

A Framework for Studying Personality in the Stress Process

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This article presents a framework for studying personality in the stress process. The framework specifies that personality may affect both exposure and reactivity to stressful events and that both processes may explain how personality affects health and psychological outcomes. The framework also specifies that personality differences in reactivity may be due to differential choice of coping efforts and differential effectiveness of those efforts. In a 14-day daily diary study of 94 students, this framework was used to analyze the links among neuroticism, daily interpersonal conflicts, coping with conflicts, and distress. Results showed that high-neuroticism participants had greater exposure and reactivity to conflicts. Furthermore, high- and low-neuroticism participants differed both in their choice of coping efforts and in the effectiveness of those efforts, a possibility not considered in previous models of personality in the stress process.

Personality is an important determinant of health and psychological outcomes (Contrada, Leventhal, & O'Leary, 1990; Friedman, 1990). Although researchers do not fully understand how personality leads to these outcomes, it has become clear that stressful experiences and how people cope with them play an important explanatory role (Bolger & Schilling, 1991). In this article, we propose a framework that delineates this explanatory role, a framework that combines trait and process approaches to the study of personality (see Mischel & Shoda, 1994). Our framework specifies that personality may affect exposure to stressful events, reactivity to those events, or both, and that these processes can help explain how personality affects outcomes. Our framework also specifies that personality differences in reactivity to stressors can be due to differential choice of coping strategies, differential effectiveness of the strategies chosen, or both. Below, we elaborate on this framework and provide an empirical test of the alternative models it implies.

Personality and Stress Processes: Stressor Exposure and Stressor Reactivity

As shown in Figure 1a, the stress process can be divided into two fundamental stages, stressor exposure and stressor reactivity. Exposure is the extent to which a person is likely to experience a stressful event. Reactivity is the extent to which a person

is likely to show emotional or physical reactions to a stressful event. If we consider the effect of personality on these processes, four possibilities arise. As shown in Figure 2, the first possibility is that personality does not affect either exposure or reactivity to stressors. We refer to this possibility as a *null model*. In this case, stressful events cannot explain any effects of personality on health and psychological outcomes.

The second possibility is that personality affects exposure but not reactivity to stressors; once these events occur, they affect everyone in the same way. Assuming this common reactivity is nonzero, stressor exposure will help explain personality effects. We call this a *differential exposure model*, and it corresponds to a mediational model in path-analytic terms (see Cohen & Cohen, 1983, pp. 353–378): Personality leads to exposure to stressors, which, in turn, leads to outcomes. Although this is a plausible model for explaining the role of personality in stress outcomes, it has rarely been used in the stress literature. A notable exception is a recent study by Ormel and Wohlfarth (1991) showing that exposure to life changes partly mediated the relationship between neuroticism and psychological distress. In the personality literature, however, there has been increasing interest in the role of personality in exposure to situations (Buss, 1987; Diener, Larsen, & Emmons, 1984; Emmons, Diener, & Larsen, 1986; Furnham, 1981; Snyder, 1983; Snyder & Ickes, 1985), and it has been argued that exposure processes can account for some of the outcomes of personality.

The third possibility is that there are personality differences in reactivity to stressors but no personality differences in exposure. Assuming this common exposure is nonzero, differential reactivity will help explain the effects of personality on outcomes. In other words, personality affects outcomes by *moderating* the effects of stressful events on these outcomes. We term this a *differential reactivity model*. As noted above, differential exposure models have not generally been used in the stress literature; by contrast, differential reactivity models have been quite common. Many personality dispositions have been

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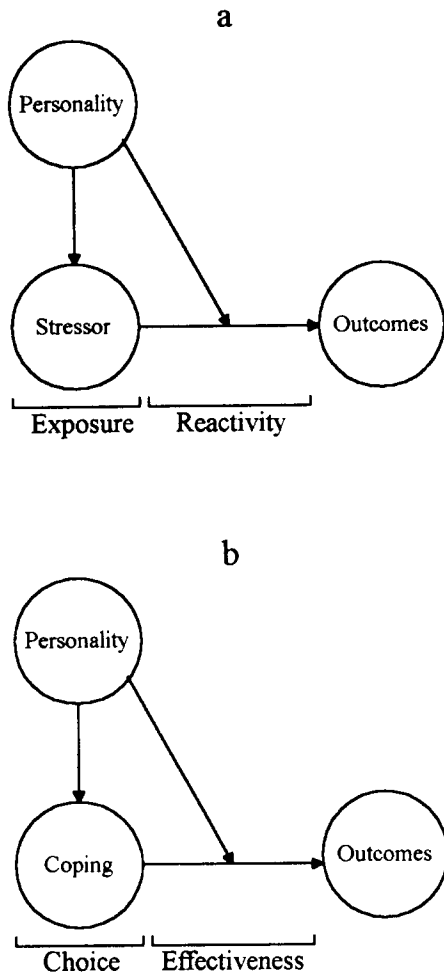


Figure 1. General framework linking personality to (a) exposure and reactivity to stressors and (b) components of reactivity: coping choice and coping effectiveness.

shown to affect reactivity to stressful events, for example, locus of control (Johnson & Sarason, 1978; Parkes, 1984), hardiness (Kobasa, 1985; Kobasa, Maddi, & Kahn, 1982), explanatory style (Abramson, Metalsky, & Alloy, 1989), and self-consciousness (Suls & Fletcher, 1985). Because the role of personality in exposure to stressors has been ignored in these studies, their implicit focus has been a differential reactivity model of personality effects. An optimal model of personality effects, however, can only be arrived at by considering both exposure (mediation) and reactivity (moderation) processes. It is not clear, therefore, whether these differential reactivity models are optimal representations of personality effects.

The final possibility, which we term a *differential exposure-reactivity model*, holds that personality affects both the exposure and reactivity stages of the stress process. Smith and his colleagues (Smith & Anderson, 1986; Smith & Rhodewalt, 1986), for example, have explicitly argued that both greater exposure to stressful situations and greater reactivity within those situations help explain why the Type A personality leads to coronary disease. Bolger and Schilling (1991) demonstrated empirically that an exposure-reactivity model provided the

best account of how neuroticism leads to distress in daily life. They also demonstrated an empirical approach to distinguishing the relative importance of exposure (mediation) and reactivity (moderation) processes and found that reactivity was twice as important as exposure. Thus, there is evidence that exposure-reactivity models best represent the effects of these personality dispositions on health and psychological outcomes.

It is important to emphasize that the four models described above specify the explanatory role of stressful events only. Although we believe that stressful events are a key explanatory variable, we do not claim that they can completely account for personality-outcome relationships.

