

OPTIMISM, ACCUMULATED LIFE STRESS, AND PSYCHOLOGICAL AND PHYSICAL ADJUSTMENT: IS IT ALWAYS ADAPTIVE TO EXPECT THE BEST?

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To evaluate Tennen and Affleck's (1987) vulnerability hypothesis, this study examined optimism-pessimism as a moderator of the link between accumulated negative life stress (over the past year) and psychological adjustment (depressive symptoms and life satisfaction) and physical adjustment (physical symptoms and vulnerability to illness) in a large sample of college students ($N = 560$). Results indicated that optimism-pessimism and negative life stress significantly predicted each outcome. Moreover, for all of the outcomes, except for life satisfaction, a significant Optimism-Pessimism \times Accumulated Negative Life Stress interaction was found. As expected, a plot of the significant interactions indicated that optimism, but not pessimism, exacerbated the associations between accumulated negative life stress and poor psychological and physical outcomes. Implications of the present findings for future research and for understanding the costs and benefits of optimism and pessimism are discussed.

For more than two decades, the concepts of optimism and pessimism have generated a great deal of research interest in the areas of personality, social, and health psychology (e.g., Aspinwall & Taylor, 1992; Chang, 1998a; Chang, Maydeu-Olivares, & D'Zurilla, 1997; Cozzarelli, 1993; Friedman et al., 1992; Mroczek, Spiro, Aldwin, Ozer, & Bossé, 1993;

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Norem & Cantor, 1986; Peterson, Seligman, & Vaillant, 1988; Sanna, 1996, 1998; Weinstein, 1980). According to Scheier and Carver (1985), *optimism* and *pessimism*, defined as generalized positive and negative outcome expectancies, represent relatively stable individual differences variables that promote and abate psychological and physical adjustment, respectively.¹ Specifically, these investigators have argued that optimism is associated with and leads to securing positive outcomes, whereas pessimism is associated with and leads to incurring negative outcomes (Scheier & Carver, 1985). Consistent with this view, reviews of empirical studies indicate that optimists are psychologically and physically better adjusted than their more pessimistic counterparts (Scheier & Carver, 1985, 1992; Scheier, Carver, & Bridges, 2001). For example, in a study by Scheier et al. (1989), optimistic patients about to undergo a generally stressful medical procedure (viz., coronary artery bypass surgery) were found to recover faster and have less postoperative complications than more pessimistic patients.

AN INTERACTIVE MODEL OF OPTIMISM-PESSIMISM AND STRESS IN PREDICTING ADJUSTMENT

Although cognitive factors such as appraisals have been found to sometimes mediate, or serve as a causal mechanism, between the stress and adjustment link (Lazarus & Folkman, 1984), researchers have started to examine the utility of models of psychological adjustment in which cognitive factors are seen to moderate, or substantively change, the association between the experience of stress and adjustment (Ingram, Miranda, & Segal, 1998).² For example, studies have found that negative, relative to positive, cognitions tend to exacerbate or worsen the influence of stress on psychological adjustment, and hence, operate as a vulnerability factor in the link between stress and adjustment (e.g., Abramson,

1. As noted by Gillham, Shatté, Reivich, and Seligman (2001), it is important to note that the present conceptualization of optimism and pessimism should not be confused with conceptualizations regarding optimistic and pessimistic attributional style. Whereas optimism and pessimism are directly measured by instruments that assess for outcome expectancies, they are only indirectly measured by instruments that assess for attributional style (Chang, 2001b). Hence, it is not surprising that despite the conceptual similarities between pessimistic attributional style and pessimism, the association between these constructs has in some cases been found to be quite low (e.g., Scheier & Carver, 1992). Therefore, one should not assume that findings obtained for optimism and pessimism necessarily and sufficiently map onto findings obtained for optimistic and pessimistic attributional style, and vice versa.

2. For a more detailed discussion on the conceptual and methodological differences between mediators and moderators, see Baron and Kenny (1986).

Metalsky, & Alloy, 1989). In contrast, studies have found that positive, compared to negative, cognitions typically abate or lessen the negative influence of stress on adjustment, thus acting as a stress buffer (e.g., Alloy & Clements, 1992; Lightsey, 1994).

Therefore, it is not surprising that optimism and pessimism, defined as generalized outcome expectancies, have been found to moderate the association between the experience of stress and psychological adjustment (e.g., Bromberger & Matthews, 1996; Chang, 1998b) and physical adjustment (e.g., Lai, 1995). For example, in a recent study examining an interactive model of optimism-pessimism and stress in a sample of 340 young and 316 older adults, Chang (2002) found that for each adult group, the negative influences of stress on depressive and psychological symptoms were significantly more exacerbated for pessimists compared to optimists.

