

Optimism, Neuroticism, Coping, and Symptom Reports: An Alternative Interpretation of the Life Orientation Test

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Found in two studies that the Life Orientation Test (LOT) had limited discriminant validity relative to measures of neuroticism. Furthermore, although previous correlations of the LOT with measures of symptom reports and coping behaviors were replicated, these correlations were eliminated when neuroticism was controlled. In contrast, the correlations of symptoms and coping with neuroticism remained significant when LOT scores were controlled. Thus, the LOT is virtually indistinguishable from measures of neuroticism, and previously reported findings using this scale are perhaps more parsimoniously interpreted as reflecting neuroticism rather than optimism. These findings are discussed in terms of existing support for models of optimism and self-control and general methodological issues in studies of personality and health.

Individual differences in generalized outcome expectancies play a central role in several conceptual approaches to self-regulation and adjustment (e.g., Bandura, 1977; Carver & Scheier, 1982; Kanfer, 1977; Rotter, 1954). Presumably, when faced with a new and potentially difficult situation, individuals with generally positive expectations about the likelihood of future successes (i.e., optimists) are likely to persist in their goal-oriented efforts. In contrast, people with more negative expectations (i.e., pessimists) are less likely to persist. Thus, individual differences in optimism versus pessimism are, in theory, related to distinct types of coping exhibited in stressful situations (e.g., attempts at mastery or control vs. withdrawal or avoidance), as well as any physical or emotional consequences of these adjustment or self-regulation processes.

Carver and Scheier's (1981, 1982) control theory is one such self-regulatory model. From this perspective, when an individual becomes aware of a discrepancy between a behavioral goal or standard and his or her present situation, an assessment process is initiated. If the individual expects that the discrepancy between the goal and the current situation is relatively likely to be reduced, renewed goal-directed effort is applied. If the expectancy is more negative, reduced effort or cessation of additional attempts follows. It is at this assessment junction that individual differences loom in importance. From this perspective, optimists would attempt to solve or cope actively with the

problems they encounter, whereas pessimists would adopt more passive and fatalistic approaches to problems. Scheier and Carver (1987) argued that the more effective coping of optimists would reduce any potential negative effects of stressors on physical and emotional health.

Life Orientation Test

Given the broad range of applicability of control theory and the central role of optimism in that theory, a reliable and valid measure of this construct is of considerable potential importance. Scheier and Carver (1985) have developed the Life Orientation Test (LOT) to assess this dimension. In an attempt to evaluate the convergent and discriminant validity of the LOT, Scheier and Carver administered this eight-item scale along with a variety of scales, including measures of hopelessness, depression, and self-esteem, to several samples of undergraduates. They reported that convergent validity was demonstrated by the fact that the LOT correlated with conceptually related constructs. Discriminant validity, they argued, was demonstrated by the fact that these relations were not so strong as to make the LOT "appear to be completely redundant with the other measures that were collected" (Scheier & Carver, 1985, p. 229).

Scheier and Carver (1987) have reviewed several studies of health, coping, and the LOT. All have produced the expected findings. Scheier and Carver (1985, Study 3) found that LOT scores were significantly correlated with scores on a self-report physical symptom checklist administered at the same time. Furthermore, even when controlling for initial levels of symptoms, initial LOT scores were prospectively related to subsequent symptom reports 4 weeks later. Presumably, the positive expectancies of optimists lead to more effective problem solving with fewer adverse health consequences. To examine the hypothesized coping style differences between optimists and pessimists, Scheier, Weintraub, and Carver (1986) examined correlations

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between LOT scores and modified versions of the Ways of Coping Checklist (WCCL; Folkman & Lazarus, 1980) in two samples of undergraduates. As expected, optimism was associated with more problem-focused coping and seeking of social support and less avoidance or disengagement. Carver and Gaines (1987) found that higher LOT scores during pregnancy were significantly correlated with lower levels of postpartum depression, even when initial levels of depression were controlled. Strack, Carver, and Blaney (1987) found that high LOT scores were associated with a greater likelihood of completing an alcohol treatment program. Finally, Scheier and Carver (1987) described some data suggesting that optimists, as assessed by the LOT, adjust to and recover from heart surgery better than do pessimists. Overall, these studies suggest that higher LOT scores are indeed associated with the types of coping behaviors, health outcomes, and emotional responses predicted by control theory.

Discriminant Validity Revisited: A Focus on Neuroticism

As noted previously, Scheier and Carver (1985) suggested that the convergent validity of the LOT was demonstrated by expected correlations with conceptually related scales measuring depression ($r = -.49$), perceived stress ($r = -.55$), hopelessness ($r = -.47$), and self-esteem ($r = .48$), among other traits. They also maintained that discriminant validity was evident in the fact that these same correlations were not so large as to suggest that the LOT is redundant with other scales. Traditionally, however, convergent and discriminant validity are evaluated by examining correlations between the scale in question and at least two other scales that differ in their conceptual similarity to the first (e.g., Campbell & Fiske, 1959). A larger correlation with a scale assessing the same or a conceptually similar construct rather than with a scale assessing a conceptually unrelated or less closely related construct provides evidence of convergent and discriminant validity. Clearer evidence of the convergent and discriminant validity of the LOT, then, would consist of large correlations with additional measures of optimism or closely related constructs and simultaneous smaller correlations with measures of less closely related constructs. Interpretation of the previously described findings involving the LOT, coping, and health as reflecting optimism would be strengthened by this pattern of associations. Otherwise, the findings involving coping and health could just as easily be viewed as reflecting some other construct assessed by the LOT. One purpose of the investigations we report in this article is to provide a more thorough assessment of the convergent and discriminant validity of the LOT.