Personality and Reactivity Processes: Coping Choice and Coping Effectiveness

Just as the stress process can be divided into stressor exposure and stressor reactivity, reactivity can be further divided into coping choice and coping effectiveness (see Figure 1b). Coping choice refers to the coping efforts people engage in in response to a stressful event. Coping effectiveness refers to the extent to which these coping efforts reduce the negative outcomes of the stressful event. It can be concluded, therefore, that personality can affect reactivity because, in the presence of stressors, personality can affect coping choice, coping effectiveness, or both. (We assume that in the absence of stressors, coping cannot occur, and thus it cannot explain reactivity. It should also be noted that, although we believe that coping is a key explanatory variable, we do not claim that it can completely account for the personality-reactivity relationship.)

If we now consider the effect of personality on coping choice and coping effectiveness, four possibilities again arise. In the first of these, as shown in Figure 3, personality does not affect either coping choice or coping effectiveness. We call this possibility a *null model*. In this case, coping cannot explain any effects of personality on reactivity to stressors.

The second possibility is that personality affects the choice of coping strategies but not their effectiveness; once coping strate-

		Personality Differences in Stressor Exposure	
		No	Yes
Personality Differences in Stressor Reactivity	No	Null Model	Differential Exposure Model
	Yes	Differential Reactivity Model	Differential Exposure-Reactivity Model

Figure 2. Alternative models linking personality, stressors, and outcomes.

		Personality Differences in Coping Choice	
		No	Yes
Personality Differences in Coping Effectiveness	No	Null Model	Differential Choice Model
	Yes	Differential Effectiveness Model	Differential Choice- Effectiveness Model

Figure 3. Alternative models linking personality, coping, and outcomes.

gies are chosen, they are equally effective for everyone. We term this a *differential coping-choice model*: Personality leads to the differential choice of coping strategies, and these strategies, in turn, lead to stress outcomes. Of course, for this mediation process to occur, effectiveness must be nonzero (see McCrae & Costa, 1986).

When coping is used to explain personality effects, coping-choice models are the standard approach. For example, several coping theorists have posited individual differences in the propensity to choose mature versus immature coping strategies (e.g., Haan, 1977; Vaillant, 1977) and argue that these help explain differences in stress outcomes. Recent work testing process models linking personality, coping, and outcomes has shown that personality variables predict the choice of coping strategies and that these strategies, in turn, lead to differential stress outcomes (e.g., Aspinwall & Taylor, 1992; Bolger, 1990; Carver et al., 1993; Holahan & Moos, 1990; Scheier et al., 1989; Stanton & Snider, 1993).

Coping choice, however, is not the only mechanism through which personality may affect stressor reactivity. In fact, personality may have no effect on coping choice, yet coping may still help explain personality effects on reactivity. This will occur if personality moderates the effectiveness of coping. In other words, some people may experience adverse outcomes following a stressful event not because they choose normatively maladaptive strategies but because they choose strategies that are ineffective for them alone. (Of course, coping choice must be nonzero for differential effectiveness to explain the effects of personality.) This third possibility is what we call a *differential coping-effectiveness model*. To our knowledge, this model has not been applied to the study of personality in the stress process.

The final possibility is what we refer to as a *differential choice-effectiveness model*: Personality leads to differences in coping choice (mediation) and coping effectiveness (moderation), and both processes help explain personality differences in stress outcomes. Of current research on personality and coping, Miller's work on monitoring and blunting closely approximates this model (Miller, 1987; Miller & Mangan, 1983). Specifically, her framework suggests that certain personality types (e.g., monitors) are characterized by a tendency to choose certain cop-

ing strategies (e.g., information seeking), strategies that are optimal for their personalities but would be maladaptive for others (e.g., blunters). The work by Cantor and her colleagues on defensive pessimism also suggests the importance of both coping choice and coping effectiveness. For example, when in stressful achievement situations, defensive pessimists choose cognitive coping strategies that highlight potential negative outcomes (Cantor, Norem, Niedenthal, Langston, & Brower, 1987; Norem & Cantor, 1986). Although these strategies serve to motivate pessimists to higher achievement, they appear to be detrimental to optimists (Cantor & Norem, 1989). Other researchers have also implicitly considered both choice and effectiveness processes, although not in the context of personality variables (Aldwin & Revenson, 1987; Menaghan, 1982).

When a differential choice-effectiveness model applies, it is important to compare the relative importance of the two processes, because although both coping choice and coping effectiveness help to explain reactivity differences, one can predominate over the other. As we will see, it is possible to determine the relative importance of the two processes by using a method similar to that used for comparing exposure and reactivity effects.

The distinctions between stressor exposure and stressor reactivity and between coping choice and coping effectiveness have potential implications for interventions to reduce the adverse effect of personality on health and psychological outcomes. If one wishes to reduce the tendency for people with certain personality dispositions to show negative outcomes, should one intervene to help reduce their exposure to stressful events or their reactivity to these events? If one focuses on the latter, should one intervene to help them choose effective coping strategies or to increase the effectiveness of the coping strategies they choose? In this article, we address these questions as they relate to a particular personality disposition, neuroticism, a particular class of stressors, interpersonal conflicts, and a particular stress outcome, distress in daily life.

Theoretical Models Linking Neuroticism, Interpersonal Conflicts, Coping, and Daily Distress

Neuroticism is thought to be a broad dimension of personality whereby people vary in autonomic nervous system lability and in the tendency to experience negative emotions (Eysenck & Eysenck, 1985). Previous research and theorizing would lead one to expect that a differential reactivity model can explain the relationship among neuroticism, stressors, and daily distress (Endler & Edwards, 1982; Eysenck & Eysenck, 1985; Larsen, 1991; Larsen & Ketelaar, 1989; Marco & Suls, 1993). However, as noted earlier, in a 42-day diary study of a community sample of couples, Bolger and Schilling (1991) found that a differential exposure-reactivity model was the most appropriate. Neuroticism led to greater exposure and reactivity to daily stressors, and both of these processes helped explain why neuroticism was associated with increased distress in daily life. Moreover, Bolger and Schilling found that among daily stressors, interpersonal conflicts with adults were the most important in explaining the neuroticism-distress relationship.

The Bolger and Schilling (1991) study had two important limitations, however. First, the study assessed reactivity using cross-sectional (same-day) relationships between stressors and

distress. Such relationships do not distinguish the effects of stressors on distress from the effect of distress on exposure to stressors. As Watson (1988) pointed out, the latter mechanism is a plausible explanation for such cross-sectional findings.

Second, Bolger and Schilling (1991) did not attempt to explain why high-neuroticism participants showed greater reactivity to conflicts. Previous work showing that daily coping affects distress (Stone, Neale, & Shiffman, 1993) suggests that coping may play an important role. One explanation would be that high-neuroticism participants make poor coping choices. For example, high-neuroticism participants may be more likely to choose confrontive coping strategies when they experience conflicts; if these strategies are normatively ineffective, this alone could explain why neuroticism predicts reactivity to conflicts. In the previous section, we referred to this type of explanation as a differential coping-choice model. Alternatively, such reactivity might not be due to differential coping choice but to differential coping effectiveness. By this reasoning, people high in neuroticism might choose the same coping strategies as other people, but these strategies would be ineffective for them alone. A third possibility is that both differential coping choice and differential coping effectiveness help explain high-neuroticism participants' greater reactivity to conflicts.

