Depression as a Moderator of Relationships Between Positive Daily Events and Day-to-Day Psychological Adjustment

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For 21 days, 123 participants provided measures of their daily depressogenic adjustment, including Beck's cognitive triad, causal uncertainty, control over the environment, self-esteem, and anxiety, and they described the positive and negative events that occurred. Daily adjustment negatively covaried with the number of negative events occurring each day and, except as measured by anxiety, positively covaried with positive events. The covariance between negative events and adjustment was stronger than the covariance between positive events and adjustment. Participants also provided measures of depressive symptoms. For the self-esteem and cognitive triad measures, adjustment covaried more strongly with negative and positive events for the depressed than they did for the nondepressed.

For more than two decades, psychologists have studied day-to-day variability in psychological states to further the understanding of individual differences in psychological well-being and adjustment. This research suggests that daily psychological adjustment covaries with daily events and that trait levels of adjustment moderate this covariation. Although informative, this research is limited in important ways. First, research on daily events and adjustment has operationalized daily adjustment primarily in terms of mood. Second, studies examining how day-level relationships are moderated by trait-level measures have focused on the moderating role of neuroticism and related constructs; few studies have focused on depression.

The focus of existing research may limit its utility for understanding more specific phenomena such as self-esteem and depression. Although understanding disturbances in mood is clearly important to understanding both self-esteem and depression, considerable research suggests that state-level constructs other than mood are worth investigating. For example, research indicates that depression is associated with greater lability in self-esteem and that depression may moderate day-level relationships between events and self-esteem (Butler, Hokanson, & Flynn, 1994).

Accordingly, the present study examined day-level relationships between events and state measures of depressogenic adjustment other than mood and how such relationships varied as a function of trait depressogenic adjustment. Each day for 3 weeks, participants described the positive and negative events that occurred and provided measures of state adjustment. Over a 4 1/2–month period, participants also provided four reports of their depressive symptoms, which collectively were used to measure depression.

Three hypotheses guided the study: (a) daily adjustment would covary negatively with daily negative events and positively with positive events, (b) adjustment would covary more strongly with negative events than with positive events, and (c) the covariation between daily events and adjustment would be stronger for people who were

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less well adjusted at the trait level than for those who were better adjusted. These hypotheses were tested by a series of multilevel random coefficient modeling analyses.

Studies of day-level relationships between events and psychological adjustment have focused on daily variations in mood, with mood usually operationalized in terms of positive and negative affect (PA and NA), dimensions suggested by Watson and Tellegen (1985). Although studies of PA and NA have been informative, understanding specific types of distress such as depression may require the use of other approaches. When introducing the PANAS, Watson, Clark, and Tellegen (1988) noted, "Consistent with previous findings that depressive symptomatology is affectively complex . . . researchers interested in studying depressed affect might therefore want to use the PANAS scales as a complement to more traditional depression measures" (p. 1068). Moreover, considerable research and theory suggest that depression also involves more cognitively focused components such as optimism about the future (e.g., Beck, 1972), perceptions of control over outcomes (e.g., Alloy, Kelly, Mineka, & Clements, 1990), and the ability to detect cause and effect in one's social world (e.g., Weary & Edwards, 1994).

To measure the breadth of constructs that research has suggested reflect depressogenic adjustment, five constructs that have been found to covary with depression at the trait level served as the basis for the daily measures of depressogenic adjustment in the present study. These were as follows: Beck's Cognitive Triad (Beck, 1972), control over the outcomes of one's behavior (Deci & Ryan, 1985), the ability to detect cause and effect in one's world (Weary, Jordan, & Hill, 1985), self-esteem (Rosenberg, 1965), and anxiety.

Research on daily events has examined day-level relationships between mood and both positive and negative events, although there has been a somewhat greater interest in negative events, as suggested by the number of studies examining only negative events (e.g., Affleck, Tennen, Urrows, & Higgins, 1994; Bolger, DeLongis, Kessler, & Schilling, 1989; Bolger & Schilling, 1991; Larsen & Kasimatis, 1991; Marco & Suls, 1993; Suls, Martin, & David, 1998). In general, these studies have found that people experience greater NA on days when more negative events occur than on days when fewer negative events occur. Positive events have been studied in conjunction with negative events (Clark & Watson, 1988; David, Green, Martin, & Suls, 1997; Gable, Reis, & Elliot, 2000; Stone, 1981, 1987; Watson, 1988) and alone (Lewinsohn & Graf, 1973; Lewinsohn & Libet, 1972). In general, these studies find that people experience greater PA on days when more positive events occur than on days when fewer positive events occur, and those that also study negative events find that NA covaries with negative events.

In contrast to the specific relationships found in mood event studies (PA and positive events covary and NA and negative events covary), research on daily variations in self-esteem has found that self-esteem covaries with both positive and negative events (Butler et al., 1994). This research suggested the hypothesis that daily adjustment would covary positively with the positive events that occurred during a day and would covary negatively with the negative events that occurred. This hypothesis is also consistent with the assumptions that poorer adjustment may predispose people to experience more negative events and that better adjustment may predispose people to experience more positive events (Bolger & Schilling, 1991; Smith & Rhodewalt, 1986).

We also expected, similar to the results of Butler et al. (1994), that the day-level covariation between adjustment and negative events would be stronger than the covariation between adjustment and positive events. This more specific prediction also was based on research demonstrating that negative events have a greater psychological impact than positive events. In an extensive review, Taylor (1991) concluded that "diverse literatures in psychology provide evidence that, other things being equal, negative events appear to elicit more physiological, affective, cognitive, and behavioral activity, and prompt more cognitive analysis than neutral or positive events" (p. 67). In a discussion of attitude evaluation, Cacioppo, Gardner, and Berntson (1997) reached a similar conclusion, labeling the tendency for negative information to be more salient for a negativity bias.