In selecting a second trait for inclusion in a multitrait convergent-discriminant validity study of the LOT, neuroticism (Eysenck & Eysenck, 1964), or negative affectivity (Watson & Clark, 1984), looms as an important dimension. *Neuroticism*, or negative affectivity, refers to a broad, stable dimension of personality consisting of chronic negative emotions including sadness, anxiety, guilt, and anger, as well as associated cognitive and behavioral characteristics such as low self-esteem, preoccupation, and insecurity. It is important to note that neuroticism refers to individual differences in normal functioning and does

not imply the presence of a psychiatric condition as did the older term *neurosis*. Neuroticism has long been a central member of virtually all conceptual and empirical taxonomies of fundamental personality traits (Digman & Inouye, 1986; McCrae & Costa, 1987; Norman, 1963). This dimension is highly stable (McCrae & Costa, 1984), even in the face of changing levels of life stress (Ormel, 1983). Furthermore, neuroticism has at least some genetic basis (Fuller & Thompson, 1978; Tellegen et al., 1988). The dimension of neuroticism is assessed well by a variety of self-report measures of its component scales or facets, such as trait anxiety, depression, and other dysphoric individual differences (Watson & Clark, 1984).

For at least two reasons, it is important to determine the extent to which the LOT measures optimism as opposed to neuroticism. It is increasingly clear that neuroticism is associated with high levels of *reported* physical illness but is not necessarily related to *actual* illness. Costa and McCrae (1985, 1987) and Watson and Pennebaker (1989) have presented extensive reviews indicating that although neuroticism is consistently related to health complaints, it does not predict the development of actual physical illness. Many studies of personality and health rely on self-reported symptoms as outcomes. If the personality scales used in such studies reflect or are highly correlated with neuroticism, then what is actually a relation between neuroticism and symptom reporting may be misinterpreted as reflecting an association between some other facet of personality and actual health. Understandably, recent discussions of research methods in the study of personality and health have recommended the measurement and statistical control of neuroticism in order to evaluate this important rival hypothesis (Costa & McCrae, 1987; Depue & Monroe, 1986; Holroyd & Coyne, 1987; Watson & Pennebaker, 1989). Given that one of the main intended uses of the LOT is in studies of physical health (Scheier & Carver, 1985, 1987) and that one of the main validating studies used a self-report measure of health (Scheier & Carver, 1985, Study 3), this issue is clearly relevant.

A second reason for evaluating the discriminant validity of the LOT relative to neuroticism concerns alternative interpretations of other findings involving the scale. For example, Vitaliano, Maiuro, Russo, and Becker (1987) found that in a sample of medical students, Beck Depression Inventory (BDI; Beck, 1967) scores were correlated with lower levels of reported problem-focused coping and support seeking and higher levels of wishful thinking and avoidance as assessed by the WCCL. It is clear that in normal samples the BDI is virtually indistinguishable from measures of trait anxiety and is best interpreted as a measure of neuroticism or negative affectivity (Gotlib, 1984; Tanaka-Matsumi & Kameoka, 1986; Watson & Clark, 1984). Thus, if the LOT has limited discriminant validity relative to neuroticism, the coping style correlates of the LOT may actually reflect neuroticism rather than optimism (see also McCrae & Costa, 1986). Similarly, chronically dysphoric individuals high in neuroticism may find a variety of stressors more emotionally upsetting than do their more emotionally stable counterparts (cf. Depue & Monroe, 1986). Thus, the dysphoric response of pessimists to childbirth reported by Carver and Gaines (1987) could conceivably reflect the negative emotional responsivity of persons with high neuroticism scores.

Overview of the Present Studies

The availability of a reliable and valid measure of optimism is clearly important given the central role of this construct in broadly applicable self-regulation theories. However, the convergent and discriminant validity of the LOT has not been thoroughly evaluated. As suggested by several conceptual and methodological critiques of the literature on personality, stress, and health (Costa & McCrae, 1987; Depue & Monroe, 1986; Holroyd & Coyne, 1987; Watson & Pennebaker, 1989), neuroticism is an important trait to be included in such an evaluation because it (a) is an established dimension of normal personality, (b) is an important potential confound in one area in which individual differences in optimism are relevant—physical health—and (c) represents a viable alternative explanation for several of the existing studies using the LOT. In the two studies we report in this article, we attempted to evaluate the convergent and discriminant validity of the LOT and tested the alternative interpretation of previous studies as reflecting the correlates of neuroticism rather than of optimism.

Study 1: Convergent–Discriminant Validation and Alternative Interpretation of Coping and Concurrent Symptoms

As a second measure of the construct of optimism, we used the Generalized Expectancy for Success Scale (GESS) developed by Fibel and Hale (1978). Generalized expectancy for success is defined by these authors as “the expectancy held by an individual that in most situations he/she will be able to attain desired goals” (p. 924). Similarly, Scheier and Carver (1985) defined *optimists* as people who “expect things to go their way, and generally believe that good rather than bad things will happen to them” (p. 219). They defined *optimism* succinctly as “expectations that good things will happen” (p. 223). In developing the LOT, Scheier and Carver (1985) were concerned with measurement of people’s *generalized* outcome expectancies rather than more situation-specific expectancies, given that the former would be more relevant to broader issues of adjustment. Very similar concerns guided Fibel and Hale (1978). These authors reasoned that as situations become unfamiliar or ambiguous, as they often are in the process of adjustment, then behavior would be determined by general rather than specific expectancies. Although some minor differences might exist between the two conceptual definitions guiding the development of the LOT and the GESS, it is clear that they are highly similar. Thus, the GESS arguably makes a highly suitable second measure of optimism for inclusion in the multitrait matrix evaluation of convergent and discriminant validity.