IS OPTIMISM ALWAYS BENEFICIAL? TENNEN AND AFFLECK'S (1987) VULNERABILITY HYPOTHESIS

The view that optimism is always good and pessimism is always bad may be too simplistic. Pessimism may not always be associated with costs or maladjustment. For example, Norem's (2001; Norem & Cantor, 1986) influential work on *defensive pessimism* has indicated that individuals who expect the worst, are able to harness their anxiety to effectively meet the demands of stressful challenges. It is important to note that unlike pessimists, however, defensive pessimists appear to engage in active and constructive coping efforts despite their negative expectancies. On the flip side, expecting the best may not always be associated with benefits. For example, in a recent study conducted by Davidson and Prkachin (1997), these investigators found that optimism, or generalized positive outcome expectancies, interacted significantly with unrealistic optimism, expectancies that risky outcomes are more likely to occur to others than to self, such that adults who expressed both high optimism and high unrealistic optimism showed the greatest decrease in exercise behavior and the least increase in their knowledge of CHD prevention compared to other groups. Hence, it would appear that the benefits of positive thinking must be weighed with its costs. In that regard, Tennen and Affleck (1987) have presented what we refer to as a vulnerability hypothesis, which suggests that optimism is not always associated with benefits and, in fact, is sometimes associated with important costs. As noted by Tennen and Affleck (1987), being optimistic may backfire when bad things happen: "According to Scheier and Carver, optimistic people expect the best. They believe that things won't go wrong. The best doesn't

always occur. When things go wrong in a big way, the optimist may be particularly vulnerable" (p. 382).

Hence, optimists who do not expect to experience stress in their lives may become more vulnerable to maladjustment than pessimists who in contrast expect to experience considerable stress in their lives. Although this possibility is intuitively appealing, if not intriguing, findings from recent studies have not provided much support for such a view. In fact, as noted previously, studies looking at the interaction between optimism and stress have tended to show that experience of high stress is associated with poorer outcomes for pessimists than for optimists (e.g., Bromberger & Matthews, 1996; Chang, 1998b, 2002; Lai, 1995).

It may be the case that researchers have not adequately tested for Tennen and Affleck's (1987) vulnerability hypothesis. Specifically, previous studies that have examined a diathesis-stress model involving optimism and stress have been based on using reports of stress limited to a short period of time (typically over the past month).³ Although being optimistic may be more adaptive for dealing with short-term stressful experiences, such a stance may be less adaptive for dealing with an accumulation of stressful experiences over a longer period of time (e.g., over the past year). As some researchers have noted, cumulative stress over a lengthy time period may have a bigger and a stronger impact on adjustment than stress over a short time period (Turner & Lloyd, 1997). Therefore, an optimist forced to deal with many stressful experiences over the course of a year may become more distressed than a pessimist insofar that such experiences are likely to strongly challenge fundamental expectations for positive outcomes. Hence, in contrast to past studies, the present study was conducted to provide a test of Tennen and Affleck's (1987) vulnerability hypothesis by looking at an interactive model involving optimism-pessimism and stressful experiences over a wider time frame, namely, over the course of a year.

PURPOSE OF THE PRESENT STUDY

Given these considerations, the purpose of the present study was to (a) examine the relations between optimism-pessimism, accumulated negative life stress, and psychological and physical adjustment; and (b) de-

3. The one exception is Bromberger and Matthews' (1996) study of middle-aged women in which stress in the past six months and stress beyond the past six months were assessed. However, it is worth noting that in both cases, ratings for exposure to stress were coded to reflect simply the presence or absence of short-term and long-term stress. Hence, this study may not have provided a meaningful test of the vulnerability hypothesis.

termine if and how optimism-pessimism moderates the link between accumulated negative life stress and adjustment. We chose to look at both psychological and physical adjustment given that these outcomes are linked to optimism and pessimism (Scheier & Carver, 1985, 1992; Scheier et al., 2001). Moreover, to ensure sufficient coverage in assessing for psychological and physical adjustment, we used multiple measures. For example, because depressive experiences and life satisfaction represent related but not redundant aspects of psychological adjustment (Chang et al., 1997), we included measures of both to determine the utility of the vulnerability hypothesis for not only predicting negative psychological outcomes (e.g., depressive symptoms), but also for predicting positive psychological outcomes (e.g., life satisfaction). Consistent with previous findings, we predicted that optimism-pessimism would be significantly related to negative life stress, and measures of psychological and physical adjustment. In addition, we predicted that optimism-pessimism would moderate the influence of negative life stress on adjustment (both psychological and physical). However, in keeping with Tennen and Affleck's (1987) vulnerability hypothesis, we expected optimism to exacerbate the association between accumulated negative life stress and adjustment, whereas pessimism was expected to abate the negative influence of such life stress on adjustment.