The second major focus of research on daily events and daily psychological states has been how event-state relationships vary as a function of psychological traits. This research has concerned the moderating effects of neuroticism and other trait-level constructs such as Type-A behavior (Larsen & Kasimatis, 1991), social support (Affleck et al., 1994), and extraversion (David et al., 1997). Results of this research are somewhat inconsistent; for example, some studies of the moderating role of trait neuroticism have found that greater neuroticism is associated with stronger covariation between negative daily events and daily mood (e.g., Bolger & Schilling, 1991; Marco & Suls, 1993), whereas other studies have not (e.g., Affleck et al., 1994, David et al., 1997). Interestingly, none of these studies found that relationships between positive events and mood were moderated by a trait, in part because studies of trait moderators have tended to focus on negative events.

Research examining the moderating effects of depression on daily event-adjustment relationships suggests that depression may moderate event-adjustment

relationships. Butler et al. (1994) found that daily self-esteem covaried more strongly with positive and negative events for remitted depressives than for those who had never been depressed. The currently depressed were between the two.

We expected that day-level relationships between events and adjustment would be stronger for people who reported higher levels of depressive symptoms than for those who reported lower levels. This hypothesized moderating effect was suggested in part by Rogers's theory of the self, particularly his beliefs about conditions of self-worth (Rogers, 1961). Within a Rogerian framework, a person's sense of self is defined partially as a function of how contingent self-worth is on environmental events or conditions. Rogers believed that the self-worth of more poorly adjusted people is more contingent (less unconditional in Rogers's terminology) on environmental feedback such as daily events than the self-worth of better adjusted people. The day-to-day psychological states (measures of the self) of those who are more poorly adjusted at the trait level should vary more as a function of daily events than the psychological states of those who are better adjusted.

Such differential sensitivity is also consistent with research suggesting that trait self-esteem is negatively related to people's reactivity or sensitivity to events. Brockner (1984) suggested that trait self-esteem is negatively related to plasticity, the susceptibility to the effects of self-relevant social cues. In a series of studies, Kernis and colleagues have found negative relationships between trait self-esteem and the stability of state self-esteem (Kernis, 1993). Extending this, Gable and Nezlek (1998) found similar relationships between depression and a general factor consisting of the instability of a variety of measures of state adjustment.

Finally, the expectation that more depressed people will be more reactive to negative events is consistent with various theoretical accounts of neuroticism (e.g., Eysenck, 1967). It is noteworthy that research and theory on neuroticism has focused on reactivity to negative events such as stressors rather than on reactivity to positive events. In contrast, Rogers (1961) and other self-focused theorists tend to be concerned with a more general construct, lability, which includes reactivity to both negative and positive events.

The present study concerned the covariation between daily events and adjustment and was not intended to test hypotheses about causal relationships between events and adjustment. Nevertheless, because covariation has traditionally been considered to be a necessary (although not sufficient) condition to establish causality, the implications of the present results for understanding causal relationships between daily events and adjustment are discussed later.

METHOD

Participants

Participants were 128 introductory psychology students, 85 women and 43 men, attending the College of William & Mary who participated in partial fulfillment of class requirements. To ensure that the sample contained a sufficient number of participants with high levels of depressive symptoms, people were invited to participate on the basis of two measures of depressive symptoms. Seven weeks before the study began, participants completed the Beck Depression Inventory (BDI) (Beck, 1967) and the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977). Approximately 25% of those invited to participate scored greater than 10 on the BDI and greater than 17 on the CES-D, whereas the remaining 75% scored significantly less than both cutpoints on these measures; that is, people with greater than normal levels of depressive symptoms were oversampled.

Measures

For each well-being construct (except anxiety), trait and state measures were collected. Trait measures were collected at the beginning and end of the study and state measures were collected each day, as were descriptions of daily events.

Depressive symptoms were measured using the BDI and CES-D. Daily depression was measured by three items representing the elements of Beck's cognitive triad (Beck, 1972): (a) negative view of self, "Overall, how positively did you feel about yourself today"; (b) negative view of life in general, "Thinking of your life in general, how well did things go today"; and (c) negative view of the future, "How optimistic are you about how your life (in general) will be tomorrow?" Participants answered these questions using 7-point scales (with higher numbers indicating a more positive outlook).

Trait causal uncertainty was measured using the Causal Uncertainty Scale (CUS) (Weary & Edwards, 1994). Daily causal uncertainty was measured using four questions based on items from the CUS that were chosen on the basis of factor loadings from previous studies (Weary & Edwards, 1994) and appropriateness for daily assessment. Using 6-point scales ranging from *strongly disagree* (1) to *strongly agree* (6), participants indicated their agreement with the item, "I did not understand why things happened the way they did" in reference to four topics: thinking back on my day today in terms of the positive interactions I had with others, I did not understand why things happened the way they did; thinking back on my day today in terms of the positive nonsocial events (e.g., schoolwork, sports, etc.) that occurred, I did not understand why things happened the

way they did; thinking back on my day today in terms of the negative interactions I had with others, I did not understand why things happened the way they did; and thinking back on my day today in terms of the negative nonsocial events (e.g., schoolwork, sports, etc.) that occurred, I did not understand why things happened the way they did.

Trait causality orientation was measured using the General Causality Orientation Scale (GCOS) (Deci & Ryan, 1985). The GCOS measures three orientations, autonomy, impersonal, and control, and daily causality orientation was measured using six items, two for each orientation. Using 7-point scales ranging from *not at all* (1) to *very much so* (7) (with higher scores representing greater perceived control), participants answered the following questions. One question concerned social activities, "Thinking back on your day today in terms of your relationships with others and the social events that occurred . . . ?" and the other concerned achievement, "Thinking back on your day today in terms of nonsocial areas of performance (e.g., schoolwork, sports, fitness, etc.) . . . ?" The two autonomy orientation questions concluded with the following, "To what extent did you feel that you had a choice about what you did and to what extent did things happen the way you wanted them to happen?" The two control orientation questions concluded with "To what extent did you do things because either you felt you should do them or because other people felt you should do them?" The two impersonal orientation questions concluded with "To what extent were you able to control the outcomes of these events?"

