49	.10
	NEM-SR	.01	.005	3.37***	.23
	NEM-AL	.006	.01	.65	.05
	PEM-SC	.01	.007	1.58	.11
	PEM-WB	-.01	.01	-1.05	.07
	BDI	.002	.003	.69	.06
Variance Components					
Level 1	Within-person	.32			
Level 2	Initial Status	.06***			
	Rate of Change	.06***			

Note. NEM-SR= Negative Emotionality-Stress Reaction; NEM-AL= Negative Emotionality-Alienation; PEM-SC= Positive Emotionality Social Closeness; PEM-WB Positive Emotionality Well-Being; BDI=Beck Depression Inventory. $N = 210$. * $p < .05$, ** $p < .01$, *** $p < .001$.

ation between daily depressive symptoms and stressors. To test this hypothesis, the cross-level interaction of personality traits and BDI, entered at Level 2, and daily stressors, group-mean centered and entered at Level 1, was tested to predict daily prospective fluctuations in depressive symptoms. None of the interactions significantly predicted daily depressive symptoms (all t s < 1.1 , p s $> .27$).

TEST OF THE DYSFUNCTIONAL ATTITUDES–OBJECTIVE DAILY STRESSOR INTERACTION AS A PREDICTOR OF PROSPECTIVE FLUCTUATIONS IN DAILY DEPRESSIVE SYMPTOMS

Given that NEM-SR predicted additional stressors over time, which in turn predicted prospective fluctuations in depressive symptoms,

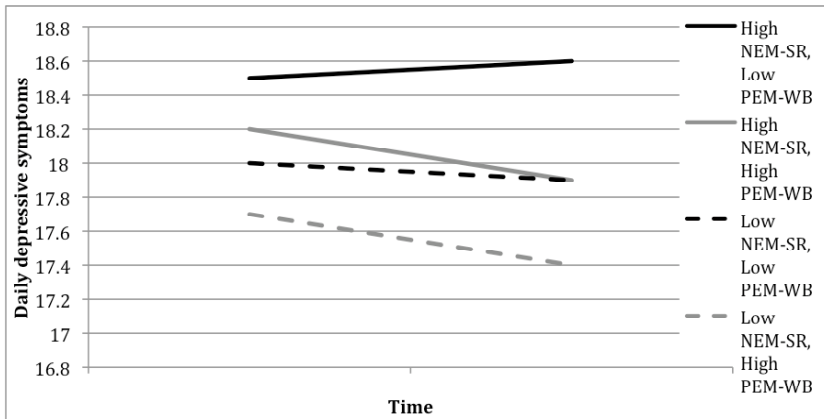


FIGURE 1. Graphic representation of linear growth curve analyses of daily depressive symptoms over the 35 days of the study as a function of baseline PEM-WB and NEM-SR.

the next set of analyses investigated whether cognitive vulnerabilities interacted with these additional stressors to predict prospective fluctuations in depressive symptoms after controlling for baseline NEM-SR. In this analysis, daily depressive symptoms was the outcome variable with group-mean centered daily stressors at Time T-1, entered as a Level 1 time varying covariate. NEM-SR and DAS were entered as main effects at Level 2, and DAS was included at Level 2 as part of a cross-level interaction with daily stressors at Level 1 to evaluate the DAS X daily stressors component. The Level 1 equation testing this was:

$$y_{it} = \beta_{0j} + \beta_{1j} (\text{stressors}_{t-1i}) + \beta_{2j}(\text{Symptoms}_{t-1i}) + r_{ij}$$

The Level 2 model was:

$$\begin{aligned} \beta_{0j} &= \gamma_{00} + \gamma_{01} (\text{NEM-SR}) + \gamma_{02} (\text{DAS}) + \mu_{0j} \\ \beta_{1j} &= \gamma_{10} + \gamma_{11} (\text{DAS}) + \mu_{1j} \end{aligned}$$

In this model, the cross-level interaction is tested by γ_{11} , which represents the relationship between daily stressors and DAS predicting fluctuations in depressive symptoms. Table 4 (top portion) shows the results. Importantly, the interaction of Table 1 dysfunctional attitudes by daily stressors predicted daily depressive symptoms over time. Figure 2 (top panel) depicts the form of this significant dysfunctional attitudes by daily stressor interaction and shows that the interaction of higher DAS in combination with greater objective daily stressors was associated with higher elevations of daily

depressive symptoms over time. Importantly, this cognitive vulnerability-stress interaction predicted depressive symptoms after controlling for NEM-SR, and NEM-SR continued to predict prospective fluctuations in daily depressive symptoms.