METHOD

PARTICIPANTS

Participants were 573 undergraduate college students (201 men and 372 women) from a mid-sized, midwestern university. Participants were predominantly white (96.2%). All participants were enrolled in an introductory psychology course and fulfilled a course requirement or obtained extra credit for participating. Ages ranged from 16 to 52 years, with a mean age of 21.50 years. Men and women were not found to differ significantly in age.

MEASURES

Optimism-Pessimism. The revised Life Orientation Test (LOT-R; Scheier, Carver, & Bridges, 1994) is a six-item measure (plus four filler items) of individual difference in optimism-pessimism (e.g., "In uncertain times, I usually expect the best"). Respondents are asked to rate the extent of their agreement to these items across a five-point Likert-type scale ranging from 0 (strongly disagree) to 4 (strongly agree). The LOT-R is a brief modified version of the original Life Orientation Test (LOT;

Scheier & Carver, 1985) and has been found to correlate .95 with the latter (see Scheier et al., 1994). Higher scores on the LOT-R generally reflect a greater tendency to expect more positive versus negative outcomes. Hence, high scores on the LOT-R reflect optimism, whereas low scores on the LOT-R reflect pessimism. Coefficient α in the present sample was .78.

Accumulated Negative Life Stress. The Life Experiences Survey (LES; Sarason, Johnson, & Siegel, 1978) is a 64-item measure of life stress that assesses the incidence and severity of various important life change events (e.g., marriage, death of a family member, new job, change of residence) that have occurred during the past year. Respondents are asked to check and rate each relevant item across a seven-point Likert-type scale ranging from -3 (extremely negative) to +3 (extremely positive). For the present study, we used rating scores obtained for "negative" life events only. We did this by identifying all life events reported to have occurred in the past year and then summing up severity scores for those events in which participants appraised them as negative, as indicated by negative ratings.

Psychological Adjustment. Psychological adjustment was assessed by the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985).

The BDI is a commonly used 21-item self-report measure of depressive symptomatology. Respondents are asked to rate the extent to which they have experienced in the past week, including today, specific depressive symptoms across a four-point Likert-type scale (for example, 0 = "I do not feel sad" to 3 = "I am so sad or unhappy that I can't stand it"). Higher scores generally indicate more severe levels of depressive symptomatology. Coefficient α in the present sample was .92.

The SWLS is a five-item measure of global life satisfaction (e.g., "I am satisfied with my life"), or a person's satisfaction with life as a whole, rather than in any specific domain. Respondents are asked to rate the extent of agreement to these items across a seven-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores generally reflect greater life satisfaction. Coefficient α in the present sample was .91.

Physical Adjustment. Physical adjustment was assessed by the Pennebaker Inventory of Limbic Languidness (PILL; Pennebaker, 1982) and the Vulnerability to Illness Scale (VIS; Andersen & Lobel, 1995).

The PILL is a 54-item measure of common physical symptoms and complaints (e.g., "Asthma," "Sunburn," "Upset stomach," "Headaches"), and assesses for general symptomatology and ill health in college populations. Respondents are asked to rate the frequency of experi-

encing a specific physical symptom across a five-point Likert-type scale ranging from 1 (have never or almost never experienced the symptom) to 5 (experienced more than once a week). In support of the validity of the PILL, research with undergraduates has indicated that high PILL scorers make more health center visits and use more aspirin than low PILL scorers (see Pennebaker, 1982). Coefficient α in the present sample was .91.

The VIS is a ten-item measure of one's susceptibility to colds and other minor illnesses (e.g., "I seem to get sick easily"). Respondents are asked to rate the extent of agreement to these items across a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The VIS has been found to be significantly related to other measures of health, including indices of physical illness and health self-appraisal (Andersen & Lobel, 1995). Higher scores on the VIS generally indicate greater vulnerability to illness. Coefficient α in the present sample was .88.