Self-esteem was measured using Rosenberg's (1965) Self-Esteem Scale (RSE). Daily self-esteem was measured using the 10 items on the trait scale reworded to refer to how participants felt about themselves that day. Daily anxiety was assessed using three items from the Profile of Mood States (Lorr & McNair, 1971) that were used by Bolger (1990) to assess daily anxiety. Participants used 9-point scales ranging from *strongly disagree* (1) to *strongly agree* (9) to respond to these three statements: I felt on edge today; I felt uneasy today; and I felt nervous today. No trait measure of anxiety was collected.

Daily events were measured using items from the Daily Events Survey (Butler et al., 1994), a 40-item measure of events appropriate for college students. In the present study, 22 of these 40 events were measured, 12 positive and 10 negative, with social and achievement domains equally represented. Events included, "went out to eat with a friend/date," "tried to do homework and couldn't understand it," "did well on a school or work task (e.g., test, assignment, job duty)," and "had plans fall through to spend time with someone special." In addition, four items (combinations of positive-negative and social-achievement) were created to measure other events that may have occurred. For example, other positive social events were measured using the item, "had other type of pleasant event (not listed above) with friends, family, or date."

Each day, participants rated each event using the following scale: 0 = *did not occur*, 1 = *occurred and not important*, 2 = *occurred and somewhat important*, 3 = *occurred and pretty important*, 4 = *occurred and extremely important*. The number of positive events that occurred each day and the number of negative events that occurred were calculated.[1]

Procedure

At the beginning of the study, participants came to a laboratory and received instructions and a computer disk containing the data collection programs. They were told they would be using a computer to answer a series of questions every day for 3 weeks and questionnaires on the first and last days of the study. Data collection programs were written using the Micro-Analytic Experimental Laboratory software package (MEL) (Schneider, 1988), and participants were able to run these programs on any IBM-compatible personal computer.

Standard instructions for the measures (with modifications for those with a daily frame of reference) were included in the programs. Data were collected using three different programs, and participants were given a list of which programs to run each day. The first program was run on the first day of the study and collected responses to the RSE, the BDI, and the GCOS. The second program was run every day of the study and collected the five daily measures of adjustment and reports of daily events. The third program was run on the last day of the study and administered another RSE, the CES-D, and the CUS.

A member of the research team maintained regular contact with participants via phone and e-mail. They were told to contact the experimenters should any problems arise, such as disk failure, computer viruses, and so forth. Such problems were rare, and when they occurred, participants were given replacement disks within 48 hours and continued the study.

At the end of the study, participants answered questions about their participation. Participants did not think that participating in the study had changed their daily routine meaningfully. Half (53%) reported spending 5 minutes or less per day running the program, and 99% reported spending 10 minutes or less per day. Participants reported that it was relatively easy to run the program, a mean of 4.6 using a 1 to 5 scale where 1 = *very difficult* and 5 = *very easy*. Finally, using 1 to 5 scales where 1 = *not at all* and 5 = *very much*, participants reported that participating in the study did not make them feel or think differently about themselves (2.1), their relation-

ships with other people (1.8), or their schoolwork or other areas of performance (1.7).

Of the 128 participants who began the study; 5 had failed disks, lost their disks, or did not follow instructions. The 123 remaining participants completed the daily measures an average of 19.6 days; 48% of the participants provided daily measures for all 21 days, 24% provided data for 20 days, and 24% provided data for 16 to 19 days.[2]

RESULTS

The present data comprised what is referred to as a multilevel (or hierarchically nested) data structure in that observations at one level of analysis (days) were nested within another level of analysis (people). Accordingly, the data were analyzed with a series of multilevel random coefficient models (MRCM) using the program HLM (Bryk, Raudenbush, & Congdon, 1998; Version 4.04). MRCM was chosen over ordinary-least-squares (OLS) methods such as using within-person correlations to measure within-person relationships because MRCM provides better parameter estimates than OLS methods (Bryk & Raudenbush, 1992; Kenny, Kashy, & Bolger, 1998; Kreft & de Leeuw 1998). Descriptions of the advantages of MRCM over comparable OLS techniques and using MRCM to analyze daily diary data are presented in Nezlek (2001).

The superiority of MRCM over comparable OLS analyses is due to various factors. First and foremost, MRCM models within-person coefficients (such as those that were the subject of this study) as random, not fixed, effects. In the present study, the exact days over which data were collected were not critical. In essence, the days comprising the study were sampled from a population of days and were meant to represent participants' typical lives. Presumably, coefficients based on samples of other days would have been just as valid (although not exactly the same) as those based on the sample collected; therefore, within-person coefficients were random in that they were sampled from each participant's population of possible coefficients. This sampling of coefficients constitutes a prima facie case for treating (modeling) coefficients describing such within-person relationships as random, not fixed.

Procedures that do not model such coefficients as random, such as OLS analyses that treat days as a repeated-measures factor in an ANOVA or analyze within-subjects coefficients as dependent measures, may provide misleading parameter estimates because they do not account for this additional source of variance. Within a traditional OLS framework, errors at different levels of analysis are mathematically independent. For example, the reliability of within-person coefficients does not contribute to tests of individual differences in these coefficients. One of the advantages of MRCM is its ability to model errors at all levels of analysis simultaneously. That is, the reliability of within-person coefficients does contribute to tests of individual differences in these coefficients. This simultaneity has implications for significance tests of fixed effects (Is an effect significantly different from 0?) and for estimates of the variance of effects.