In the present study, we examined the importance of all the processes posited above—stressor exposure, stressor reactivity, coping choice, and coping effectiveness—as possible explanations for the effect of neuroticism on distress in daily life. Furthermore, we examined longitudinal (cross-day) effects of stressors and coping on distress. In line with the Bolger and Schilling (1991) findings discussed earlier, we predicted that an exposure–reactivity model would best represent the data and that reactivity would be a more important process than exposure. Extending this earlier study, we attempted to explain reactivity in terms of coping-choice and coping-effectiveness processes. This allowed us to determine which of the four reactivity models discussed earlier (Figure 3) best represents the data. The relative importance of the choice and effectiveness processes also were evaluated.

Figure 4 illustrates the specifics of the framework to be examined. Two features are noteworthy. First, because Bolger and Schilling (1991) found that interpersonal conflicts were the most important daily stressors in explaining the neuroticism–distress relationship, we focused specifically on daily interpersonal conflicts. Second, the framework includes three negative emotions that are potential outcomes of daily conflicts: anger, anxiety, and depression. Bolger and Schilling (1991) examined overall daily distress alone, and this may have obscured important effects of conflicts on specific negative emotions.

We examined this framework in a 14-day diary study in which participants provided daily ratings of their exposure to interpersonal conflicts, their coping choices, and their emotional states. We used the longitudinal, within-person nature of these data to study individual differences in people's exposure and reactivity to conflicts, the coping strategies they chose in response to conflicts, and the effectiveness of these strategies. We then examined the extent to which individual differences in these processes were affected by neuroticism.

Method

Design

On each day of the 14-day-diary period, participants completed a brief questionnaire in which they reported the occurrence of interper-

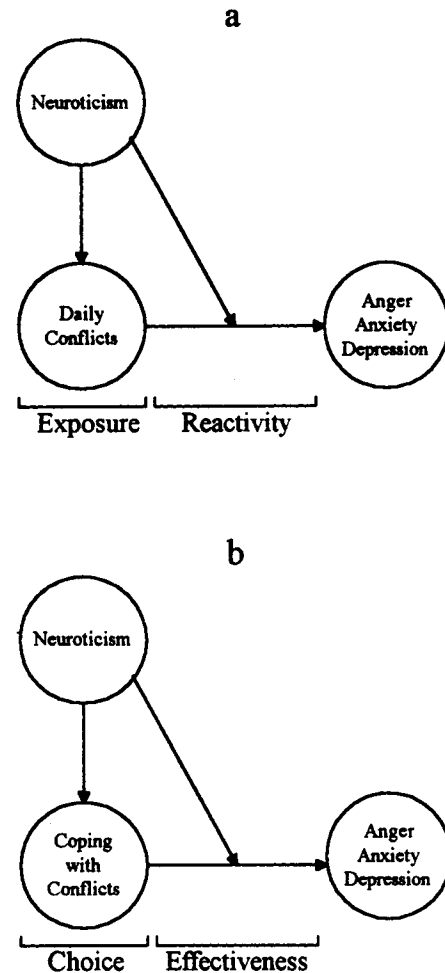


Figure 4. Specific framework linking neuroticism to (a) exposure and reactivity to daily conflicts and (b) components of reactivity: coping choice and coping effectiveness.

sonal conflicts, their chosen ways of coping with these conflicts, and their negative emotions. Neuroticism was measured along with a number of other personality and social relationship variables during a lab session that preceded the onset of the diary period.

Participants

Ninety-four introductory psychology students participated in the study to partially fulfill a course requirement. Sixty-five of the participants were female, and 29 were male. The mean age of participants was 19.5 years.

Measures

Neuroticism. The 22-item neuroticism scale from the Eysenck Personality Inventory (Eysenck & Eysenck, 1964) was used to assess this construct. Sample items include: "Would you call yourself a nervous person?", "In general, are your feelings easily hurt?", and "Are you a worrier?" Participants responded either yes or no to each item. Although neuroticism is a continuous variable, to simplify the analyses, particularly the exposure–reactivity and choice–effectiveness comparisons (discussed below), we treated it as a dichotomy. We divided neuroticism at the median such that 46 participants were classified as high

in neuroticism (and assigned a score of 1) and 48 were classified as low in neuroticism (and assigned a score of 0).

Interpersonal conflicts. The occurrence of interpersonal conflicts was reported daily through a checklist of common stressful events. The checklist contained three items concerning negative interactions (defined as "arguments, tensions, or being criticized"). Participants were asked if such an event took place with a "family member," a "close friend/boyfriend/girlfriend," and "any other individual (other friends, roommates, acquaintances, or strangers)." If more than one stressful event occurred during the day, participants were also asked to indicate which of these events was the most stressful.

Coping. The manner in which participants responded to their interpersonal conflicts was assessed through a 27-item short form of the Ways of Coping Scale (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986), designed for completion on a daily basis. Participants completed the checklist for their most stressful event of the day.

The checklist items consisted of brief sentences describing different ways of coping with stressful events (e.g., "talked to someone about the situation"; "went on as if nothing had happened"; "realized I brought the problem on myself"). Participants indicated their choice of each coping response by checking the space provided. The coping items were designed to tap the following seven ways of coping: planful problem solving, accepting responsibility, self-controlling, distancing, seeking social support, confrontive coping, and escape-avoidance. Each coping factor was measured using the three or four highest loading items according to a factor analysis conducted by Folkman et al. (1986). Coping was scored by summing the number of items checked in each coping category and converting these scores to a 100-point scale.

Distress. Distress was measured daily using items from the Profile of Mood States (Lorr & McNair, 1971) tapping anger-hostility, tension-anxiety, and depression-dejection. We used the three highest loading items from a factor analysis conducted by Lorr and McNair (1971) to represent each factor. The items tapping anger were "annoyed," "peevish," and "resentful." The items tapping anxiety were "on edge," "uneasy," and "nervous." The items tapping depression were "sad," "hopeless," and "discouraged." Participants were asked to indicate the extent to which they experienced each of these feelings during the previous 24 hours. They responded by circling the appropriate number on a 5-point scale ranging from *not at all* (0) to *extremely* (4). To compute daily scores for each participant on anger, anxiety, and depression, we took the mean of the relevant items for each affect and converted it to a 100-point scale.

Procedure

All participants took part in an initial lab session in groups of 1 to 6 persons. At the beginning of this session, participants were informed of the length and requirements of the study and were told they could withdraw without penalty if they were unable to commit the amount of time necessary. They were also assured of the anonymity of their responses. They then completed the Eysenck Personality Inventory along with various other personality, social relationship, and demographic measures.