TEST OF THE NEGATIVE COGNITIVE STYLE-OBJECTIVE DAILY STRESSOR INTERACTION AS A PREDICTOR OF PROSPECTIVE FLUCTUATIONS IN DAILY DEPRESSIVE SYMPTOMS

Like the previous analyses, the negative cognitive style-stress component was examined to see if it would predict depressive symptoms after controlling for baseline NEM-SR. The cognitive style by daily objective stressors was examined with similar equations as delineated above, except that CSQ replaced DAS in Level 2. Results, shown in Table 3 (bottom), revealed that Table 1 negative cognitive style by daily stressors predicted daily depressive symptoms over time. Figure 2 (bottom panel) illustrates the form of this significant negative cognitive style by daily stressor interaction and shows that greater levels of negative cognitive style in combination with more objective daily stressors was associated with higher elevations in daily depressive symptoms over time. Importantly, the negative cognitive style-stress interaction predicted depressive symptoms after controlling for NEM-SR, and NEM-SR continued to predict prospective fluctuations in daily depressive symptoms.⁴

DISCUSSION

This study evaluated a theoretically derived social-cognitive process that may explain the established link between neuroticism and later

4. Research examining neuroticism and stress found that daily stress and neuroticism interacted to predict daily negative affect (Mroczek & Almeida, 2004). Although the cross-level interaction of NEM-SR X daily stress did not predict daily depressive symptoms in this sample, there still is the possibility that neuroticism may function as a moderator for the cognitive vulnerability (either dysfunctional attitudes or negative cognitive style) X stress interaction in the prediction of daily depressive symptoms. To address this question, I examined NEM- Stress Reaction as a moderator of the stress-depression link and the interaction of stress and cognitive vulnerability for each type of cognitive vulnerability. No interactions (i.e., the NEM X stress interaction, nor the NEM X Cognitive Vulnerability X Stress) predicted daily depressive symptoms after entering all necessary main effects and two-way interactions. These analyses suggest that NEM-Stress Reaction did not moderate the basic cognitive vulnerability-stress interaction.

TABLE 4. Cognitive Vulnerabilities X Stressors Predicting Prospective Fluctuations in Depressive Symptoms After Controlling for Negative Emotionality-Stress Reaction

Variable		Coefficient	S.E.	t	ES(r)
Dysfunctional Attitudes X stress					
Fixed Effects					
Depressive Symptoms					
Intercept	16.11	1.75	9.2***	.53	
	NEM-SR	.44	.08	5.5***	.36
	DAS	.03	.008	3.63**	.24
Stressors Slope at Time T-1					
	Intercept	.20	.46	.44	.03
	DAS	.008	.003	2.59**	.17
Time varying covariate					
		.27	.01	18.59***	.78
(symptoms Time T-1)					
Variance Components					
Level 1	Within-person	12.10			
Level 2	Initial Status	7.48***			
	Stress slope	.36***			
	Symptoms (Time T-1)	.01***			
Negative Cognitive Style X stress					
Fixed Effects					
Depressive Symptoms					
	Intercept	13.53	1.73	7.82***	.47
	NEM-SR	.42	.02	5.25***	.36
	CSQ	1.06	.18	5.92**	.37
Stressors Slope at Time T-1					
	Intercept	.64	.43	1.53	.10
	CSQ	.80	.29	2.72**	.18
Time varying covariate					
		.27	.01	18.57***	.78
(symptoms Time T-1)					
Variance Components					
Level 1	Within-person	12.10			
Level 2	Initial Status	7.01***			
	Stress slope	.36***			
	Symptoms (Time T-1)	.01***			