Moreover, the advantages of HLM over comparable OLS techniques are more pronounced when the number of observations per unit of analysis (e.g., days provided by different people) are small or vary considerably across units (e.g., different people provide different numbers of days) and when covariances are being modeled instead of means. HLM uses a combination of precision weighting (units of analysis contribute to parameter estimates as a function of their reliability and the number of observations within the unit) and Bayesian modeling to estimate measures of central tendency and variances.

The analyses had three goals: (a) to determine the validity and reliability of the daily measures of psychological adjustment, (b) to examine relationships between these measures and daily events, and (c) to examine how day-level relationships between adjustment and events varied as a function of depression.

Validity and Reliability of Daily Measures of Adjustment

The validity and reliability of the measures of daily adjustment were examined using three-level models in which items were nested within days, which were nested within participants. By treating the items constituting a scale as a nested factor, HLM provided a latent variable analysis of scale scores (Bryk & Raudenbush, 1992, pp. 191-196). This procedure also provided estimates of the day-level reliability of the daily measures. The validity of the daily measure of a construct was operationalized as the strength of the relationship between the trait measure of a construct and the mean daily level of the same construct, expressed as shared variance. Reliability was estimated for day and person levels, and these estimates were provided directly by HLM. Reliability and validity analyses are described in the appendix, and the results are summarized in Table 1.

The analyses of the three items measuring Beck's cognitive triad indicated that this daily measure was reliable and valid. Similarly, the analyses of the four items measuring causal uncertainty and the 10 items measuring self-esteem indicated that these daily measures were reliable and valid. The analyses also indicated that three items measuring anxiety were reliable. Although no trait measure of anxiety was collected, previous research by

TABLE 1: Descriptive Statistics for Daily Measures

	Mean	*Person-Level Variance*	*Day-Level Variance*	*Person-Level Reliability*	*Day-Level Reliability*	*Validity*
Cognitive triad	5.14	.74	.89	.94	.81	.56
Self-esteem	7.22	1.31	.74	.97	.80	.86
Causal uncertainty	2.48	.64	.42	.97	.72	.50
Anxiety	3.73	2.43	2.67	.95	.86	NA
GCOS-control	4.76	.67	.72	.95	.66	.22
Positive events	5.25	4.67	4.46	.95	NA	NA
Negative events	2.13	2.00	2.60	.94	NA	NA

NOTE: All validity coefficients were significant at the .0001 level. GCOS = General Causality Orientation Scale.

Bolger (1990) suggested that these three items were valid.

The GCOS daily measures were intended to measure the autonomy, control, and impersonal orientations of the GCOS. Nevertheless, the analyses indicated that four of the six items measured the impersonal orientation, whereas two did not correspond to a trait-level GCOS construct. In light of this, the items designed to measure autonomy and impersonal orientations were recoded into one four-item daily measure of impersonal orientation, and the two items intended to measure control orientation were dropped from the analysis.[3] This new measure is referred to as control, referring to control over outcomes, and it was found to be reliable and valid. On the basis of these analyses, for each measure of adjustment, daily scores were operationalized as the mean score for the items constituting that scale.

Daily Events and Day-to-Day Adjustment

Day-level relationships between daily events and adjustment were examined using a two-level MRCM. In essence, for each person, a regression equation was estimated describing the relationships between daily adjustment and daily events with adjustment as a dependent measure and positive and negative event scores as independent measures. The Level 1 model was as follows:

$$y_{ij} = \beta_{0j} + \beta_{1j}\text{PosEvent} + \beta_{2j}\text{NegEvent} + r_{ij} ,$$

in which y is an adjustment score for person j on day i, β_{0j} is a random coefficient representing the intercept for person j, β_{1j} is a random coefficient for positive events, β_{2j} is a random coefficient for negative events, and r_{ij} represents error.

Mean event scores varied considerably across persons and days, and the average positive event score was higher than the average negative event score (5.22 vs. 2.15, $p < .01$). To eliminate the influence of these differences on parameter estimates, event scores were group-mean centered, with group defined as the individual participant. Thus, coefficients for daily events described relationships between daily deviations from each person's mean event scores and deviations from that person's mean adjustment.

TABLE 2: Day-Level Relationships Between Adjustment and Events

Measure	*Intercept*	*Positive Events*	*Negative Events*	χ^2
Self-esteem	7.21	0.08*0.18*	35.6	
Anxiety	3.73	0.03 0.31*	45.6	
Control	4.76	0.09*0.14*	6.2	
Cognitive triad	5.14	0.14*0.21*	13.8	
Uncertainty	2.48	–0.02*0.09*	14.6	

NOTE: Results of the χ^2 tests of the equality of the positive and negative coefficients are in the column labeled χ^2. All of these tests had 1 *df* and were significant at the .01 level or beyond.
*$p < .005$.

Hypotheses about day-level relationships between adjustment and events were tested by analyzing Level 1 coefficients at Level 2 (the person) using the following model:

$$\beta_{0j} = \gamma_{q0} + u_{qj} .$$

In these models, γ_{q0} represented the average of the Level 1 coefficients describing relationships between measures of adjustment and daily events. Error was represented by u_{qj}. For each measure, there were three coefficients (q = 0, 1, 2), the intercept, a coefficient (referred to as a slope to distinguish it from an intercept) for positive events, and a slope for negative events. The mean slope between positive events and adjustment was represented by γ_{10}, and γ_{20} represented the mean slope between negative events and adjustment. The results of these analyses are presented in Table 2.