At the end of the lab session, participants were given 14 daily diaries (each diary consisted of 2 pages) along with verbal and written instructions on how to complete them. They were asked to complete one diary at the end of each day. After the first week, participants returned the first seven diaries. Participants brought the second seven diaries with them to a second lab session (not relevant to the present investigation). At the end of the second lab session, participants were fully debriefed, thanked, and given credit for their participation.

Analysis of Diary Data: Hierarchical Linear Models

In this study, 94 participants provided 14 consecutive daily reports. The resulting dataset has two levels of analysis, a within-subject level,

reflecting daily variation within individuals over time, and a between-subject level, reflecting differences between individuals on average. We used the within-subject level of analysis to estimate each participant's stressor exposure, stressor reactivity, coping choice, and coping effectiveness. We used the between-subject level of analysis to examine the extent to which individual differences in these processes were affected by neuroticism.

These analyses were conducted using a multilevel, or hierarchical, linear model approach (Bryk & Raudenbush, 1992). This approach allows one to simultaneously analyze between-subject and within-subject variation. Conventional linear models, such as regression, cannot analyze both sources of variation simultaneously. As a result, researchers using conventional approaches either fail to distinguish between-subject from within-subject variation, or they eliminate the within-subject level altogether. Failure to distinguish between-subject and within-subject variation results in the use of incorrect error terms to test both between- and within-subject effects (see Kenny, Kashy, & Bolger, in press, for a more detailed discussion). Elimination of the within-subject level through aggregation across repeated measurements results in the loss of valuable information. If the data from the present study were aggregated, within-subject estimates of stressor reactivity and coping effectiveness could not be obtained. To avoid these problems, therefore, we used a hierarchical linear model approach to analyze our data. The specific models estimated are described in the results section.

Results

Overview

To test the various models implied by the framework depicted in Figures 4a and 4b, we conducted the following analyses. We first considered the effect of neuroticism on the two major stages of the stress process, exposure and reactivity, to test the hypothesis that an exposure-reativity model best fits the data. Next, we used a procedure that permits the size of mediation and moderation effects to be compared. This allowed us to determine whether, as predicted, reactivity (moderation) was a more important process than exposure (mediation). We then considered the effect of neuroticism on the two substages of reactivity—coping choice and coping effectiveness—to evaluate the appropriateness of the various reactivity models displayed in Figure 3. Finally, we determined the relative importance of the choice (mediation) and effectiveness (moderation) processes in explaining the effect of neuroticism on reactivity.

Neuroticism and Exposure to Conflicts

The first analysis was designed to test the hypothesis that neuroticism would predict exposure to interpersonal conflicts. Specifically, participants in the high-neuroticism group were expected to report more interpersonal conflicts over the 2-week diary period than those in the low-neuroticism group. This hypothesis was confirmed.

As noted above, to analyze the effect of neuroticism on participants' exposure to interpersonal conflicts, we used a multilevel, or hierarchical, linear model (Bryk & Raudenbush, 1987, 1992; Mason, Wong, & Entwisle, 1984; Strenio, Weisberg, & Bryk, 1983). The hierarchical linear model allows one to obtain separate estimates of exposure for each participant and to express individual differences in these estimates as a function of neuroticism.

The first, within-subject, level of the model specifies that a participant's level of conflict on any given diary day is a function

of his or her mean level of conflict across all diary days and a deviation from that mean. This model can be written as follows:

$$C_t = a_0 + e_t \quad (1)$$

where C_t is the occurrence of a conflict on day t , a_0 is the mean level of conflicts across all diary days, and e_t is a residual component of conflict on day t . To compute the dependent variable in the preceding equation, C_t , we collapsed across the three different types of conflicts (those with family, friends, and others) to create a dichotomous index. Thus, for each diary day, participants received a score of 1 if they reported the occurrence of at least one conflict and a score of 0 if they did not. This means that the coefficient a_0 , which is the mean level of conflicts across all diary days, can be interpreted as the proportion of days on which a participant reports at least one conflict. (Note that for each participant, a_0 is assumed to be drawn randomly from a normal distribution. Also, e_t is assumed to be drawn from a normal distribution with mean 0, constant variance across all subjects, and no autocorrelation over time.)

The second, between-subject, level of the model posits that the first-level coefficient for any participant i , a_{0i} , is a function of neuroticism, as follows:

$$a_{0i} = b_0 + b_1 N_i + q_i \quad (2)$$

Equation 2 indicates that the proportion of days on which participants report a conflict is a function of an intercept, a neuroticism component, and a random component. The equation further reveals that this proportion is equal to b_0 for the low-neuroticism group and $b_0 + b_1$ for the high-neuroticism group; therefore, the difference between these two proportions, b_1 , provides the test of our hypothesis regarding differential exposure to conflicts. (Note that the random component, q_i , is assumed to be drawn from a normal distribution with mean 0 and variance σ_q^2 .)

We estimated this model using the HLM computer program (Bryk, Raudenbush, Seltzer, & Congdon, 1989). Results showed that the proportion of diary days on which low-neuroticism participants reported an interpersonal conflict (b_0) was .25. The equivalent proportion for the high-neuroticism group ($b_0 + b_1$) was .41. The difference (b_1) is .16 and is significant, $t = 3.83, p = .000$. Therefore, these results support the hypothesis that high-neuroticism participants report greater exposure to daily conflicts than low-neuroticism participants.

Neuroticism and Reactivity to Conflicts

The next set of analyses was designed to test the hypothesis that an individual's level of neuroticism predicts his or her reactivity to interpersonal conflicts. Specifically, participants in the high-neuroticism group were expected to report more distress following an interpersonal conflict than those in the low-neuroticism group. This hypothesis received substantial support.

To analyze the effect of neuroticism on reactivity to interpersonal conflicts, we again used a hierarchical linear model. The first level of this model specifies that each person in the population has his or her own characteristic relationship between interpersonal conflicts at day t and change in distress between day

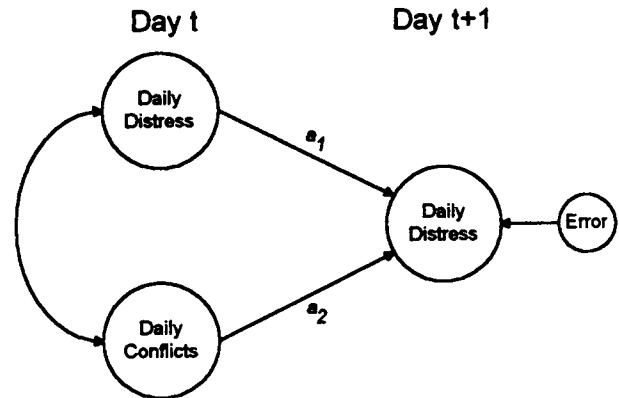


Figure 5. Within-subject statistical model linking daily conflicts to change in daily distress. a_1 = slope for prior day's distress; a_2 = slope for prior day's conflicts, i.e., reactivity to conflicts.