Note. $N = 210$ for all analyses. CSQ= Cognitive Style Questionnaire; DAS= Dysfunctional Attitudes Scale; NEM-SR= Negative Emotionality-Stress Reaction. * $p < .05$; ** $p < .01$; *** $p < .001$.

depressive symptoms. Based on Hankin and Abramson's (2001) elaborated cognitive vulnerability-transactional stress theory, the following hypothesized processes were tested: (1) individuals with higher levels of trait negative emotionality, assessed at baseline, would encounter more objective stressors over time (i.e., stress generation), and, as a result, they would experience prospective elevations of depressive symptoms over time; and (2) they would interpret and explain these additional stressors in more negative ways (i.e., a cognitive vulnerability-stress interaction). These hypotheses were investigated prospectively in a 35-day diary study in which depressive symptoms and stressors were assessed daily.

The results were consistent with these hypotheses. Of the personality traits examined in this study, only negative emotionality-stress reaction was associated with initial status and trajectories of daily depressive symptoms over time, as well as with initial level and trajectories of objective daily stressors over time. Individuals with higher scores at baseline on trait negative emotionality-stress reaction appear to be at greater risk for experiencing and maintaining depressive symptoms, at least in part because they generate additional stressors for themselves over time. This stress generation process, in which individuals with higher levels of negative emotionality-stress reaction encountered more objective negative life events over the month, partially mediated the association between negative emotionality and daily depressive symptoms. In addition to supporting the stress generation process, participants with higher negative emotionality-stress reaction levels exhibited greater dispositional cognitive vulnerability. As these more negatively emotional individuals tended to generate more daily stressors over time, they also interpreted and explained these additional stressors in more depressogenic ways. The cognitive vulnerability (both negative cognitive style and dysfunctional attitudes) interaction with daily stressors predicted fluctuations in the following day's depressive symptoms, and this cognitive vulnerability-stress interaction predicted daily depressive symptoms above and beyond the effect of baseline negative emotionality, which also independently predicted daily depressive symptoms. These results are discussed next within the context of cognitive vulnerability to depression, personality, and depression research and theory.