PROCEDURE

All study measures were administered to all 573 participants in the form of a take home survey that was to be returned the next day of class. The responses provided by 13 participants were dropped from the study because they were either incomplete or not returned on time. Hence, the responses provided by the remaining 560 participants were used. Participants were not made aware of the purpose of the study until after they had completed all measures. To protect the participants' anonymity, only participant numbers were placed on the instruments. In addition, all participants signed separate consent forms that indicated that all test data would be kept strictly confidential.

RESULTS

Correlations between all the study measures, means, and standard deviations are presented in Table 1. As the table shows, all of the correlations were significant and in the expected direction. Specifically, scores on the LOT-R were inversely related to scores on the BDI, PILL, and scores on the VIS. On the other hand, LOT-R scores were positively associated with SWLS scores. As expected, the relations between scores on the LES and these same outcome measures were significant and in the opposite direction. Moreover, LOT-R and LES scores were significantly and inversely related to each other. However, the magnitude of the association was small ($r = -.29$).

To examine the extent to which being an optimist or a pessimist was associated with differences in adjustment, we also calculated the means

TABLE 1. Correlations, Means, and Standard Deviations for All Study Measures

| Measures | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------|-------|-------|-------|-------|--------|-------|
| 1. LOT-R | — | | | | | |
| 2. LES | -.29* | — | | | | |
| 3. BDI | -.50* | .41* | — | | | |
| 4. SWLS | .52* | -.27* | -.60* | — | | |
| 5. PILL | -.30* | .27* | .42* | -.24* | — | |
| 6. VIS | -.23* | .19* | .30* | -.16* | .35* | — |
| <i>M</i> | 14.18 | 11.69 | 9.86 | 23.83 | 114.70 | 25.56 |
| <i>SD</i> | 4.44 | 12.88 | 7.96 | 6.34 | 28.06 | 7.09 |

Note. *N* = 560. LOT-R = revised Life Orientation Test; LES = Life Experiences Survey; BDI = Beck Depression Inventory; SWLS = Satisfaction With Life Scale; PILL = Pennebaker Inventory of Limbic Languidness; VIS = Vulnerability to Illness Scale. **p* < .001.

for the four adjustment measures between optimists and pessimists (based on using cutoff scores one standard deviation above and below the mean on the LOT-R; for optimists, LOT-R *M* = 20.60 and for pessimists, LOT-R *M* = 6.74).⁴ These results are presented in Table 2. As the table shows, optimists reported greater psychological adjustment (less depressive symptoms and greater life satisfaction) and greater physical adjustment (less physical symptoms and less vulnerability to illness) than did pessimists. In general, these results for the BDI, SWLS, and the PILL are very similar to those found between optimists and pessimists in another study (Chang, 1998a).

OPTIMISM-PESSIMISM AND ACCUMULATED NEGATIVE LIFE STRESS AS PREDICTORS

To examine the predictive utility of optimism-pessimism (as measured by the LOT-R) and accumulated negative life stress (as measured by the LES) in accounting for variance in measures of psychological and physical adjustment, we conducted a series of hierarchical regression analyses. For each of the regression equations, scores on the LOT-R were entered as the First Step, followed by LES scores in the Second Step. Finally, to test for an Optimism-Pessimism × Accumulated Negative

4. No significant differences were found on age and sex between optimists and pessimists. For optimists (39 men and 52 women), mean age was 21.64 years. For pessimists (24 men and 54 women), mean age was 21.27 years.

TABLE 2. Means and Standard Deviations on Outcome Measures between Optimists and Pessimists

| Outcome Measure | Optimists | | Pessimists | | <i>t</i> (167) |
|-----------------|-----------|-----------|------------|-----------|----------------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | |
| BDI | 4.89 | 4.01 | 16.93 | 9.51 | -10.98* |
| SWLS | 27.52 | 4.49 | 17.91 | 6.35 | 11.45* |
| PILL | 103.95 | 26.54 | 129.64 | 30.73 | -5.83* |
| VIS | 22.52 | 6.27 | 27.74 | 7.60 | -4.90* |

Note. For optimists, $n = 91$. For pessimists, $n = 78$. BDI = Beck Depression Inventory; SWLS = Satisfaction With Life Scale; PILL = Pennebaker Inventory of Limbic Languidness; VIS = Vulnerability to Illness Scale. * $p < .001$.

Life Stress interaction, the multiplicative term was entered in the Final Step of the equation. Results of these analyses for predicting unique variance in psychological and physical adjustment are presented in Table 3.