As measures of neuroticism, we used the Taylor (1953) Manifest Anxiety Scale (TMAS) and the trait form of the State–Trait Anxiety Inventory (A-Trait; Spielberger, Gorsuch, & Lushene, 1970). Watson and Clark (1984) reviewed a large body of evidence indicating that these two highly correlated scales are valid measures of stable individual differences in neuroticism or negative affectivity.

To evaluate convergent and discriminant validity, we compared the mono- versus heterotrait correlations in a mono-method, multitrait matrix. As described previously, a larger cor-

relation with the GESS (i.e., monotrait correlations) than with the A-Trait or TMAS (i.e., heterotrait correlations) would provide evidence of the LOT’s convergent and discriminant validity. In addition, we subjected this matrix to a principal-components factor analysis. Good discriminant validity would be reflected in a solution with two factors (i.e., optimism and neuroticism), whereas poor discriminant validity would be reflected in a one-factor solution with relatively equal and high loadings for all four variables. By using two separate samples, we were able to replicate the convergent–discriminant validity findings.

If the LOT were to display poor discriminant validity relative to neuroticism, then correlations between the LOT and coping or symptoms could actually reflect the influence of neuroticism. Therefore, we attempted to replicate the previous findings concerning the correlations of the LOT with coping behaviors (Scheier et al., 1986) and symptom reports (Scheier & Carver, 1985) and evaluated the contribution of neuroticism to these correlations by holding A-Trait scores constant through partial correlations.

Method

Subjects. Sample 1 included 74 male and 82 female undergraduates enrolled in an introductory psychology course. Sample 2 included 52 male and 51 female undergraduates also enrolled in introductory psychology. All participants received partial course credit.

Procedure and inventories. In group sessions, subjects in Sample 1 completed the LOT, GESS, A-Trait, and TMAS. The LOT consists of 8 five-point items plus 4 unscored filler items. Half of the items are scored in the positive direction (e.g., “In uncertain times, I usually expect the best”), the other half in the negative direction (e.g., “If something can go wrong for me, it will”). The 8-item scale has adequate internal consistency (e.g., Cronbach’s alpha = .76) and test–retest reliability ($r = .79$ over 4 weeks). The GESS consists of 30 five-point Likert items. On the five-point scales, subjects rate the probability (1 = *highly improbable*, 5 = *highly probable*) of each of several specific outcomes occurring in the future. Outcomes cover a broad range of positive (e.g., “I will succeed in the projects I undertake,” “I will attain the career goals I have set for myself,” “I will succeed at most things I try”) and negative events (e.g., “I will be unable to accomplish my goals,” “I will not be very good at learning new skills,” “I will discover that my plans don’t work out too well”). Negative items are reversed before scoring. Fibel and Hale (1978) reported split-half reliabilities for the GESS of $r = .82-.91$ and 6-week test–retest reliabilities of $r = .80-.89$. According to Fibel and Hale, the GESS demonstrates construct validity information by its significant, negative correlations with measures of depression, hopelessness, and anxiety.

The TMAS and A-Trait are widely used and accepted measures of neuroticism. The TMAS consists of 50 true–false items selected from the Minnesota Multiphasic Personality Inventory, and the A-Trait consists of 20 Likert items. Given their wide use and general acceptance, the reader is referred elsewhere for reviews of the psychometric properties of these scales (Lamb, 1978; Watson & Clark, 1984).

Subjects in Sample 2 also completed a set of questionnaires in large group testing sessions. They completed the LOT, GESS, TMAS, and A-Trait. They also completed the Revised Ways of Coping Checklist (RWCC; Vitaliano, Russo, Carr, Maiuro, & Becker, 1985) and a physical symptoms checklist. The RWCC is quite similar to the original proposed by Folkman and Lazarus (1980). In this self-report questionnaire, subjects identify a recent stressor. They then indicate, on Likert scales, the extent to which they used each of a list of coping behaviors and

Table 1
*Intercorrelations of the Life Orientation Test (LOT),
 Generalized Expectancy for Success Scale (GESS), A-Trait,
 and Taylor Manifest Anxiety Scale (TMAS)
 in Samples 1 and 2: Study 1*

Measure	1	2	3	4
1. LOT	—	.63	-.61	-.57
2. GESS	.51	—	-.59	-.50
3. A-Trait	-.66	-.59	—	.78
4. TMAS	-.50	-.50	.83	—

Note. Sample 1 correlations are above the diagonal, Sample 2 below. Sample 1, $N = 156$; Sample 2, $N = 103$. All correlations, $p < .001$.

thoughts in response to the stressor. On the basis of a large factor analysis, Vitaliano et al. (1985) have grouped the coping behaviors into five scales: problem-focused coping (15 items), seeking social support (6 items), blaming self (3 items), wishful thinking (8 items), and avoidance (10 items). Vitaliano et al. (1987) have demonstrated more robust findings when relative rather than raw scores are used. For example, the relative score for problem-focused coping is derived by dividing the sum of the mean scores for all five scales into the mean score (i.e., sum of problem-focused items divided by the number of items) for problem-focused coping. This controls for the tendency to endorse more or less overall coping actions when examining the correlates of presumably adaptive (e.g., problem-focused) and maladaptive (e.g., avoidance) coping strategies.