As hypothesized, there were significant relationships between daily adjustment and both positive and negative events. All five γ_{20} slopes representing relationships between adjustment and negative events were significantly different from 0. Moreover, the γ_{10} slopes representing the relationships between positive events and the self-esteem, control, cognitive triad, and uncertainty

TABLE 3: Day-Level Relationships Between Adjustment and Events as Moderated by Depressive Symptoms

	Self-Esteem			*Cognitive Triad*			*GCOS Control*			*Anxiety*			*Causal Uncertainty*		
	Coef.	t	p	*Coef.*	t	p	*Coef.*	t	p	*Coef.*	t	p	*Coef.*	t	p
Intercept															
Nondepressed	7.64	77.9	<.001	5.46	72.6	<.001	4.99	62.9	<.001	3.18	22.7	<.001	2.28	28.9	<.001
Depressed	6.07	8.3	<.001	4.26	8.5	<.001	4.13	5.6	<.001	5.22	7.5	<.001	3.01	4.8	<.001
Positive events															
Nondepressed	0.07	4.9	<.001	0.12	8.9	<.001	0.09	6.9	<.001	–0.01	<1	*ns*	–0.02	1.7	<.11
Depressed	0.12	2.2	<.05	0.19	2.5	<.015	0.10	<1	*ns*	–0.06	<1	*ns*	–0.04	1.5	<.12
Negative events															
Nondepressed	–0.16	8.8	<.001	<0.18	10.2	<.001	<0.14	7.8	<.001	0.30	7.7	<.001	–0.10	5.9	<.001
Depressed	–0.23	2.1	<.05	<0.26	2.3	<.02	<0.14	<1	*ns*	0.34	<1	*ns*	–0.06	1.4	<.17

NOTE: For coefficients for the nondepressed, the column labeled *p* contains the probability level of tests that the coefficient was not 0, whereas for coefficients for the depressed, the column labeled *p* contains the probability level of tests that the difference between the nondepressed and depressed coefficients was 0.

measures were also significantly different from 0. The relationship between anxiety and positive events did not approach conventional levels of significance ($p > .20$).

Across all participants, adjustment was lower on days when negative event scores were higher than on days when negative events score were lower, and adjustment (except anxiety) was higher on days when positive event scores were higher than on days when they were lower. For example, for daily self-esteem, the average positive event coefficient was .08, and the average negative event coefficient was –.18. On average, for each positive event above his or her mean number of positive events a person experienced, that person's daily self-esteem increased .08. Correspondingly, for each negative event above his or her mean number of negative events a person experienced, daily self-esteem decreased .18.

The strength of day-level relationships between positive events and adjustment and day-level relationships between negative events and adjustment were compared using tests of fixed effects (Bryk & Raudenbush, 1992, pp. 48-52). To account for the fact that coefficients representing these relationships differed in sign, these tests compared the absolute values of coefficients. As hypothesized, the covariation between daily adjustment and negative events was stronger than the covariation between adjustment and positive events. The absolute magnitudes of all γ_{20} coefficients were significantly larger than the magnitudes of the corresponding γ_{10} coefficients. The results of these analyses are presented in Table 2.

Depression as a Moderator of Day-Level Relationships Between Events and Adjustment

The last step in the analysis examined how trait levels of adjustment moderated relationships between daily events and adjustment. Participants were classified as depressed or not based on four reports of depressive symptoms provided over 4 1/2 months, a CES-D and BDI completed 7 weeks prior to the study, and a CES-D and BDI completed during the study. Thirty-three participants who scored above cutpoints of 10 on the BDI and 17 on the CES-D on at least three out of these four measures were classified as depressed, and the remaining 90 were classified as nondepressed. This procedure ensured that only participants who reported high levels of depressive symptoms over an extended period of time were classified as depressed.[4]

Differences between these two groups were examined using a variant of the model used in the previous analyses:

$$\beta_{qj} = \gamma_{q0} + \gamma_{q1}(\mathrm{DEP}) + u_{qj}.$$

As in the previous analysis, γ_{qj} represented the coefficients generated in the Level 1 models, the relationships between measures of adjustment and events. Depression was dummy coded (1 = depressed); therefore, γ_{q0} represented the average Level 1 coefficient for the nondepressed and γ_{q1} represented the depression effect, how much the average Level 1 coefficient for the depressed differed from the average coefficient for the nondepressed. Differences between depressed and nondepressed participants in the strength of the relationship between daily events and adjustment were tested by the γ_{q1} coefficients.

Consistent with previous research (e.g., Bolger & Schilling, 1991), the mean negative event scores for the depressed participants were higher than for the nondepressed (2.79 vs. 1.89, $p < .01$), although there were no differences between the two groups in positive event scores. As in the previous analysis, event scores were group-mean-centered, eliminating the influence on parameter estimates of these differences in event scores. The results of these analyses are presented in Table 3. To simplify the presentation of these results, the depression effect for each coefficient (γ_{q1}) was added to the coeffi-

TABLE 4: Lagged Relationships From Daily Events to Daily Adjustment

Present Day	*Previous Day*	*Coef.*	t	p
Self-esteem	Self-esteem	.08	2.38	<.02
	Positive events	.00	<1	*ns*
	Negative events	–.04	2.38	<.02
Cognitive triad	Cognitive triad	.12	4.39	<.01
	Positive events	.00	<1	*ns*
	Negative events	.00	<1	*ns*
GCOS-Control	GCOS-Control	.09	3.20	<.01
	Positive events	.01	1.03	*ns*
	Negative events	.00	<1	*ns*
Anxiety	Anxiety	.20	7.01	<.01
	Positive events	.00	<1	*ns*
	Negative events	.07	2.46	<.02
Causal uncertainty	Causal uncertainty	.13	4.46	<.01
	Positive events	.02	2.49	<.02
	Negative events	.02	1.38	*ns*

NOTE: Mean unstandardized coefficients are in the column labeled Coef. GCOS = General Causality Orientation Scale.

cient describing the nondepressed (γ_{q0}) so that the tabled values represent the average coefficients for the two groups.