As this table shows, LOT-R scores accounted for a significant amount of the variance in both of the psychological adjustment measures. Specifically, LOT-R scores accounted for 25% and 27% of the variance in depressive symptoms and life satisfaction, respectively. It is noteworthy that LES scores accounted for a significant amount of additional variance in depressive symptoms ($\Delta R^2 = 7\%$) and in life satisfaction ($\Delta R^2 = 2\%$) even after partialing out variance accounted for by optimism-pessimism. In addition, as the table shows, for depressive symptoms, the LOT-R \times LES interaction was significant ($\Delta R^2 = 2\%$) even after partialing out the variances accounted for by both optimism-pessimism and accumulated negative life stress. In contrast, the interaction term was not significant in predicting life satisfaction.

To illustrate the LOT-R \times LES interaction for depressive symptoms, we plotted the regression of depressive symptoms on accumulated negative life stress at high and low levels of optimism-pessimism (see Figure 1). Consistent with procedures outlined by Aiken and West (1991), we used the simple slope for the regression of depressive symptoms on accumulated negative life stress by using the high (one standard deviation above the mean) and low (one standard deviation below the mean) values for optimism-pessimism. Because researchers consider such values as a reflection of optimism and pessimism (e.g., Chang, 1998a), respectively, these references will be used henceforth. As the figure shows, there was a significant positive relation between negative life stress and psychological symptoms at high levels of optimism ($b = .22$, $t(556) = 7.95$, $p < .01$ (two-tailed)). That is, the association between accumulated

TABLE 3. Hierarchical Regression Analyses Showing Amount of Variance Accounted for by Optimism-Pessimism and Accumulated Negative Life Stress of Each Outcome Measure

| Outcome Measure | <i>R</i> | ΔR^2 | <i>df</i> | <i>F</i> |
|---------------------------------|----------|--------------|-----------|----------|
| Depressive symptoms | | | | |
| LOT-R | .50 | .25 | 1,558 | 188.64** |
| LES | .57 | .07 | 1,557 | 61.66** |
| LOT-R \times LES | .59 | .02 | 1,556 | 17.18** |
| Life satisfaction | | | | |
| LOT-R | .52 | .27 | 1,558 | 203.83** |
| LES | .54 | .02 | 1,557 | 12.30** |
| LOT-R \times LES | .54 | .00 | 1,556 | 2.06 |
| Physical symptoms | | | | |
| LOT-R | .30 | .09 | 1,558 | 56.79** |
| LES | .36 | .04 | 1,557 | 23.96** |
| LOT-R \times LES | .38 | .01 | 1,556 | 9.34* |
| Vulnerability to illness | | | | |
| LOT-R | .23 | .05 | 1,558 | 29.69** |
| LES | .26 | .02 | 1,557 | 99.93** |
| LOT-R \times LES | .29 | .01 | 1,556 | 8.88* |

Note. *N* = 560. LOT-R = revised Life Orientation Test; LES = Life Experiences Survey. * $p < .01$; ** $p < .001$.

negative life stress and depressive symptoms was exacerbated for optimists. In contrast, for pessimists, accumulated negative life stress did not have a strong influence on depressive symptoms ($b = .07$), $t(556) = 1.76$, *ns*.

As Table 3 also shows, LOT-R scores again accounted for a significant amount of the variance in both of the physical adjustment measures. Specifically, LOT-R scores accounted for 9% and 5% of the variance in physical symptoms and vulnerability to illness, respectively. In addition, LES scores accounted for a significant amount of additional variance in physical symptoms ($\Delta R^2 = 4\%$) and in vulnerability to illness ($\Delta R^2 = 2\%$) even after partialing out variance accounted for by optimism-pessimism. In addition, as the table shows, the LOT-R \times LES interaction was significant for both physical symptoms ($\Delta R^2 = 1\%$) and vulnerability to illness ($\Delta R^2 = 1\%$) even after partialing out the variances accounted for by both optimism-pessimism and accumulated negative life stress.