The physical symptom checklist was similar to many used in studies of stress and health. Subjects were presented with a list of 90 common physical symptoms and illnesses (e.g., colds, flu, headache, etc.). It should be noted that this measure contains no items reflecting mental health concerns (e.g., depression, anxiety, etc.). As in the Scheier and Carver (1985, Study 3) procedure, subjects were asked to indicate on a 5-point Likert scale (1 = *not at all*, 5 = *extremely*) the extent to which they were bothered by each health item during the past 3 weeks.

Results and Discussion

Convergent-discriminant validity. The intercorrelations of the LOT, GESS, TMAS, and A-Trait in Samples 1 and 2 are presented in Table 1.¹ As expected, the LOT and GESS are highly correlated, as are the A-Trait and TMAS. However, the LOT is at least as closely correlated with the A-Trait and TMAS. In Sample 1, tests of the significance of differences between correlations indicated that the LOT was equally correlated with the GESS, A-Trait, and TMAS. In Sample 2, the LOT was significantly more highly correlated with the A-Trait than with the GESS or TMAS, both $t(153) > 2.2$, $ps < .05$. On the basis of these univariate relations, it is clear that the LOT shares considerable variance with measures of neuroticism and that it is difficult to distinguish individual differences in optimism (or pessimism, when the direction of the scales are taken into account) from individual differences in neuroticism.

A principal-components factor analysis of the correlations in Sample 1 revealed the presence of a single large factor with an eigenvalue of 2.47 and accounting for 71.0% of the variance. The eigenvalue for the next factor was only 0.58. Factor loadings on the single factor indicated that all four variables loaded highly on this factor: GESS = $-.74$, LOT = $-.75$, TMAS = $.84$, and A-Trait = $.87$.

A similar principal-components analysis of correlations for Sample 2 revealed one large factor; eigenvalue = 2.83, 70.7% of the variance explained. The second largest factor had an eigenvalue of 0.55. Again, all four scales loaded highly on the primary factor: GESS = $-.76$, LOT = $-.80$, TMAS = $.86$, and A-Trait = $.93$.

Taken together, these analyses support the following conclusions: (a) the LOT is closely correlated with measures of neuroticism, (b) the LOT is as closely correlated with measures of neuroticism as it is with a second measure of optimism, and (c) the factor analysis results suggest that all four scales measure a single dimension. Overall, these findings suggest that the LOT has limited discriminant validity.

Associations with symptoms and coping. On the basis of previous theory and research (Scheier & Carver, 1985; Scheier et al., 1986), we expected that optimists as defined by the LOT would report (a) fewer symptoms, (b) more adaptive coping strategies such as problem-focused coping, and (c) fewer potentially maladaptive coping strategies such as wishful thinking and avoidance. These correlations are presented in Table 2. The expected relations with symptoms and problem-focused coping are significant. In addition, high LOT scores are associated with low levels of self-blame. Previous findings concerning the correlation of the LOT with wishful thinking and avoidance were not replicated.

To determine if these findings reflect shared variance with neuroticism, we computed partial correlations controlling for A-Trait scores (cf. McCrae & Costa, 1986). We selected the A-Trait for this analysis rather than the TMAS because the TMAS contains several somatic items. Using it as a covariate might, therefore, artificially deflate the correlation with physical symptoms. As can be seen in Table 2, when neuroticism is controlled the expected associations between higher LOT scores and lower symptom reports and more problem-focused coping are eliminated. Only the correlation with self-blame remains significant. Thus, the present and previous correlations between the LOT and symptom reports and coping could be interpreted as reflecting neuroticism.

Parallel analyses involving the GESS indicated that higher scores on this measure were significantly correlated with reduced symptom reports, higher problem-focused coping and support seeking, and less wishful thinking. When A-Trait scores were controlled, however, only the correlation with support seeking remained significant and in the expected direction. When A-Trait scores were controlled, high GESS scores were associated with increased symptom reports.

We calculated the analogous correlations between A-Trait scores, symptoms, and coping with and without controlling for LOT and GESS scores. These correlations are presented in Table 2 as well. As expected, individuals high in neuroticism reported more somatic complaints, less problem-focused coping and support seeking, and more wishful thinking and self-blame. When LOT and GESS scores are controlled via partial correlation, the associations with symptoms, problem-focused coping, and wishful thinking remain significant. Only the correlations

¹ In both studies, results are very similar for men and women. Therefore, the analyses are combined across sexes.

Table 2
Correlations of the Life Orientation Test (LOT), Generalized Expectancy for Success Scale (GESS), and A-Trait Scores With Symptom Reports and Coping Behaviors: Study 1

Outcome measures	Correlations with LOT		Correlations with GESS		Correlations with A-Trait	
	Simple	Controlling for A-Trait	Simple	Controlling for A-Trait	Simple	Controlling for LOT & GESS
Symptom reports	-.28**	.07	-.18*	.20*	.52**	.46***
Coping behaviors						
Problem-focused	.40***	.15	.26**	-.01	-.59***	-.32***
Seeks support	.11	.02	.27**	.23**	-.17*	-.04
Wishful thinking	-.15	.08	-.26**	-.10	.34***	.23**
Self-blame	-.24**	-.19*	-.14	-.07	.18*	.02
Avoidance	-.07	.02	-.12	-.06	.15	.11

Note. $n = 103$. All ps one-tailed.