As hypothesized, relationships between self-esteem and the cognitive triad measures were significantly larger for depressed than for nondepressed participants. For these measures, the γ_{11} and γ_{21} coefficients were significantly different from 0. For example, a unit increase in daily positive events scores was associated with a .12 increase in self-esteem for the depressed, whereas for the nondepressed it was associated with a .07 increase. For negative events, the corresponding figures for a unit increase were decreases of .23 and .16. Contrary to expectation, relationships between events and the other measures did not vary as a function of depression.[5]

Finally, there were significant differences between nondepressed and depressed participants in the daily means of all measures (intercepts in Table 4). In terms of all measures, nondepressed participants were better adjusted on a daily basis than depressed participants were after controlling for daily events.[6]

Lagged Relationships Between Daily Adjustment and Daily Events

Although the present study was not explicitly designed to study causal relationships, examining lagged relationships between constructs can provide some insight into causal relationships (e.g., West & Hepworth, 1991). Accordingly, a series of analyses was conducted in which adjustment on day i was modeled as a function of adjustment on day i–1 and events on day i–1. Parallel analyses were conducted in which events on day i were modeled as a function of adjustment on day i–1 and events on day i–1. For example, to determine whether changes in self-esteem lead to or were followed by changes in events, the following models were analyzed:

$$\text{Lag 1: ESTEEM(day i)}_{ij} = \beta_{0j} + \beta_{1j}\text{(ESTEEM day i–1)} + \beta_{2j}\text{(POS-EVENT day i–1)} + \beta_{3j}\text{(NEG-EVENT day i–1)} + r_{ij}.$$

$$\text{Lag 2: POS-EVENT(day i)}_{ij} = \beta_{0j} + \beta_{1j}\text{(ESTEEM day i–1)} + \beta_{2j}\text{(POS-EVENT day i–1)} + r_{ij}.$$

$$\text{Lag 3: NEG-EVENT(day i)}_{ij} = \beta_{0j} + \beta_{1j}\text{(ESTEEM day i–1)} + \beta_{2j}\text{(NEG-EVENT day i–1)} + r_{ij}.$$

The critical coefficients in these models are the lagged coefficients on the Lag 1 equation β_{2j}(POS-EVENT day i–1) and β_{3j}(NEG-EVENT day i–1); and the lagged coefficient, β_{1j}(ESTEEM day i–1), in the Lag 2 and Lag 3 equations. A causal sequence from events to self-esteem is suggested by significant β_{2j}(POS-EVENT day i–1) or β_{3j}(NEG-EVENT day i–1) coefficients in the Lag 1 equation, whereas a sequence from self-esteem to events is suggested by a significant β_{1j}(ESTEEM day i–1) coefficient in the Lag 2 or Lag 3 equations. These analyses required that data were provided on consecutive days. Of the 2,412 days recorded, only 2,289 could have data for a previous day because there were 123 participants and for each of them, the first day could not logically have a previous day. Of these 2,289 days, 2,221 (97%) had data for previous days.

These analyses found no statistically significant lags from adjustment to events, and only one lag (from anxiety to negative events) approached conventional levels of significance ($p = .085$). In light of this pattern, these results are not presented or discussed. The analyses of lagged relationships from events to adjustment found three significant lags, one from negative events to self-esteem, one from negative events to anxiety, and one from positive events to causal uncertainty. The results of these analyses are summarized in Table 4. Consistent with the results of the static (within a single day) analyses, more negative events on day i–1 were associated with lower self-esteem and greater anxiety on the following day. Somewhat surprisingly, and inconsistent with the results of the static analyses, more positive events on day i–1 were associated with increased causal uncertainty on the following day.

Supplementary Analyses of Mood

The independence of the adjustment-event covariance found in this study from the mood-event covariance found in other studies was examined in a series of analyses in which relationships between adjustment and events were controlled for anxiety and mood. Each day, participants rated their mood on a 1 to 9 scale

with endpoints labeled *happy-sad*. When measures of adjustment (other than anxiety) were modeled as a function of events and anxiety and mood, with one exception (the positive events–causal uncertainty relationship), slopes between adjustment and events remained statistically significant (ps < .01) and meaningful in magnitude. Admittedly, anxiety is only a component of negative affectivity, and happy-sad is only a component aspect of a much more complex affective construct. Nonetheless, in a structurally similar study, Nezlek (1999) found that daily self-esteem and daily depressogenic adjustment (operationalized as they were in this study) covaried meaningfully with negative and positive events after controlling for the covariance between events and both NA and PA. Taken together, these results suggest that daily adjustment as operationalized in the present study covaries meaningfully with daily events above and beyond the covariation between events and mood.

DISCUSSION

As hypothesized, daily depressogenic adjustment negatively covaried with the negative events that occurred each day, and except for anxiety, daily adjustment positively covaried with positive events. These findings complement and extend previous research on daily events by demonstrating that depressogenic adjustment is sensitive to daily events. Moreover, the fact that adjustment covaried with both positive and negative events suggests that daily adjustment as operationalized in this study was not merely a measure of a general negativity factor such as NA. Research examining both positive and negative events and NA has found that NA covaries with negative but not with positive events (e.g., Gable et al., 2000; Nezlek, 1999).

Although considerable evidence indicates that anxiety and depression are closely associated at the trait level (e.g., Feldman, 1993), the present results suggest that anxiety and depression are somewhat distinct phenomena at the state level. This conclusion is similar to those reached by Stader and Hokanson (1998) in a study of the daily covariability of depressive symptoms and psychosocial processes and by Roberts and Gotlib (1997) in a study of temporal variability in self-evaluation.

Also as expected, the day-level covariation between depressogenic adjustment and negative events was stronger than the covariation between adjustment and positive events. This replicates previous research on daily events and daily variability in self-esteem (Butler et al., 1994) and is consistent with research indicating that negative events and stimuli generally have more impact than positive events and stimuli (Cacioppo et al., 1997; Taylor, 1991). This result extends previous research by explicitly documenting that this tendency also characterizes relationships between daily events and measures of daily depressogenic adjustment.