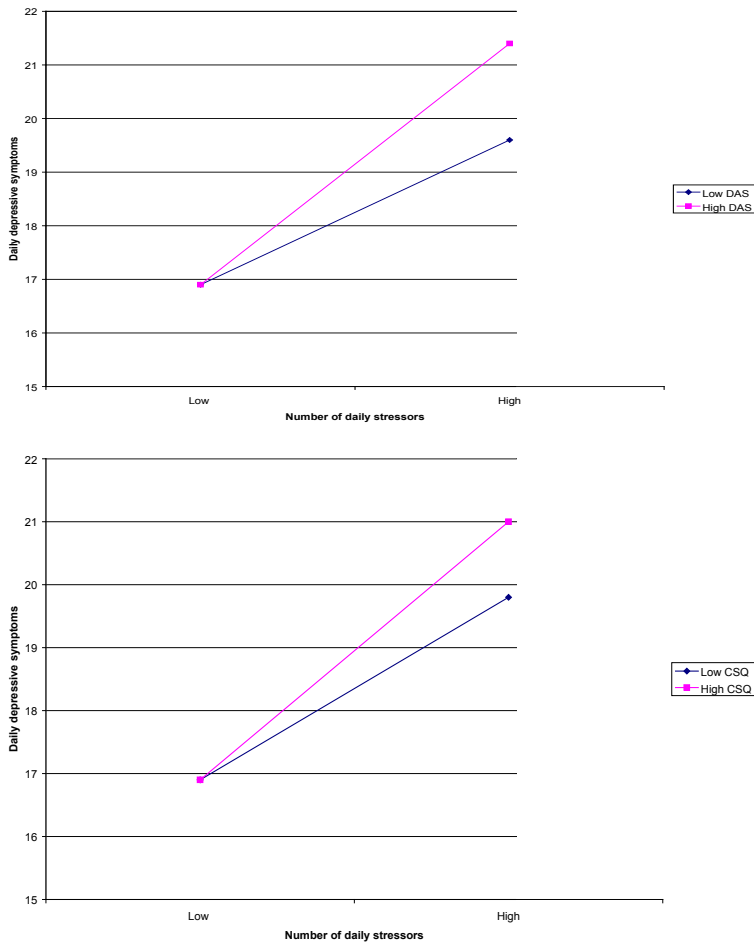


FIGURE 2. Graphic representation of the significant cross-level interactions between daily objective stressors and cognitive vulnerabilities as predictors of daily depressive symptoms. High and low levels of cognitive style and dysfunctional attitudes were defined according to +/- 1 SD on each of these measures (i.e., DAS and CSQ). The cross-level interaction between daily objective stressors and dysfunctional attitudes is represented on the top panel, and the cross-level interaction between daily objective stressors and negative cognitive style is on the bottom panel.

PERSONALITY-DEPRESSIVE SYMPTOMS FINDINGS

Only NEM-Stress Reaction and PEM—Well-Being were associated with initial levels of daily depressive symptoms. Importantly, NEM-Stress Reaction, but not PEM-Well-Being, predicted prospective trajectories of depressive symptoms across the month. An important feature of the present study was its multi-wave design that enabled a separate examination of which personality traits were associated with initial levels versus prospective trajectories of depressive symptoms over time. Cross-sectional, and even two-time point studies, cannot examine process of change and the shape of individual's growth trajectories, such as initial levels versus rate of change over time (Willett & Singer, 2003).

Scores on the other personality scales from the MPQ, including PEM-Social Closeness and NEM-Alienation, did not predict daily depressive symptoms at baseline or trajectories over time. These results are generally consistent with those of Krueger (1999), who found that Stress Reaction and Well-Being, but also Alienation, predicted prospective increases in affective symptoms in his two-time point panel design following young adults from age 18 to 21. This general replication across independent studies (see Widiger et al., 1999) lends support to the predictive role of personality traits. Still, it should be noted that this study predicted initial levels and trajectories of symptoms without assessment or knowledge of past or current depressive disorder. As such, these findings most likely pertain to the mechanisms underlying maintenance and course of depressive symptoms as opposed to those processes implicated in the first onset of depression.

STRESS GENERATION FINDINGS

Only scores on the NEM-Stress Reaction scale predicted initial levels and trajectories of stressors over time. Individuals who scored highly on the NEM-Stress Reaction trait scale experienced greater levels of stressors over time, and in turn, these additional stressors subsequently were associated with greater daily depressive symptoms. This finding is consistent with stress generation models of depression, which posit that individuals contribute to the occurrence of stressful events through their behaviors, attitudes, and characteristics (Hammen, 1999, 2005). This model highlights the interpersonal

nature of depression: more neurotic individuals tend to create more negative events for themselves, and this exposure to greater stress, in turn, contributes to more depressive symptoms (cf., Fergusson & Horwood, 1987; Kendler et al., 2003; Poulton & Andrews, 1992).

PEM-Well-Being predicted initial level of depressive symptoms, yet this personality scale was not related to encountering more objective stressors over time, and thus could not mediate the association between positive emotionality and depressive symptoms at baseline. This is consistent with theory and enhances the discriminant validity of NEM-SR and PEM-Well-Being, as PEM-Well-Being was not hypothesized to be associated with experiencing more stressors over time. It is of interest that stressors did not mediate the PEM-WB association with depressive symptoms, whereas daily stressors did partially explain the longitudinal association between NEM-SR and daily depressive symptoms, in the current study. This pattern of findings is consistent with a study of youth that investigated temperament traits predicting later depressive symptoms and the processes by which these traits contribute to depression (Wetter & Hankin, 2009). Among youth, Wetter and Hankin (2009) found that negative events partially mediated the longitudinal association between NEM and later depressive symptoms, whereas reduced social support, but not stressors, partially accounted for the PEM and depressive symptoms association. Taken together, these studies suggest that different mechanisms contribute to the processes linking PEM with depression as compared with the mechanisms underlying the relation between NEM and depression. This pattern of findings is consistent with the view that multiple pathways (i.e., equifinality and multifinality) connect personality traits with later increases in depressive symptoms.