Similar to the procedure used for depressive symptoms, we again plotted the regression of physical symptoms on negative life stress based on high and low scores on the LOT-R to illustrate the LOT-R \times LES interac-

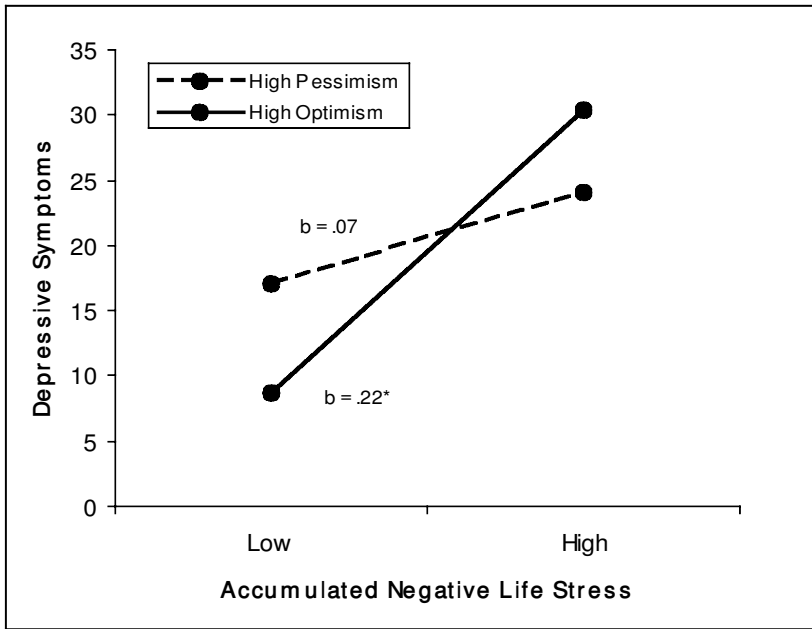


FIGURE 1. Relationship of accumulated negative life stress with depressive symptoms at high and low levels of optimism-pessimism. * $p < .01$.

tion (see Figure 2). As the figure shows, there was a significant positive relation between accumulated negative life stress and physical symptoms at high levels of optimism, ($b = .57$), $t(556) = 5.74$, $p < .01$. At high levels of pessimism, the relation between accumulated negative life stress and physical symptoms was not significant, ($b = .12$), $t(556) = .51$, *ns*. Hence, the association between accumulated negative life stress and physical symptoms was exacerbated for optimists, but not for pessimists.

Next, we plotted the regression of vulnerability to illness on negative life stress at high levels of optimism and pessimism to illustrate the LOT-R \times LES interaction (see Figure 3). As the figure shows, there was a significant relation between accumulated negative life stress and vulnerability to illness at high levels of optimism, ($b = .11$), $t(556) = 4.88$, $p < .01$. At high levels of pessimism, the relation between accumulated negative life stress and vulnerability to illness was not significant, ($b = -.01$), $t(556) = -.20$, *ns*. Accordingly, the association between accumulated negative life stress and vulnerability to illness was again exacerbated for optimists, but not for pessimists.

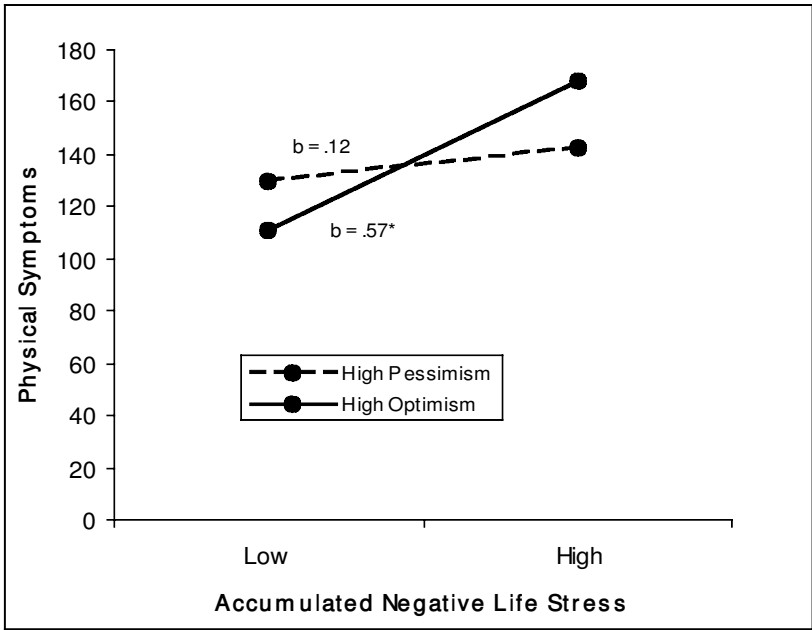


FIGURE 2. Relationship of accumulated negative life stress with physical symptoms at high and low levels of optimism-pessimism. $*p < .01$.