The present results that are probably the most relevant to understanding depression are those describing differences between depressed and nondepressed people in day-level relationships between events and adjustment. As expected, depressed people were more labile (reacted more strongly to events) than the nondepressed in terms of their self-esteem and depressive thinking. The daily variability of depressive thinking per se has not been examined; therefore, the present results showing that trait depression moderates relationships between daily events and daily depressive thinking meaningfully extends previous research on lability and trait adjustment. The depression effect in the lability of self-esteem also agrees with the results of a previous study of such relationships (Butler et al., 1994). Butler et al. found that the previously depressed were more labile than the currently nondepressed (in terms of self-esteem-relevant self-evaluations), although the currently depressed were not different from either of these two groups.

Butler et al. (1994) discussed a variety of explanations for the greater lability of the depressed, and most of these explanations emphasized the weaker sense of self the depressed may have. The present results confirm this logic and also suggest another complementary explanation. The stronger reactions of the depressed to positive events may have been due to different expectations held by the depressed and nondepressed. A negative view of the future is an essential component of Beck's cognitive triad. Consistent with this premise, in a study of daily plans and goals, Nezlek and Elia (1999) found that higher depressive symptoms were associated with setting goals that would take more time to accomplish and were more difficult and harder to accomplish. Within such a framework, the positive events that occur (e.g., meeting a goal) to the depressed may have a greater influence on psychological well-being than they do for the nondepressed due to a contrast effect or a violation of expectations. It is important to note that such a contrast effect would not be due to the differences in how many positive events occurred. There was no depression effect in the number of positive events reported per day, and because event scores were group-mean-centered, individual differences in event scores did not contribute to parameter estimates.

The assumption that trait depression makes people more vulnerable to stressful or negative events is central to diathesis-stress models, and the present results supported such models in terms of the lability of self-esteem and depressive thinking. At first glance, the fact that depression did not moderate some adjustment-negative event relationships seems to be inconsistent with such

assumptions; however, it may not be. The daily adjustment of the depressed was varying around a much lower mean than the daily adjustment of the nondepressed. For depressed people, decreases in daily adjustment brought about by negative events may lower adjustment to a point where it has implications for trait adjustment, whereas the decreases the nondepressed experience may not. The nondepressed may vary through a normal or adaptive range, whereas the range of the depressed may include a maladaptive segment into which the depressed fall in response to negative events. The relatively infrequent experience of such poor daily adjustment may not have implications for trait adjustment but more frequent experience of such poor daily adjustment may maintain or increase the risk for depression.

Differences in people's lability across different day-level measures of adjustment are not unique to this study. Moderators of event-outcome relationships have been studied with a wide variety of measures of daily adjustment, trait adjustment, and daily events, and as noted earlier, these relationships vary across studies. This may reflect the fact that event-outcome relationships may be more sensitive to the specific ways in which constructs have been operationalized than has been previously supposed. For example, Kennedy-Moore, Greenberg, Newman, and Stone (1992) found different day-level relationships using different operationalizations of mood. Clearly, resolving such issues will require a larger body of research.

The preceding discussion has tacitly assumed that daily events affect daily adjustment, an assumption made in most research on daily events. Such a causal relationship is consistent with the results of a longitudinal study by Suh, Diener, and Fujita (1996), who found that recent positive life events lead to increases in life satisfaction, whereas recent negative life events lead to decreases. Similarly, based on structural equation modeling analyses, Nezlek and Reis (1999) concluded that quality of daily social interaction was causally related to mental health, not the reverse. Moreover, studies of causal relationships between daily events and psychological states suggest an event-state causal sequence. Bolger and Zuckerman (1995) found that distress experienced on a particular day was related to the conflict experienced on a previous day, and Gable et al. (2000) found that events occurring on a preceding day predicted present-day affect, whereas prior day affect did not predict present-day events.

In the present study, analyses of lagged relationships similar to those presented by Gable et al. (2000) found some evidence for a causal link from events to adjustment. In the analyses of self-esteem and anxiety, prior day's negative events predicted present adjustment controlling for prior day's adjustment. In contrast, no lagged relationship between prior day's adjustment and present events approached conventional levels of significance. Although suggestive, the results of these lagged analyses need to be considered cautiously. Lagged relationships occurred only for some of the measures and in the expected direction only for negative events. Clearly, more research that is explicitly designed to examine such causal relationships is needed to resolve such questions.

One of the more important questions about the present results concerns the extent to which the moderating effects of trait depression on day-level relationships reflect differences in depression per se or differences in neuroticism or a general predisposition to experience negative affect. We think the present results make a valuable contribution to the understanding of depression for three reasons. First, depression was measured four times over a 4 1/2-month period using two different measures. Although individual differences in self-reports of depressive symptoms may reflect individual differences in a more general factor, such a general factor does not account for the unique variation associated with depression. Multiple assessments with multiple measures of depression should maximize the extent to which individual differences reflect depression per se rather than a general negativity factor. Second, in previous studies, neuroticism (or general negativity) has not moderated day-level relationships between positive events and psychological states, and the present measure of depression did. Third, Nezlek (1999) replicated the present results and found that compared to trait PA, NA, and anxiety, the CESD was the most reliable moderator of relationships between daily positive events and daily self-esteem and between positive events and daily depressogenic adjustment.

What implications do the present results have for understanding the etiology and maintenance of depression? Keeping various caveats in mind, they suggest that cognitive reactions to daily events are part of these processes. Cognitively focused measures of depressogenic adjustment covaried with the events that occurred each day, and although such relationships may be consistent with previous research and theory, they have not been demonstrated before. Most important, the present results suggest that understanding psychological well-being (at least in terms of depression) needs to take into account people's reactivity to positive events. Unfortunately, as discussed by Barnett and Gotlib (1988), the temporally static design of the present study does not provide a basis for determining if the relationships described herein are antecedents, concomitants, or consequences of depression. Such determination must await the results of prospective studies.