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

with support-seeking and self-blame are eliminated. Overall, these sets of correlations suggest that the LOT's correlations with symptom reports and coping behaviors are perhaps best seen as reflecting neuroticism rather than optimism. With the exception of support seeking, this is true of the GESS as well.

Study 2: Convergent-Discriminant Validity, Coping, and Prospective Symptom Reports

Our second study had three purposes. First, we attempted to replicate the convergent-discriminant validity analysis once more. Second, we attempted to replicate the findings of Study 1 regarding the influence of neuroticism on the relations between optimism and coping and symptom reports. Third, we evaluated the extent to which neuroticism can account for the LOT's previously reported *prospective* relation with symptom reports. Several factors made this additional study important. Given that the first two validity analyses raised serious questions concerning the LOT's discriminant validity, we felt it was important to ensure that these results were highly consistent. Similarly, given that Study 1 supported an important alternative interpretation of previous studies using the LOT, we felt it was critical to replicate these results. Finally, whereas neuroticism may explain the LOT's *concurrent* association with symptom reports, the *prospective* relation reported by Scheier and Carver (1985, Study 3) could conceivably reflect the unique influence of optimism. Thus, we attempted to replicate this prospective association between the LOT and symptom reports and to evaluate the contribution of neuroticism to it.

Method

Subjects. Participants included 91 male and 103 female undergraduates. They received for their participation partial credit in a course in introductory psychology.

Procedures and measures. In group testing sessions, subjects completed the previously described LOT, GESS, TMAS, A-Trait, RWCL, and physical symptom checklist. Approximately 5 weeks later they returned and completed a second physical symptom checklist.

Results and Discussion

Convergent-discriminant validity. The correlations among the LOT, GESS, A-Trait, and TMAS are presented in Table 3. As in the previous two studies, the LOT was at least as closely correlated with the measures of neuroticism as it was with the second measure of optimism. Tests of the significance of differences between correlations indicated that the LOT was more closely correlated with the A-Trait than with the GESS, $t(191) = 2.94$, $p < .01$. Once again, this pattern of correlations questions the interpretation of the LOT as strictly reflecting optimism.

The principal-components analysis of the correlation matrix in Table 3, as in the previous studies, revealed a single large factor with an eigenvalue of 2.79 and accounting for 69.7% of the variance. The next largest eigenvalue was 0.71. As in the previous studies, all four scales loaded highly on the main factor: GESS = $-.68$; LOT = $-.87$; TMAS = $.86$; and A-Trait = $.91$.

Concurrent correlations with coping and symptoms. Table 4 presents the correlations between LOT scores and concurrent reports of coping and symptoms. Consistent with previous theory and research, higher LOT scores are associated with fewer symptom reports, more problem-focused coping, and less wishful thinking and avoidance. The LOT scores are also correlated with support seeking and self-blame in conceptually plausible directions. When neuroticism is held constant by controlling

Table 3
Intercorrelations of the Life Orientation Test (LOT), Generalized Expectancy for Success Scale (GESS), A-Trait, and Taylor Manifest Anxiety Scale (TMAS): Study 2

Measure	LOT	GESS	A-Trait
GESS	.55	—	—
A-Trait	-.70	-.45	—
TMAS	-.63	-.37	.82

Note. $N = 194$. All correlations are significant at $p < .001$.

Table 4
Correlations of the Life Orientation Test (LOT), Generalized Expectancy for Success Scale (GESS), and A-Trait Scores With Symptom Reports and Coping Behaviors: Study 2

Outcome measures	Correlations with LOT		Correlations with GESS		Correlations with A-Trait	
	Simple	Controlling for A-Trait	Simple	Controlling for A-Trait	Simple	Controlling for LOT & GESS
Symptom reports	-.26***	.09	-.19**	.06	.48***	.40***
Coping behaviors						
Problem-focused	.37***	.08	.32***	.14*	-.45***	-.28***
Seeks support	.30***	.16*	.37***	.31***	-.27***	-.06
Wishful thinking	-.27***	-.01	-.33***	-.20**	.38***	.28***
Self-blame	-.16**	-.18**	-.10	-.09	.04	-.11
Avoidance	-.23***	.01	-.28***	-.15*	.32***	.20**

Note. $n = 194$. All ps one-tailed.

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

A-Trait scores in partial correlations, however, the most theoretically central findings involving symptoms, problem-focused coping, wishful thinking, and avoidance are eliminated. The positive association with support seeking and the negative correlation with self-blame remain significant.

As also represented in Table 4, the GESS displayed several correlations consistent with optimism theory. Higher scores were associated with lower symptom reports, higher levels of problem-focused coping and support seeking, and lower levels of wishful thinking and avoidance. When A-Trait scores were controlled, the association with symptom reports was eliminated, but the associations with coping measures remained significant.

When the parallel correlations between neuroticism and symptoms and coping are computed, with and without controlling LOT and GESS scores, the results of Study 1 are replicated. The A-Trait scores are significantly correlated with symptom reports, problem-focused coping, wishful thinking, avoidance, and support seeking. When LOT and GESS scores are controlled, each of these correlations remains highly significant, except for support seeking. Thus, as in Study 1, the concurrent symptom and coping correlates of the LOT appear to reflect the influence of neuroticism. Also as in Study 1, the concurrent symptom correlates of the GESS appear to reflect neuroticism; however, unlike Study 1, the GESS was associated with coping reports independently of neuroticism.