Despite the significant associations among negative emotionality, objective stressors, and depressive symptoms over time that were consistent with the theory, it is important to acknowledge that less than full mediation was observed. Potential reasons for partial mediation via stress generation processes can be examined in future research. First, this study had a relatively short overall follow-up (one month total). Even though it was powerful in its intensive measurement with daily diaries, this may not have been a long enough interval of time for more major, severe negative life events to occur. It is possible that more major life events may be more predictive of future depressive symptoms and may explain more of the negative emotionality-depressive symptoms association. Major events, as

opposed to daily hassles, may be a better predictor of onset of clinically significant depression (Hammen, 2005). Second, only overall objective stressors were examined as mediating the personality-depression link, whereas interpersonal theories of stress and depression (e.g., Hammen, 1991, 2005) suggest that dependent, as opposed to independent, events may be more likely to result from negative emotionality and predict later depressive symptoms. The daily diary method used in this study did not allow for the coding that could reliably distinguish between independent and dependent events because participants were not queried about the context surrounding event occurrence, and information about context is needed to decide on the degree of event dependency (Brown & Harris, 1978). Future research utilizing this daily diary methodology of assessing negative events would benefit from incorporating information on the context of the negative events.

Importantly, this appears to be the first prospective multi-wave study to test whether personality traits, such as negative emotionality-stress reaction, contribute to the generation of additional *objective* stressors over time. Past studies (e.g., Lakdawalla & Hankin, 2008; Ormel & Wohlfarth, 1991; Van Os & Jones, 1999) used at most a two time-point prospective design with self-report stress checklists to assess for the occurrence of negative events over time. However, findings from such studies with self-report stressor checklists are limited in that they cannot be used to disentangle whether 1) individuals who score highly on negative emotionality perceive and appraise events as more threatening and/or recall events as more negative over time, or whether, 2) neurotic people actually encounter more objective negative life events in the flow of daily life. Clearly, both processes are possible and may help to explain the association between personality and depressive symptoms. The present study's results demonstrate that individuals with higher negative emotionality-stress reaction scores do, in fact, record more objective negative life events over time. Still, note that people who exhibit greater negative emotionality are more likely to perceive, appraise, and/or recall events more negatively. Negative emotionality was associated significantly with both types of cognitive vulnerability to depression (i.e., negative cognitive style and dysfunctional attitudes).

COGNITIVE VULNERABILITY-STRESS FINDINGS

Both of the cognitive vulnerabilities, negative cognitive style and dysfunctional attitudes, interacted with daily stressors to predict prospective fluctuations in depressive symptoms. These findings provide additional support for these cognitive theories of depression (Abramson et al., 1989; Beck, 1987). Importantly, these cognitive vulnerability-stress interactions predicted prospective fluctuations in depressive symptoms even after controlling for the effect of baseline NEM-SR, which prior research and this study show is a moderately strong predictor of later depressive symptoms. That the cognitive vulnerability-stress interactions predicted later depressive symptoms above and beyond the effect of NEM-SR shows that these cognitive vulnerabilities are not epiphenomenal with NEM. Thus, these findings address criticisms of cognitive theories of depression (e.g., Barnett & Gotlib, 1988; Coyne & Whiffen, 1995) by showing that cognitive vulnerabilities to depression cannot be simply reduced to nor do they overlap entirely with personality traits, like negative emotionality.