t and day $t + 1$. This within-subject level of the model is depicted graphically in Figure 5 and can be written as follows:

$$D_{t+1} = a_0 + a_1 D_t + a_2 C_t + e_{t+1} \quad (3)$$

where D_{t+1} is distress on day $t + 1$; D_t is distress on day t ; C_t indicates whether a conflict occurred on day t (coded 0 if no conflict occurred and 1 if a conflict did occur); a_0 is the intercept (i.e., the level of distress on day $t + 1$ when no conflict occurred and distress was zero on day t); a_1 is the slope for prior distress (i.e., the number of units higher on distress on day $t + 1$ for each unit higher on distress on day t); a_2 is the slope for conflicts, or reactivity (i.e., the number of units higher on distress on day $t + 1$ associated with the occurrence of a conflict on day t); and e_{t+1} is a random component of distress on day $t + 1$. (For each individual, a_0 , a_1 , and a_2 are assumed to be drawn randomly from a normal distribution. Similarly, e_{t+1} is assumed to be drawn from a normal distribution with a mean of 0, constant variance across all subjects, and no autocorrelation over time.) Because prior day's distress is included as a control variable, the dependent variable can be interpreted as residualized change in distress from day t to day $t + 1$ (Kessler & Greenberg, 1981).

Note that this model uses a 1-day lagged design. Interpersonal conflicts and distress on day t (today) both lead to distress on day $t + 1$ (tomorrow). Because each participant provided 14 days of data, there were 13 2-day pairs from which to estimate effects for each participant.

The second, between-subject, level of the model posits that the first-level reactivity coefficient for participant i , a_{2i} , is a function of neuroticism, as follows:

$$a_{2i} = b_0 + b_1 N_i + s_i \quad (4)$$

Thus, Equation 4 indicates that each participant's reactivity slope is a function of an intercept, a neuroticism component, and a random component (the random component, s_i , is assumed to be drawn from a normal distribution with mean 0 and variance σ_s^2). This equation further reveals that the reactivity for the low-neuroticism group is equal to b_0 and the reactivity for the high-neuroticism group is equal to $b_0 + b_1$. Thus, the

reactivity difference between the groups, b_1 , provides the test of our hypothesis that high-neuroticism participants would be more reactive to interpersonal conflicts than low-neuroticism participants.

We estimated three such multilevel regression equations, one each for anger, anxiety, and depression. Table 1 shows the results of these analyses. The slope for today's conflicts on change in anger was significant and positive for the high-neuroticism group ($b = 4.53, t = 2.65, p = .009$) but not for the low-neuroticism group ($b = -0.17, t = .09, p = .928$). Furthermore, the difference between the slopes was marginally significant ($b = 4.70, t = 1.87, p = .061$). Similar results were obtained for depression: For the high-neuroticism group, the slope for today's conflicts was positive and almost significant ($b = 3.17, t = 1.93, p = .054$). For the low-neuroticism group, the slope was slightly smaller in magnitude and negative in sign ($b = -2.91, t = 1.68, p = .093$). The difference between the slopes was significant ($b = 6.08, t = 2.54, p = .011$). For anxiety, none of the relevant slopes were significant. We can conclude from these results that, for depression and anger, neuroticism significantly and positively predicted reactivity to daily interpersonal conflicts. These effects are depicted graphically in Figure 6.

Taken together, the results of the exposure and reactivity analyses indicate that a differential exposure-reactivity model best fits the data for anger and depression. For anxiety, however, it appears that a null model best fits the data, that is, interpersonal conflicts do not play an explanatory role.

Comparison of Exposure and Reactivity

So far we have seen that, compared to those low in neuroticism, participants high in neuroticism reported both greater exposure and greater reactivity to interpersonal conflicts. The relative importance of these two processes can be assessed using a procedure that allows mediation and moderation effects to be compared (see Iams & Thornton, 1975; Kessler, 1979; Winsborough & Dickinson, 1971). Specifically, this procedure compares the effect on distress of mathematically equating both the exposure and reactivity of the high-neuroticism group to that of the low-neuroticism group. The effect on distress of equating the groups on exposure corresponds to the mediation effect; the effect on distress of equating the groups on reactivity corresponds to the moderation effect. Whichever operation reduces

distress more reveals the more detrimental process: differential exposure or differential reactivity.

The differential exposure effect is the expected change in the distress of high-neuroticism participants if their exposure to conflicts were made equal to that of low-neuroticism participants but their reactivity remained the same. This effect is equal to the mean difference in exposure to conflicts between the high- and low-neuroticism groups (.16) multiplied by the reactivity to conflicts of the high-neuroticism group (as shown by the b s for anger, anxiety, and depression in Table 1).

The differential reactivity effect is the expected change in the distress of high-neuroticism participants if their reactivity to conflicts were made equal to that of low-neuroticism participants but their exposure remained the same. Specifically, this effect is equal to the difference in reactivity to conflicts between the low- and high-neuroticism groups (shown by the difference in b s for anger, anxiety, and depression in Table 1) multiplied by the mean exposure to conflicts of the high-neuroticism group (.41).¹

Table 2 displays the results of these calculations. Effects are shown both in raw units (i.e., the 100-point scale) and in standardized units (i.e., between-subject SD s; see Cohen, 1988). Note that for anger, the differential reactivity effect was more than twice the size of the differential exposure effect (-1.93 vs. $-.72$ raw units). For depression, the differential reactivity effect was nearly five times as large as the differential exposure effect (-2.49 vs. $-.51$ raw units). (The results for anxiety were not estimated because conflicts were not related to anxiety change for either the high- or low-neuroticism groups, and therefore conflicts cannot explain the effect of neuroticism on daily anxiety.) These results indicate that reducing the reactivity of high-neuroticism participants to that of low-neuroticism participants would produce a larger overall decrease in negative affect than would reducing their exposure. Thus, it is high-neuroticism participants' reactivity to conflicts that was most detrimental to their negative affect.

We now turn our attention to the two substages of reactivity; first, we examine whether neuroticism predicted participants' choice of particular methods of coping with conflicts.

Neuroticism and Coping Choice

To examine the effect of neuroticism on coping choice, we estimated seven hierarchical linear models with each of the seven ways of coping as dependent variables. The single predictor variable in the first-level (within-subject) equations was a dummy variable coded 1 if the most stressful event of the day was a conflict and 0 if it was not (participants completed the

Table 1
Effects of Daily Conflicts on Change in Anger, Anxiety, and Depression, by Level of Neuroticism

Group	Effect of conflicts at day t on					
	Anger at $t + 1$		Anxiety at $t + 1$		Depression at $t + 1$	
	b	p	b	p	b	p
High neuroticism	4.53	.009	-0.04	.979	3.17	.054
Low neuroticism	-0.17	.928	-2.61	.136	-2.91	.093
Difference	4.70	.061	2.57	.277	6.08	.011

Note. The dependent variable at day t was controlled in each analysis.