Prospective correlations with symptom reports. To examine the prospective association between LOT scores and symptom reports, Time 1 LOT scores were correlated with Time 2 symptom scores when controlling initial levels of symptoms via partial correlation. Replicating Scheier and Carver's (1985, Study 3) finding, this association is small but statistically significant, $r(172) = -.13$, $p < .05$. When Time 1 A-Trait scores are controlled, however, this correlation is eliminated, $r(171) = .01$. The GESS was not significantly associated with Time 2 symptoms when controlling for initial levels of symptoms, $r(173) = -.09$. The parallel analysis involving neuroticism proved to be more robust. When controlling Time 1 symptom levels, A-Trait scores are significantly correlated with Time 2 symptoms, $r(173) = .21$, $p < .003$. Furthermore, this association remains

significant even when LOT and GESS scores are controlled in a partial correlation, $r(172) = .16$, $p < .02$. Thus, as with the concurrent symptom correlates of the LOT and GESS, the prospective association between the LOT and symptom reports apparently reflects the operation of neuroticism.²

Conclusions

Implications for Studies of Optimism

The convergent and discriminant validity correlations in the present studies suggest that it is difficult if not impossible to distinguish the LOT from measures of neuroticism or negative affectivity. The LOT correlated at least as well with widely used measures of neuroticism as it did with a second measure of generalized expectancies. Factor analysis of the three matrixes suggests that all four scales assess a single dimension. This limited discriminant validity of the LOT with regard to neuroticism presents interpretive difficulties for its use. It is quite likely that associations involving the LOT reflect neuroticism rather than optimism. Studies 1 and 2 supported this alternative interpretation. Although we were able to replicate theoretically derived correlations between LOT scores and (a) lower levels of concurrent symptom reporting, (b) lower levels of future symptom reporting, (c) higher levels of problem-focused coping, and (d) lower levels of the passive coping expected from pessimists (i.e., wishful thinking and avoidance), each of these associations was eliminated when neuroticism was controlled. Control of LOT and GESS scores, however, did not eliminate correlations between neuroticism and these same symptom and coping measures. At the very least, these findings indicate that optimism as defined by the LOT is not related to coping and symptom reports independently of the influence of neuroticism. Given the fact that the LOT cannot be distinguished from measures of neuroticism in the convergent-discriminant matrixes, however, it is perhaps more parsimonious to suggest that the LOT's corre-

² Minor differences in degrees of freedom reflect incomplete or missing data.

lations with coping and symptom reports reflect the influence of neuroticism.

The symptom correlates of the GESS also clearly reflected the influence of neuroticism, as did most of the coping correlates of this scale in Study 1. The fact that the correlations with coping measures in Study 2 were independent of neuroticism indicates that, in comparison to the LOT, the GESS may be somewhat less susceptible to the confounding effects of neuroticism.³

The poor discriminant validity of the LOT relative to measures of neuroticism and the elimination of the LOT's correlations with symptoms and coping when neuroticism is controlled are consistent with the conclusion that previous findings involving this scale reflect the influence of neuroticism. If the LOT assesses neuroticism, then it is somewhat unclear why neuroticism measures such as the A-Trait remain correlated with symptoms and coping when LOT scores are controlled. Removing variance due to neuroticism by controlling LOT scores should seemingly eliminate the correlation between a second measure of neuroticism and other outcome variables. It should be noted, however, that across the three samples in the present studies, the correlations between the A-Trait and TMAS are significantly larger than the correlations of the LOT with these measures (all $ps < .05$). Thus, although the LOT is clearly associated with neuroticism, it is most likely a weaker measure of the general trait than are these other traditional measures of neuroticism.

Of course, these conclusions are based on the specific measures of the two constructs used in this study. Alternative measures of optimism, especially if they were less contaminated with neuroticism, might produce entirely different findings about the relative contributions of neuroticism and optimism to coping and symptom reports. At the present time, however, it is probably best to view the previously established symptom report and coping strategy correlates of optimism as actually reflecting the more pervasive, established personality dimension of neuroticism. Future research should examine whether this is true of other correlates of optimism as well. These conclusions should be further qualified by the fact that our studies used undergraduate samples. Other populations should be used in additional studies of the relations among optimism, neuroticism, coping, and symptoms.

It is important to note that the present findings in no way challenge the validity of control theory or the component of that model dealing with optimism. Because of their adaptive coping efforts, optimists may indeed be less prone to the emotional and physical effects of daily stress. This is certainly plausible in the control theory framework. The present results simply call into question the interpretation of some empirical evidence previously used to evaluate that model. They also suggest that future tests of control theory and the role of optimism must consider the potential contaminating effects of neuroticism if they are to produce less ambiguous findings. As in previous recommendations (Costa & McCrae, 1987; Depue & Monroe, 1986; Holroyd & Coyne, 1987; Watson & Pennebaker, 1989), assessment and statistical control of neuroticism is obviously relevant in this regard. Also, however, selection of dependent measures that are less susceptible to the confounding effects of neuroticism (cf. Holroyd & Coyne, 1987; Watson & Pennebaker, 1989)

and refinement of optimism scales to reduce overlap with neuroticism would allow more useful tests of this model.