DISCUSSION

OPTIMISM-PESSIMISM, ACCUMULATED NEGATIVE LIFE STRESS

This study expanded on previous research on the relations between optimism-pessimism, stress, and adjustment. Consistent with findings from previous studies of optimism-pessimism (e.g., Chang, 1998a; Mroczek et al., 1993; Scheier & Carver, 1985), results of the present study demonstrated that greater optimism was significantly associated with less depressive symptoms, physical symptoms, and less vulnerability to illness. In addition, greater optimism was found to be significantly associated with greater life satisfaction (Chang et al., 1997).

Moreover, consistent with previous research on optimism-pessimism and stress (e.g., Chang, 1998b; Lai, 1995), LOT-R scores were found to be negatively and significantly related to LES scores. Thus, the accumulation of negative life stress over the past year was found to be associated with less optimism in adults. However, it is worth noting that the amount of variance shared between the LOT-R and the LES

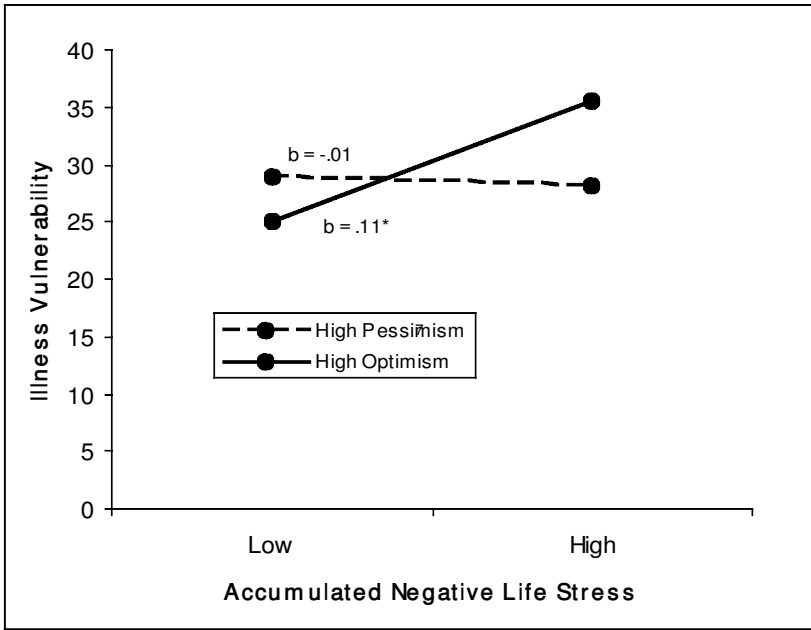


FIGURE 3. Relationship of accumulated negative life stress with vulnerability to illness at high and low levels of optimism-pessimism. * $p < .01$.

was found to be approximately 8.4%. Hence, although the significant association found between the two measures may lead some to speculate that the experience of accumulated negative life stress may possibly influence or be influenced by an individual's level of optimism, the amount of potential influence in either direction appears to be modest at best.

In addition, accumulated negative life stress was found to be significantly associated with each of the psychological and physical adjustment measures. Consistent with previous findings (e.g., Billings & Moos, 1982, Sarason et al., 1978), a strong association was found between scores on the LES and on the BDI ($r = .41$). More modest associations were found between scores on the LES and the other adjustment measures. However, insofar that significant associations were found, researchers may consider ways in which negative life stress may have an impact not only on depressive symptoms, but also on other important outcomes such as life satisfaction, physical symptoms, and illness vulnerability.

Furthermore, it is worth noting that all of the adjustment measures were significantly related to each other in the expected direction. For example, Andersen and Lobel (1995) found that scores on the VIS and on the PILL were positively and significantly related to each other ($r = .38$) in a sample of college students. Similarly, a significant positive correlation ($r = .35$) was found between these two measures in the present study. Furthermore, it is important to note that the associations found between the various outcome measures were not so strong as to suggest that they were redundant with each other. For example, even the strong association found between the SWLS and the BDI indicated that these measures accounted for less than 37% of common variance. In sum, the present correlational findings suggest that optimism-pessimism and the experience of accumulated negative life stress have a significant association with a wide range of psychological and physical outcomes in adults.

WHEN OPTIMISM IS BAD, AND PESSIMISM IS NOT?