¹ Note that the differential exposure and reactivity effects as defined above refer to the consequences of changing a particular factor (exposure or reactivity) first, that is, leaving the other factor unchanged. Because differential exposure and reactivity effects are correlated, however, different results would be obtained if we considered the order in which they were changed. Thus, if exposure were changed after reactivity, its effects would not be as large as if it were changed before reactivity (and vice versa). This issue did not concern us in this study because we were interested in contrasting the benefits of reducing either exposure or reactivity alone, leaving the other unchanged. See Iams and Thornton (1975) for a more detailed discussion of this issue.

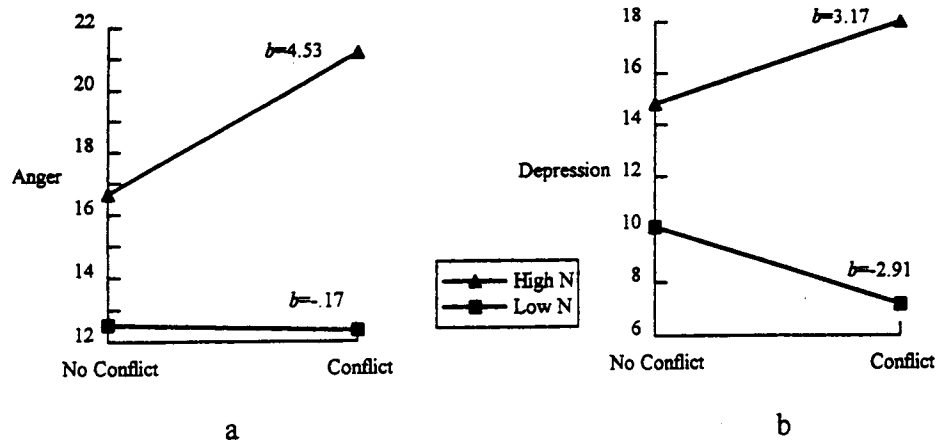


Figure 6. Effect of interpersonal conflicts at day *t* on distress at day *t* + 1, controlling for distress at day *t* for high- and low-neuroticism participants: results for (a) anger and (b) depression.

coping measure only for the most stressful event of the day, which may or may not have been an interpersonal conflict). In the second-level (between-subject) equations, the neuroticism dummy variable was used to predict individual differences in the first-level coefficients. Thus, these second-level equations estimate the extent to which neuroticism predicts the choice of certain coping strategies, given that an interpersonal conflict was the most stressful event of the day. The mean level of each coping response for the high- and low-neuroticism groups, as well as the mean difference, can be obtained from the second-level equations.

The results of these analyses are presented in Table 3. Recall that all coping measures are expressed on a 100-point scale. As seen in Table 3, participants in the high-neuroticism group engaged in significantly more planful problem solving, self-controlling, seeking social support, and escape-avoidance than did low-neuroticism participants. In addition, there was a trend toward high-neuroticism participants engaging in more confrontive coping. Note that in no case did high-neuroticism participants engage in significantly less coping activity.

Neuroticism and Coping Effectiveness

The next set of analyses was designed to examine the second substage of reactivity shown in Figure 4b: the relationship between neuroticism and coping effectiveness. Specifically,

Table 2
Effect of Setting the Conflict Exposure and Reactivity of High-Neuroticism Participants Equal to That of Low-Neuroticism Participants for Anger, Anxiety, and Depression

Affect	Differential exposure		Differential reactivity	
	Raw units	SD units ^a	Raw units	SD units ^a
Anger	-0.72	-0.05	-1.93	-0.14
Anxiety	—	—	—	—
Depression	-0.51	-0.04	-2.49	-0.18

^a Between-subject SD.

changes in participants' distress following their use of the coping responses were predicted by neuroticism in two separate regression analyses, one with anger and the other with depression as the dependent variable. (We omitted anxiety because, as noted in the previous section, there was no effect of neuroticism on anxiety reactivity.) Like our previous analyses, these regression equations had two levels.

At the first, within-subject level, we estimated the effects of all seven coping responses at day *t* on distress at day *t* + 1. Also entered at this level as control variables were (a) distress at day *t* and (b) two dummy variables coded to isolate the effects of coping when an interpersonal conflict was the most stressful event of the day. As in the reactivity analyses, the slope for each coping response indicates the subsequent change in distress associated with the choice of that response following an interpersonal conflict. We refer to this as the effectiveness of the coping response.

At the second, between-subject, level, we estimated the effect of neuroticism on the within-subject slopes. This allowed us to test the possibility that the effectiveness of the various coping responses differed between high- and low-neuroticism participants. After estimating each regression equation containing all the predictor variables mentioned above, we then reestimated these equations eliminating all nonsignificant terms (*p* > .1). This resulted in models in which self-controlling and confrontive coping predicted anger; and self-controlling, escape-avoidance, and confrontive coping predicted depression. In the cases of self-controlling and confrontive coping predicting anger and of confrontive coping predicting depression, neuroticism did not significantly alter the effectiveness of these coping responses; thus, a common slope for the high- and low-neuroticism groups was estimated.

Table 4 shows the results of these final regression analyses. As shown in the first two columns, both self-controlling and confrontive coping positively and significantly predicted changes in anger between day *t* and day *t* + 1. Thus, engaging in more self-controlling and confrontive coping in response to an interpersonal conflict today predicted greater levels of anger tomorrow. As noted above, because neuroticism did not significantly interact with either coping behavior, identical slopes are reported for the high- and low-neuroticism groups.

Table 3
Mean Levels of Coping Choice as a Function of Neuroticism

Ways of coping	High-N group	Low-N group	<i>p</i> (difference)
Planful problem solving	30	22	.000
Accepting responsibility	27	26	.638
Self-controlling	32	22	.000
Distancing	29	26	.264
Seeking social support	35	30	.019
Confrontive coping	32	28	.076
Escape-avoidance	25	18	.000

Note. Based on coping reports for days on which an interpersonal conflict was the most stressful event of the day. N = neuroticism.

Presented in the last two columns of Table 4 are the results for depression. Note that the results for confrontive coping are nearly identical to those for anger. The slope is significantly positive and unaffected by level of neuroticism. Thus, engaging in more confrontive coping on day *t* predicted not only higher levels of anger on day *t* + 1 but higher levels of depression as well.