Implications for Studies of Personality and Health

The present results and their implications for the study of optimism are relevant to several more general issues in the study of personality and health. Our results support previous suggestions to examine critically the pervasive influence of neuroticism in this domain (Costa & McCrae, 1985, 1987; Watson & Pennebaker, 1989). They also underscore the caution needed in interpreting studies using self-reports of health. There is a small and significant relation between subjective reports and actual health status, but there is no assurance that this portion of the variance in health reports is the same as that which correlates with a variety of personality and stress measures (cf. Costa & McCrae, 1987; Watson & Pennebaker, 1989). For example, this issue has recently surfaced in the study of hardiness, a personality characteristic involving an increased sense of commitment to life goals, belief in control over events, and appraisal of life changes as positive challenges (Kobasa, 1982). Existing measures of hardiness have been criticized for a variety of reasons, including their apparent assessment of general maladjustment (Funk & Houston, 1987; Hull, Van Treuren, & Virnelli, 1987). This overlap with measures of adjustment creates the possibility that correlations between hardiness and health reports actually reflect shared variance with neuroticism (Allred & Smith, 1989). Consistent with this interpretation, two recent studies have demonstrated that correlations between hardiness and health reports are eliminated when measures of neuroticism or negative affectivity are controlled (Funk & Houston, 1987; Rhodewalt & Zone, 1989). Thus, the interpretive ambiguities resulting from the neuroticism confound are not unique to studies of optimism.

Our findings also underscore the need for more careful and

³ Several authors have suggested the use of confirmatory factor analysis in evaluating convergent-discriminant validity matrixes (Briggs & Cheek, 1986; Cole, 1987; Judd, Jessor, & Donovan, 1986). In all three studies, we analyzed the matrixes with this technique as well as with the more traditional factor analysis. Two models were tested and directly compared. In all three cases, the two-factor model (LOT and GESS define the optimism factor, which is in turn correlated with the neuroticism factor defined by the A-Trait and TMAS) provided a better fit with the data than did the one-factor model. The apparent discrepancy between these results and the principle-components analysis most likely reflects the fact that the very high correlation between the TMAS and the A-Trait relative to the other correlations renders a better fit for the two-factor model. However, in all three samples the optimism and neuroticism factors were very highly correlated, $r_s = -.68, -.73, \text{ and } -.71$. This high degree of overlap suggests that any correlates of the optimism factor may reflect neuroticism. To test this hypothesis, we repeated the coping and symptom reporting analyses of Studies 1 and 2 using factor scores. As in the main analyses, the correlations of the optimism factor with coping, concurrent symptoms, and prospective symptoms were eliminated when neuroticism factor scores were controlled. The analogous correlations with the neuroticism factor, however, remained significant even when optimism factor scores were controlled. Thus, these analyses confirm the interpretation of previous correlations of optimism with coping and health reports as reflecting neuroticism.

complete studies of the convergent and discriminant validity of new entries into the taxonomy of personality characteristics hypothesized to influence health, as well as the existing elements in this array. As Holroyd and Coyne (1987) have argued, such studies would "reduce the risk that we would reinvent constructs under new labels . . . [and allow] investigators to orient new constructs in a psychometric space that would indicate their relationships to established personality dimensions such as neuroticism" (p. 367). Such evaluations of convergent and discriminant validity should include multiple measures of each construct (cf. Campbell & Fiske, 1959). In selecting a second construct for inclusion in such an analysis, plausible alternative constructs that offer rival explanations for findings obtained with a new scale provide the strongest evidence of discriminant validity. Even if discriminant validity is established in comparison to a rival construct, it is still important to demonstrate that the new scale is independently related to additional criteria (such as coping and symptoms in the present study) in order to determine whether the new scale has predictive utility (Mischel, 1968) beyond that attributable to its overlap with rival constructs. Although fairly complex, such theory-driven construct validation efforts are likely to ensure that the literature on personality and health develops in a useful, systematic fashion.

It is clear that the study of personality and health has experienced a renewed vitality in recent years (Suls & Rittenhouse, 1987). It is also clear that there are many conceptual and methodological problems in the current literature (Holroyd & Coyne, 1987; Krantz & Hedges, 1987). In this climate of both optimistic and pessimistic viewpoints concerning the role of personality in health, careful consideration of these conceptual and methodological issues is essential.