In general, consistent with the correlational results, the present study found that LOT-R scores accounted for a significant amount of the variance in each measure of psychological adjustment (average $R^2 = .26$) and physical adjustment (average $R^2 = .07$). Moreover, LES scores were found to add significant incremental validity in predicting psychological (average $\Delta R^2 = .05$) and physical outcomes (average $\Delta R^2 = .03$) above and beyond optimism-pessimism. Hence, these results suggest that beyond the influences of optimism-pessimism, accumulated negative life stress made an important independent contribution to the prediction of psychological and physical adjustment in adults. Also consistent with expectations, the results indicated that the interaction between LOT-R and LES scores added further significant incremental validity in predicting three of the four outcomes assessed in the present study. The one exception was in predicting life satisfaction. On average, the LOT-R \times LES interaction accounted for approximately 1.3% of additional variance beyond what was accounted for by both optimism-pessimism and accumulated negative life stress in predicting depressive symptoms, physical symptoms, and illness vulnerability.

Moreover, the present study found that the manner in which optimism-pessimism moderated the influence of accumulated negative life stress on these three outcomes was consistent with Tennen and Affleck's (1987) vulnerability hypothesis. Specifically, the association between accumulated negative life stress and depressive symptoms was found to be exacerbated for optimists compared to what was found for pessi-

mists. Similar findings were obtained when the pattern of interaction was examined for physical symptoms and for vulnerability to illness. In fact, for pessimists, the associations between accumulated negative life stress and all three outcomes (based on their simple slopes) were found to be not significant. However, insofar that such a finding was not found in predicting life satisfaction, the present results suggest that although for optimists the accumulation of stress may be associated with greater psychological and physical symptomatology, optimists appear to remain generally satisfied with their lives. It may be this sort of resiliency that allows optimists to maintain their generalized positive outcome expectancies across time. Consistent with this view, the results of conducting a set of post hoc analyses in which we predicted LOT-R scores from LES, BDI, SWLS, PILL, and VIS scores indicated that the strongest predictor of optimism-pessimism among all of these variables was life satisfaction ($\beta = .34, p < .001$).

Beyond our focus on examining a vulnerability model, it is worth noting that all of the obtained interactions, as indicated by their plots, also revealed another interesting pattern. Specifically, under conditions of low accumulated life stress, optimists consistently had lower scores on depressive symptoms, physical symptoms, and vulnerability to illness than did pessimists. That is, unlike pessimists, optimists appear to be better adjusted when they experience very little negative life stress. Hence, it may prove to be just as important to help optimists avoid exposure to accumulated stressful experiences as it may be to help optimists seek out and maintain low stressful experiences. In contrast, such efforts may not necessarily help pessimists obtain better adjustment. As the present findings indicated, level of stress was not a significant predictor of depressive symptoms, physical symptoms, and vulnerability to adjustment for pessimists. Nonetheless, it remains important to examine the effectiveness of potential interventions to reduce negative life experiences on adjustment for both optimists and pessimists.

Some limitations to the present study must be noted. First, comparable to previous studies involving optimism-pessimism in adults, the present sample was largely Caucasian. However, given that important cultural differences have been found on optimism-pessimism between Asians and Caucasians (e.g., Chang, 1996, 2001a, 2002; see also, Chang, Asakawa, & Sanna, 2001), it would be important to determine if cultural factors may also play a role in understanding how optimism-pessimism moderates the link between accumulated negative life stress and psychological and physical adjustment. Second, and relatedly, because the present sample was also composed of young adults (i.e., college students), the present findings may not generalize

to younger or older populations given potential age-related or developmental differences in exposure to stressful experiences and in coping resources. No doubt, it would be important to examine the value of the present vulnerability hypothesis across different age groups across the entire lifespan. Third, given that the present sample represented a relatively healthy and adjusted population, it would be important to determine if the present findings can be generalized to more select populations (e.g., clinical populations, chronically ill populations). Fourth, it would be important to test alternative models. For example, insofar that optimism and pessimism map onto extroversion and neuroticism, respectively (Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992), it would be important to determine if the present results remain unchanged when other personality factors are included in the equation. Lastly, although the present study examined the role of optimism-pessimism and accumulated negative life stress as predictors of psychological and physical adjustment, one cannot draw any inferences about cause and effect given the cross-sectional nature of the present study. Hence, although more difficult to conduct, a prospective design study that assesses for all of the present measures on at least two different points in time would help greatly clarify the causal relations between optimism-pessimism, accumulated negative life stress, and adjustment.

CONCLUDING COMMENT

In conclusion, the present set of findings is the first to offer some support for Tennen and Affleck's (1987) vulnerability hypothesis, and to raise some doubts about the incontrovertible power of optimistic thinking (vs. pessimistic thinking) on adjustment. Clearly, more research is needed to determine more precisely the conditions and processes around which optimism and pessimism may be associated with positive and negative psychological and physical adjustment across different populations.

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