Turning to the results for self-controlling and escape-avoidance, we can see that in both cases level of neuroticism significantly determined the effectiveness of these coping responses. For self-controlling, high-neuroticism participants' choice of this coping response resulted in greater levels of depression the following day ($b = .09, t = 1.84, p = .065$). However, when low-neuroticism participants engaged in more self-controlling, the result was lower levels of depression the following day ($b = -.14, t = 2.03, p = .042$). The difference between these slopes was significant ($b = .23, t = 2.75, p = .006$). For escape-avoidance, when high-neuroticism participants engaged in this coping response, there was no significant effect on subsequent levels of depression. For low-neuroticism participants, however, the result was higher subsequent levels of depression ($b = .18, t = 1.98, p = .047$). Again, the difference between these slopes is significant ($b = .28, t = 2.51, p = .012$).

Taken together, the results of the coping choice and coping

effectiveness analyses indicate that a differential choice model best fits the data for anger. For depression, however, the findings are mixed. Whereas the results for confrontive coping support a differential choice model, the results for self-controlling and escape-avoidance support a differential choice-effectiveness model.

Comparison of Coping Choice and Coping Effectiveness

The previous analyses demonstrated that high-neuroticism participants differed from low-neuroticism participants in both their choice of coping responses and the effectiveness of those responses. Analogous to the case of differential exposure and reactivity, the relative importance of differential coping choice and effectiveness can be compared through a procedure that determines the effect on distress of equating the coping choice and coping effectiveness of the high-neuroticism group to those of the low-neuroticism group. For a given coping strategy, the differential coping-choice effect is equal to the mean difference in the choice of that strategy between the high- and low-neuroticism groups (shown in Table 3) multiplied by the effectiveness of that strategy for the high-neuroticism group (shown by the *bs* for anger and depression in Table 4). The differential coping-effectiveness effect is equal to the mean choice of that strategy for the high-neuroticism group (shown in Table 3) multiplied by the difference in effectiveness between the high- and low-neuroticism groups (shown by the *bs* for anger and depression in Table 4). The results of these calculations are presented in Table 5. Effects are shown in both raw and standardized (between-subject *SD*) units.

The findings for anger indicated that lowering high-neuroticism participants' choice of self-controlling and confrontive coping to equal that of low-neuroticism participants would produce a small decrease in their levels of anger ($-.90$ and $-.32$ raw units, respectively). This finding is consistent with the previous coping analysis, which demonstrated that these two coping responses predicted increases in anger and were chosen more by high-neuroticism than low-neuroticism participants. The differential effectiveness effects were not estimated because the effectiveness of these coping responses did not differ by level of neuroticism. No components for escape-avoidance were estimated because this coping response did not affect changes in anger for either the high- or the low-neuroticism group.

The results for depression are listed in the last four columns of Table 5. The differential choice effects for self-controlling and

Table 4
Effects of Daily Coping With Conflicts on Change in Anger, Anxiety, and Depression, by Level of Neuroticism: Unstandardized Regression Coefficients

Coping response	Anger		Depression	
	<i>b</i>	<i>p</i>	<i>b</i>	<i>p</i>
Self-controlling				
High-N group	0.09	.018	0.09	.065
Low-N group	0.09	.018	-0.14	.042
Difference	—	—	0.23	.006
Escape-avoidance				
High-N group	—	—	-0.10	.120
Low-N group	—	—	0.18	.047
Difference	—	—	0.28	.012
Confrontive coping				
High-N group	0.08	.020	0.07	.033
Low-N group	0.08	.020	0.07	.033
Difference	—	—	—	—

Note. N = neuroticism.

Table 5
Effect of Setting the Coping Choice and Effectiveness of High-Neuroticism Participants Equal to That of Low-Neuroticism Participants

Coping response	Anger				Depression			
	Differential choice		Differential effectiveness		Differential choice		Differential effectiveness	
	Raw units	SD units ^a	Raw units	SD units ^a	Raw units	SD units ^a	Raw units	SD units ^a
Self-controlling	-0.90	-0.07	—	—	-0.90	-0.07	-7.36	-0.54
Escape-avoidance	—	—	—	—	0.70	0.05	7.00	0.52
Confrontive coping	-0.32	-0.02	—	—	-0.28	-0.02	—	—

^a Between-subject *SD*.

confrontive coping are similar to those for anger, indicating that lowering high-neuroticism participants' choice of these coping responses would produce a small decrease in their levels of depression (-0.90 and -0.28 raw units, respectively). The differential choice effect for escape-avoidance is also small, but it is positive in sign (.70 raw units). This finding indicates that high-neuroticism participants' choice of this coping response actually benefits them and that altering their level of choice to that of low-neuroticism participants would produce a small increase in depression.

The differential effectiveness effects for depression are much larger than the differential choice effects, indicating a greater impact on depression of equating the high- and low-neuroticism participants' coping effectiveness. Altering the effectiveness of self-controlling for high-neuroticism participants to equal that of low-neuroticism participants would produce a decrease in negative affect of 7.36 raw units. Altering the effectiveness of escape-avoidance would produce an increase in negative affect of 7.00 raw units. Because the slopes for confrontive coping did not significantly differ by level of neuroticism, the differential effectiveness effect for this coping response was not estimated.

Discussion

We argued at the beginning of the article that personality may affect the stress process by influencing stressor exposure, stressor reactivity, or both. We further argued that personality may affect stressor reactivity by influencing coping choice, coping effectiveness, or both. Finally, we argued that various models of the role of personality in the stress process can be constructed based on these possibilities. Our analyses of the links between neuroticism, interpersonal conflicts, coping, and emotional outcomes indicated that the most appropriate model varies by type of emotional outcome.

Modeling the Role of Daily Conflicts in the Neuroticism-Distress Relationship

A differential exposure-reactivity model for anger and depression. Our results showed that a differential exposure-reactivity model best fits the data for anger and depression. Compared to low-neuroticism participants, high-neuroticism participants experienced more daily conflicts and were more likely to react to them with anger and depression. Furthermore, reactivity was a more important process than exposure

in explaining the greater anger and depression of high-neuroticism participants. These results replicate and extend previous work by Bolger and Schilling (1991) in two ways. First, these results are based on a longitudinal (cross-day) assessment of reactivity and thus are less prone to rival explanations than the cross-sectional assessment used in the previous study. Second, although Bolger and Schilling (1991) demonstrated that neuroticism leads to greater exposure and reactivity to daily conflicts and that these processes help explain emotional outcomes, they did not distinguish among various forms of emotional outcomes. In the present study, we have identified these outcomes as anger and depression.

Regarding exposure, it is important to consider whether the high-neuroticism participants actually experienced more conflicts or were simply more likely than low-neuroticism participants to interpret interpersonal events as conflictual. Bolger and Schilling (1991) considered this question by analyzing whether couples' agreement about the occurrence of a marital conflict varied as a function of the neuroticism level of the husband or wife. Their results showed that when a high-neuroticism participant reported a marital conflict, his or her spouse was just as likely to agree that it occurred as when a low-neuroticism participant reported a conflict. Thus, although neuroticism may lead people to interpret events as conflictual, the Bolger and Schilling (1991) results suggest that a substantial proportion of the exposure effect reflects the actual occurrence of interpersonal conflicts.