Finally, it is noteworthy that this is the first study to examine cognitive vulnerabilities (negative cognitive style and dysfunctional attitudes) interacting with the *daily* occurrence of objective stressors to predict prospective trajectories of depressive symptoms over time. Previous prospective cognitive vulnerability-stress studies have used naturalistic follow-ups, in which both negative events and depressive symptom levels are recalled over short-term (e.g., Metalsky & Joiner, 1992; Joiner et al., 1999) or long-term (e.g., Hankin et al., 2004) intervals. Other studies have examined the interaction of baseline cognitive vulnerability levels with naturally occurring, discrete stressors, such as exam failure (e.g., Abela & Seligman, 2000; Hankin et al., 2004; Metalsky, Joiner, Hardin, & Abramson, 1993), to predict short-term changes in depressive symptoms. The present study design, which assessed objectively negative stressors occurring in the flow of daily life, enabled a more powerful test of the cognitive vulnerability-stress component from Beck's and Hopelessness theories.

STRENGTHS, LIMITATIONS, AND FUTURE DIRECTIONS

As noted, use of an intensive, multi-wave design helps to advance knowledge on the connection between personality and depressive symptoms and enhances confidence in the pattern of findings. Daily stressors were coded with reliable, state-of-the-art contextual stress procedures to ensure that only objective stressors were analyzed.

Nevertheless, several limitations of this research should be noted. First, a possible concern of self-report studies involving personality and depressive symptoms is that depressed mood may influence how participants answer items on a self-report measure about their baseline personality. Problems of this nature complicate studies investigating the predisposition model of personality and depression.

Second, the contextual threat coding system, currently the optimal method for assessing stress (Hammen, 2005; Monroe, 2008), cannot completely eliminate subjectivity in stress ratings. Individuals with a highly neurotic personality may perceive, recall, and/or record more negative life events, and thus more events were available to be coded via the contextual threat procedures. This possibility, similar to the concern that elevated depressive symptoms may color personality assessment, is inherent in stress research. In addition, positive events were not assessed in this study, so positive events as potential buffers against daily depressive symptoms (e.g., Nezelek & Allen, 2006) could not be examined. The use of alternative methods (e.g., naturalistic stressors) and inclusion of positive events would be helpful in future research.

Third, the current study enabled an intensive, micro-analytic test of stress generation as mediating processes predicting daily depressive symptoms, yet it remains uncertain whether negative emotionality influences the generation of severe and/or dependent stressors and whether cognitive vulnerabilities interact with these kinds of stressors to enhance the likelihood of developing clinically significant depressive symptoms. No prospective, multi-wave study has examined the stress generation process with major negative events or dependent stressors as a mediator of the neuroticism and clinical depression association. This also presents an important future direction for research.

Finally, the present study used a daily diary approach, which has certain advantages and disadvantages (e.g., increased probability of missing severe stressors). For example, experience sampling methods (ESM) provide a powerful design to test dynamic processes over

relatively short time frames, and ESM has particular advantages over traditional daily diary methods (Conner, Feldman-Barrett, Tugade, & Tennen, 2007). In addition, it will be important for future research to use multi-wave assessments with different timing of follow-ups over a longer period to enhance assessment of major stressors and study the dynamic effects of stressors and depressive symptoms over longer time frames. The effects observed in this daily diary study, and the underlying causal processes, may be different depending on whether a shorter versus longer time frame is used.

Although it will be important and useful for future research to utilize different designs (e.g., ESM) and time intervals to examine potential nuances and differences in the dynamic effects and underlying causal processes connecting distal personality with stressors, depressive symptoms, and cognitive vulnerabilities, it is noteworthy that the present study used a 35-day multi-wave study to investigate how personality traits, objective stressors, depressive symptoms, and baseline cognitive vulnerabilities relate to each other over the flow of daily life. As such, this study advances knowledge on the daily, dynamic processes linking stressors and depressive symptoms over a month as a function of baseline NEM and cognitive vulnerabilities and adds to the knowledge base on personality and cognitive risks to depression. Using different assessment methods and follow-up intervals can build on these findings to provide a deeper understanding of how personality and cognitive vulnerabilities affect stress exposure and generation as well as prediction of depressive symptoms over varying lengths of time.

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