Appendix
Reliability and Validity Analyses

For each construct, a series of three-level models was conducted in which the items measuring that construct were nested within days and days were nested within participants. Each analysis included 123 participants (Level 3) and 2,412 days (Level 2). The number of entries at Level 1 was the product of the number of items in a measure and the number of days. Equations describing these models are presented below with the nomenclature used by Bryk and Raudenbush (1992).

Model 1: Totally Unconditional

$$\text{Item level} \quad (\text{Level 1}) \qquad y_{ijk} = \pi_{0jk} + e_{ijk}$$

$$\text{Day level} \quad (\text{Level 2}) \qquad \pi_{0jk} = \beta_{00k} + r_{0jk}$$

$$\text{Person level} \quad (\text{Level 3}) \qquad \beta_{00k} = \gamma_{000} + u_{00k}$$

Model 2: Traits Included at Person Level

$$\text{Person level} \quad (\text{Level 3}) \qquad \beta_{00k} = \gamma_{000} + \gamma_{001}(\text{TRAIT}) + u_{00k}$$

The first model is called a totally unconditional model in multilevel random coefficient models (MRCM) terminology. Coefficients from Level 1 (the item level) were modeled only as intercepts at both Level 2 (days) and Level 3 (persons), providing reliability estimates at the day and person levels and estimates of the error variance of the latent daily mean of each construct, the variance of u_{00k}. In the second model, coefficients from Level 2 (daily means) were modeled at Level 3 as a function of the corresponding trait measure. The validity of a daily measure was operationalized as the reduction in error variance from the first and second models. The analyses of self-esteem and depression included two trait measures at the person level in the second model because self-esteem and depression were measured at the beginning and end of the study.

The analysis of the General Causality Orientation Scale (GCOS) was not as straightforward as the analyses of the other measures. Six items were designed to provide daily measures of the autonomy, control, and impersonal orientations of the GCOS (two items each). The validity and reliability of these measures were examined using a three-level HLM with a zero-intercept Level 1 model:

$$y_{ijk} = \pi_{1jk}(\text{AUT}) + \pi_{2jk}(\text{IMP}) + \pi_{3jk}(\text{CON}) + e_{ijk}.$$

In this model, y was the response, π_{1jk} was a dummy-coded variable representing the two autonomy items (AUT) (autonomy items coded as 1, other items coded as 0), π_{2jk} was a dummy-coded variable representing the two impersonal items (IMP), and π_{3jk} was a dummy-coded variable representing the two control items (CON). The three coefficients, π_{1jk}, π_{2jk}, and π_{3jk}, represented the daily means for each construct for each person.

This analysis provided estimates of the day-level correlations (τ_πs) among the three constructs. The day-level correlation between the coefficients representing the autonomy and impersonal constructs was .99, strongly suggesting that the four items intended to measure these two constructs measured the same construct, control over outcomes of behavior. This analysis also found that daily mean levels of these two constructs were related (both p s < .0001) to the impersonal orientation on the GCOS at the individual level (Level 3). Furthermore, the two items designed to measure control orientation were not significantly related to any of the three GCOS trait measures (all p s > .25). These findings lead us to recode the four items designed to measure the autonomy and impersonal orientations into one four-item measure of impersonal orientation and to drop the two items intended to measure the control orientation. The resulting measure was a reliable and valid measure of the impersonal construct.

NOTES

1. Positive and negative composite scores, the average importance of events, also were created. The results of analyses using composite scores were similar to the results presented in this article. Also, the present study used only a subset of the daily events survey (DES) items because it was felt that some of the items on the DES occurred too infrequently to qualify as a daily event. It appears that no frequent items were eliminated because the mean number of positive and negative events recorded per day in this study was similar to the numbers reported by Butler, Hokanson, and Flynn (1994) using the full scale version.

2. Unfortunately, the date and time participants provided their responses were not recorded. Nevertheless, we are confident that participants complied with instructions. First, they were sent reminders every 3 days to be certain to comply. Second, as instructed, some participants skipped days when they forgot to run the daily program. Third, and most important, the distributions of positive and negative event scores obtained in the present study are similar to the distributions from a similar study in which date and time of response were recorded (Nezlek & Plesko, 2001). In the present study, participants recorded an average of 5.25 positive events per day (*SD* = 3.03) and an average of 2.32 negative events (*SD* = 1.41). The corresponding figures from Nezlek and Plesko were 5.07 (2.06) and 2.39 (1.38). Also, Nezlek and Plesko used similar procedures to collect data and to instruct and maintain contact with participants, and they excluded only 3% of participants and 1% of days from their analyses because responses were not recorded as requested.

3. The results of analyses that included these two items did not differ meaningfully from those reported in this article.

4. For ease of presentation, those who scored above the cutpoints are referred to as *depressed* and those who scored below the cutpoints are referred to as *nondepressed*. These terms have been used only to simplify the discussion, and this use does not imply that participants who scored above the cutpoints had been diagnosed as depressed or were clinically depressed. Also, the results of analyses that operationalized adjustment as a continuous variable (a factor score based on the four reports of symptoms) were similar to the results presented in this article.

5. A variety of different statistical artifacts such as autocorrelations and heteroskedasticity of variances can influence the results of data collected in a multilevel design over time. The results of analyses that controlled for temporal trends and autocorrelations in the data were very similar to those presented in this article. Moreover, examination of predicted scores suggested that the present results were not due to individual or group differences in the variances of coefficients or to floor or ceiling effects for the rating scales. Details of these analyses are available from the first author.

6. Overall, nondepressed participants had higher daily levels of well-being than depressed participants. Differences between depressed and nondepressed participants in mean levels of daily adjustment are discussed in Gable and Nezlek (1998).

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