If this is so, then there are at least three reasons why high-neuroticism participants experience more conflicts. It could be that their high levels of daily negative affect, particularly anger and depression, lead to interpersonal problems, a possibility discussed by Magnus and his colleagues (Magnus, Diener, Fujita, & Pavot, 1993). It could also be that their strategies of coping with conflicts cause these conflicts to continue or to spawn new conflicts. This possibility seems plausible given that high-neuroticism participants were more likely to use confrontive coping strategies in response to conflicts. Finally, it could be that they engage in less anticipatory and preventive coping than other people, which results in greater exposure to stressors, including conflicts. Because our study focused on reactive coping, we were unable to examine this possibility.

A null model for anxiety. Our results show that conflicts do not explain the effects of neuroticism on anxiety. These results are interpretable if one considers that anxiety is usually a re-

sponse to an upcoming threatening event, whereas depression and, to some extent, anger are responses to events that have already occurred (Lazarus, 1991). Given that the dependent variables in this study were various forms of distress on days following a conflict, it is understandable that anger and depression showed the strongest effects.

Modeling the Role of Daily Coping in the Neuroticism-Reactivity Relationship

Because reactivity to daily conflicts played an important role in explaining the greater anger and depression of high-neuroticism participants, we examined possible component processes underlying reactivity: coping choice and coping effectiveness. Again, we found that both processes were important, although, again, the results varied by type of emotional outcome.

A differential coping-choice model for anger. We found that participants high in neuroticism reported greater use of many coping methods in response to interpersonal conflicts. Effects were strongest for the choices of planful problem solving, self-controlling, and escape-avoidance methods. Previous studies have shown that neuroticism predicts greater choice of what McCrae and Costa (1986) termed immature coping methods such as wishful thinking, self-blame, and avoidant coping (see also Bolger, 1990; Parkes, 1986, 1990). Clearly, not all of the methods used by high-neuroticism participants in this study could be termed immature. To our knowledge, this is the first study to examine neuroticism and coping with daily conflicts; thus, these results are necessarily provisional.

In the case of anger, neuroticism influenced coping choice but not coping effectiveness. Compared to low-neuroticism participants, high-neuroticism participants were more likely to use self-controlling and confrontive coping, but these coping efforts were equally detrimental for both groups. For anger, therefore, coping mediated the neuroticism-reactivity relationship in a standard path-analytic way: Neuroticism led to differences in coping choice, which were translated, through a common effectiveness process, into differences in anger. Thus, our results support a differential coping choice model for anger. As mentioned at the beginning of this article, this has been the predominant model linking personality, coping, and outcomes, but it is only valid when there are no personality differences in coping effectiveness.

A combination of models for depression. For two coping methods, self-controlling and escape-avoidance, our results showed that a standard mediational approach to explaining the links between neuroticism, coping, and outcomes is not valid in the case of depression. This is because these two coping methods had very different effects when used by low-neuroticism participants than when used by high-neuroticism participants. Efforts to exert self-control were effective in preventing depression for low-neuroticism participants, but such efforts backfired for high-neuroticism participants. For escape-avoidance, coping was not significantly related to depression for the high-neuroticism group, but it led to increases in depression for the low-neuroticism group. Thus, for these two coping methods, our results support a differential coping choice-effectiveness model: To understand high-neuroticism participants' depression reactivity to conflicts, it is necessary

to take into account both their choice of coping efforts and the effectiveness of those efforts.

For confrontive coping, however, our results showed that a differential choice model is optimal. Neuroticism leads to more confrontive coping when conflicts occur, and because confrontive coping leads to depression for both high- and low-neuroticism participants, neuroticism leads to greater depression following conflicts.

Limitations and Future Directions

This study has several limitations. A principal limitation is the absence of appraisals as mediators in the stress process. From the work of Lazarus and Folkman (1984), it is clear that appraisals play an important role in determining whether events are labeled as stressful (primary appraisal) and whether and what kinds of coping are used (secondary appraisal). Unfortunately, appraisal processes of daily stressors are likely to be very rapid, and testing process models that include appraisals would require more frequent repeated measurements than is practical in diary studies. The incorporation of appraisals would also greatly increase the complexity of the theoretical model, because an appraisal stage would need to be included as a component of both stressor exposure and coping choice. Our decision to exclude appraisals, therefore, was largely a pragmatic one.

A second limitation concerns our focus on coping with the most stressful event of the day. Although the framework presented in this study is intended to apply to all conflicts, we felt it was not reasonable to ask participants to provide detailed accounts of their coping efforts with every conflict they experienced in a given day. Thus, our coping results may apply only to more severe daily conflicts.

A third limitation concerns our exclusive focus on cross-day effects. Although it is likely that conflicts have important same-day effects on distress, we did not examine these in the current study. The reason we did not do so was that, with one observation per day, same-day relationships between conflicts and distress would be ambiguous regarding the direction of causality. This limitation can be overcome by implementing studies that include multiple assessments of stressors and distress in a given day. An example of such a study can be found in the work of Larsen (1991).

Another limitation relates to our analyses of neuroticism and coping effectiveness. No specific predictions were made concerning the influence of neuroticism on the effectiveness of specific coping responses, and few of the tests were statistically significant. We believe the primary value of the current results is in demonstrating that personality can influence coping effectiveness, a possibility not considered in previous models of the stress process.

Finally, this study is limited by the crude checklist method we used to obtain reports of daily conflicts. Because of this, we cannot be sure that the conflicts reported by different participants are of equal severity. In the absence of statistical controls for stressor severity, participants exposed to more severe conflicts will appear to be more emotionally reactive than they actually are. Moreover, if neuroticism affects the severity of conflicts, differences in reactivity related to neuroticism may be partly or wholly spurious. Although it was not possible to test this idea in the current study, we do not think that differences

in conflict severity can account for the reactivity effects. In an earlier study of a major stressor, the Medical College Admissions Test, in which the objective features of the stressor were identical for all participants, clear differences in emotional reactivity as a function of neuroticism were found (Bolger, 1990).

Conclusions

In this article, we outlined a multistage framework for studying the role of personality in the stress process. In the specific case of neuroticism and daily distress, it appears necessary to take into account stressor exposure and stressor reactivity as well as coping choice and coping effectiveness as explanatory processes. Our results have both replicated and extended earlier work by Bolger and Schilling (1991). We have shown that reactivity to conflicts is more important than exposure to conflicts in explaining the effects of neuroticism on daily distress. We have also decomposed the reactivity effect into coping choice and coping effectiveness components and examined reactivity over time. Although it has not been customary for researchers to investigate the role of personality in coping effectiveness, our results suggest that more attention should be given to this possibility in future studies. Finally, the theoretical framework we have outlined is quite general and can be applied to other personality constructs and other stress outcomes.

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