References

- Allred, K. D., & Smith, T. W. (1989). The hardy personality: Cognitive and physiological responses to evaluative threat. *Journal of Personality and Social Psychology, 56*, 257-266.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review, 84*, 191-215.
- Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. New York: Harper & Row.
- Briggs, S. R., & Cheek, J. M. (1986). The role of factor analysis in the development and evaluation of personality scales. *Journal of Personality, 54*, 106-148.
- Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*, 81-105.
- Carver, C. S., & Gaines, J. G. (1987). Optimism, pessimism, and postpartum depression. *Cognitive Therapy and Research, 11*, 449-462.
- Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control-theory approach to human behavior*. New York: Springer-Verlag.
- Carver, C. S., & Scheier, M. F. (1982). Control theory: A useful conceptual framework for personality-social, clinical, and health psychology. *Psychological Bulletin, 92*, 111-135.
- Cole, D. A. (1987). Utility of confirmatory factor analysis in test validation research. *Journal of Consulting and Clinical Psychology, 55*, 584-594.
- Costa, P. T., Jr., & McCrae, R. R. (1985). Hypochondriasis, neuroticism, and aging: When are somatic complaints unfounded? *American Psychologist, 40*, 19-28.
- Costa, P. T., Jr., & McCrae, R. R. (1987). Neuroticism, somatic complaints, and disease: Is the bark worse than the bite? *Journal of Personality, 55*, 299-316.
- Depue, R. A., & Monroe, S. M. (1986). Conceptualization and measurement of human disorder in life stress research: The problem of chronic disturbance. *Psychological Bulletin, 99*, 36-51.
- Digman, J. M., & Inouye, J. (1986). Further specification of the five robust factors of personality. *Journal of Personality and Social Psychology, 50*, 116-123.
- Eysenck, H. J., & Eysenck, S. B. G. (1964). *Manual for the Eysenck Personality Inventory*. London: University Press.
- Fibell, B., & Hale, W. D. (1978). The Generalized Expectancy for Success Scale—A new measure. *Journal of Consulting and Clinical Psychology, 46*, 924-931.
- Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior, 21*, 219-239.
- Fuller, J. L., & Thompson, W. R. (1978). *Foundations of behavior genetics*. St. Louis, MO: Mosby.
- Funk, S. C., & Houston, B. K. (1987). A critical analysis of the Hardiness Scale's validity and utility. *Journal of Personality and Social Psychology, 53*, 572-578.
- Gotlib, I. H. (1984). Depression and general psychopathology in university students. *Journal of Abnormal Psychology, 93*, 19-30.
- Holroyd, K. A., & Coyne, J. (1987). Personality and health in the 1980s: Psychosomatic medicine revisited? *Journal of Personality, 55*, 359-375.
- Hull, J. G., Van Treuren, R. R., & Virnelli, S. (1987). Hardiness and health: A critique and alternative approach. *Journal of Personality and Social Psychology, 53*, 518-530.
- Judd, C. M., Jessor, R., & Donovan, J. E. (1986). Structural equation models and personality research. *Journal of Personality, 54*, 149-198.
- Kanfer, F. H. (1977). The many faces of self-control, or behavior modification changes its focus. In R. B. Stuart (Ed.), *Behavioral self-management: Strategies, techniques and outcomes* (pp. 1-48). New York: Brunner/Mazel.
- Kobasa, S. C. (1982). The hardy personality: Toward a social psychology of stress and health. In G. S. Sanders & J. Suls (Eds.), *Social psychology of health and illness* (pp. 3-32). Hillsdale, NJ: Erlbaum.
- Krantz, D. S., & Hedges, S. M. (1987). Some cautions for research on personality and health. *Journal of Personality, 55*, 351-357.
- Lamb, D. (1978). Anxiety. In H. London & J. E. Exner, Jr. (Eds.), *Dimensions of personality* (pp. 37-83). New York: Wiley.
- McCrae, R. R., & Costa, P. T., Jr. (1984). *Emerging lives, enduring dispositions: Personality in adulthood*. Boston: Little, Brown.
- McCrae, R. R., & Costa, P. T., Jr. (1986). Personality, coping, and coping effectiveness in an adult sample. *Journal of Personality, 54*, 385-405.
- McCrae, R. R., & Costa, P. T., Jr. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52*, 81-90.
- Mischel, W. (1968). *Personality and assessment*. New York: Wiley.
- Norman, W. T. (1963). Toward an adequate taxonomy of personality attributes: Replicated factor structure in peer nomination ratings. *Journal of Abnormal and Social Psychology, 66*, 574-583.
- Ormel, J. (1983). Neuroticism and well-being inventories: Measuring traits or states? *Psychological Medicine, 13*, 165-176.
- Rhodewalt, F., & Zone, J. (1989). Appraisal of life change, depression, and illness in hardy and nonhardy women. *Journal of Personality and Social Psychology, 56*, 81-88.
- Rotter, J. B. (1954). *Social learning and clinical psychology*. Englewood Cliffs, NJ: Prentice-Hall.
- Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology, 4*, 219-247.

- Scheier, M. F., & Carver, C. S. (1987). Dispositional optimism and physical well-being: The influence of generalized outcome expectancies on health. *Journal of Personality, 55*, 169-210.
- Scheier, M. F., Weintraub, J. K., & Carver, C. S. (1986). Coping with stress: Divergent strategies of optimists and pessimists. *Journal of Personality and Social Psychology, 51*, 1257-1264.
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Strack, S., Carver, C. S., & Blaney, P. H. (1987). Predicting successful completion of an aftercare program following treatment for alcoholism: The role of dispositional optimism. *Journal of Personality and Social Psychology, 53*, 579-584.
- Suls, J., & Rittenhouse, J. D. (1987). Personality and physical health: An introduction. *Journal of Personality, 55*, 155-167.
- Tanaka-Matsumi, J., & Kameoka, V. A. (1986). Reliabilities and concurrent validities of popular self-report measures of depression, anxiety, and social desirability. *Journal of Consulting and Clinical Psychology, 54*, 328-333.
- Taylor, J. A. (1953). A personality scale of manifest anxiety. *Journal of Abnormal and Social Psychology, 48*, 285-290.
- Tellegen, A., Lykken, D. T., Bouchard, T. J., Wilcox, K. J., Segal, N. S., & Rich, S. (1988). Personality similarity in twins reared apart and together. *Journal of Personality and Social Psychology, 54*, 1031-1039.
- Vitaliano, P. P., Maiuro, R. D., Russo, J., & Becker, J. (1987). Raw versus relative scores in the assessment of coping strategies. *Journal of Behavioral Medicine, 10*, 1-18.
- Vitaliano, P. P., Russo, J., Carr, J. E., Maiuro, R. D., & Becker, J. (1985). The Ways of Coping Checklist: Revision and psychometric properties. *Multivariate Behavioral Research, 20*, 3-26.
- Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. *Psychological Bulletin, 96*, 465-490.
- Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: Exploring the central role of negative affectivity. *Psychological Review, 96*, 233-253.

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