

Distinguishing Optimism From Neuroticism (and Trait Anxiety, Self-Mastery, and Self-Esteem): A Reevaluation of the Life Orientation Test

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Research on dispositional optimism as assessed by the Life Orientation Test (Scheier & Carver, 1985) has been challenged on the grounds that effects attributed to optimism are indistinguishable from those of unmeasured third variables, most notably, neuroticism. Data from 4,309 subjects show that associations between optimism and both depression and aspects of coping remain significant even when the effects of neuroticism, as well as the effects of trait anxiety, self-mastery, and self-esteem, are statistically controlled. Thus, the Life Orientation Test does appear to possess adequate predictive and discriminant validity. Examination of the scale on somewhat different grounds, however, does suggest that future applications can benefit from its revision. Thus, we also describe a minor modification to the Life Orientation Test, along with data bearing on the revised scale's psychometric properties.

Accumulating evidence from a variety of sources suggests that dispositional optimism is beneficial for physical and psychological well-being. For example, Aspinwall and Taylor (1992) have recently shown that optimistic persons adjust more favorably to important life transitions than do persons who are more pessimistic in outlook. In a similar vein, Litt, Tennen, Affleck, and Klock (1992) have reported that optimistic women who are unsuccessful at *in vitro* fertilization respond better to the failure than do women who are more pessimistic. Conceptually similar results have also been reported by Scheier et al. (1989). Their study tracked a group of men undergoing coronary artery bypass surgery. Optimistic men evidenced a more rapid physical recovery after their surgery and reported a higher quality of life 6 months postoperatively than did the more pessimistic men in the sample. Nor are these the only beneficial effects for dispositional optimism that have been reported in the literature (for a more comprehensive review, see Scheier & Carver, 1992).

Related research suggests that these differences in outcomes derive partly from differences between optimists and pessimists in the manner in which they cope with the challenges in their lives. Optimists differ from pessimists in their stable coping

tendencies (Carver, Scheier, & Weintraub, 1989) and in the kinds of coping responses that they spontaneously generate when given hypothetical coping situations (Scheier, Weintraub, & Carver, 1986). Optimists also differ from pessimists in the manner in which they cope with serious disease (Friedman et al., 1992) and with concerns about specific health threats (e.g., Carver et al., 1993; Stanton & Snider, 1993; Taylor et al., 1992). A general characterization of the findings of this research is that optimists tend to use more problem-focused coping strategies than do pessimists. When problem-focused coping is not a possibility, optimists turn to more adaptive emotion-focused coping strategies such as acceptance, use of humor, and positive reframing of the situation. Pessimists tend to cope through overt denial and by mentally and behaviorally disengaging from the goals with which the stressor is interfering, regardless of whether something can be done to solve the problem or not.

These findings regarding optimism are consistent with the model of behavioral self-regulation from which our own work on optimism grew (e.g., Carver & Scheier, 1981, 1990a; Scheier & Carver, 1988). This is a model that has roots in the long tradition of expectancy-value theories in psychology. In this model, people are seen as remaining engaged in efforts to overcome adversity to reach goals as long as their expectancies of eventual success are sufficiently favorable. When their doubts are too severe, people are more likely to give up on the threatened goals. These differences in expectancies are also assumed to be paralleled by variations in affective experience (for details, see Carver & Scheier, 1990b). With enough movement toward desired goals, affect is positive. If movement toward desired goals is sufficiently impeded, affect is negative.

Although this viewpoint on behavior and affect can be applied in terms of situational variations in expectancies across time or events, it can also be applied in terms of individual differences. Optimists are people who tend to hold positive expectancies for their future; pessimists are people who tend to hold more negative expectations for the future. Thus, our anal-

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Data collection for this article was supported by National Science Foundation (NSF) Grants BNS87-17783 and BNS87-06271. Preparation of the article was facilitated by NSF Grants BNS90-11653 and BNS90-10425, American Cancer Society Grant PBR-56, and National Heart, Lung, and Blood Institute grant HL44436-01A1.

We are indebted to Joel Greenhouse for consulting on those aspects of the data analysis pertaining to factor analysis, and to Jeffrey Thomas for assisting in the preparation of data tables.

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ysis of how optimism versus pessimism leads to different responses to adversity is one application of a more general model of the processes that underlie behavior, a model that is applicable to a wide range of motivational issues and contexts.

Critique and Challenge

Much of the research on optimism and pessimism (although certainly not all of it; e.g., Beck, Steer, Kovacs, & Garrison, 1985; Reker & Wong, 1983) has made use of the Life Orientation Test (LOT; Scheier & Carver, 1985) to assess individual differences on this dimension. This scale has recently been criticized by others. By implication, this criticism also undermines the integrity of the optimism construct. The primary purpose of this article is to address these issues.

Most of the criticism aimed at the scale involves the third variable problem. Smith, Pope, Rhodewalt, and Poulton (1989) were the first to raise this issue, doing so with respect to trait anxiety. That is, they questioned whether effects attributable to optimism might really be due to variance that optimism shared with trait anxiety. Consistent with this view, Smith et al. (1989) reported relatively high correlations between optimism and trait anxiety across two independent samples. Smith et al. also showed that it was possible to eliminate the significant negative association that they found between optimism and reports of physical symptoms by controlling for the effects of trait anxiety. In contrast, the association between trait anxiety and reports of physical symptoms remained significant even after the effects of dispositional optimism were removed. Similarly, significant zero-order correlations between optimism and different varieties of coping were largely eliminated when the effects of trait anxiety were controlled, whereas many of the associations between anxiety and coping remained strong after removing the effects of dispositional optimism. In a similar vein, Marshall and Lang (1990) have also raised the third variable problem, but with respect to self-mastery rather than trait anxiety (see also Robbins, Spence, & Clark, 1991).

We have several observations to make with respect to this work. Our first point concerns the nature of the outcome variables that have been examined across studies. Both Smith et al. (1989) and Robbins et al. (1991) examined the relationship between optimism and health complaints, and neither found an independent effect for optimism when variables such as trait anxiety were controlled. Smith et al. also examined coping strategies, however, and found that optimism was an independent predictor of certain coping responses. Similarly, Robbins et al. (1991) also examined health maintenance behaviors and found optimism to be an independent predictor of these. The point here is that optimism may be a stronger independent predictor of some outcomes than of others. Shared variance may explain the association between optimism and symptom reporting, for example, but may not fully explain the link between optimism and other outcomes of interest.

There is a second (though related) issue here, as well. Previous researchers have used outcome measures that were somewhat limited in scope. For example, Smith et al. (1989) relied on only five coping categories to explore associations between dispositional optimism and coping tendencies, controlling for trait anxiety. Yet a far greater number of coping responses can be identi-

fied and measured reliably (Carver et al., 1989). The possibility thus remains that dispositional optimism may be uniquely related in important ways to outcome variables that went unmeasured in these earlier studies. In this regard, it is interesting to note that dispositional optimism was associated with eight different coping qualities in Carver et al.'s (1993) study of adjustment to breast cancer surgery. Of these eight coping responses, only half were measured in the Smith et al. (1989) study.

Our third observation has to do with the nature of the predictors with which optimism has been compared. Most of the concern to date has centered around the overlap between optimism and neuroticism or negative affectivity, as indexed by one or another measure of chronic anxiety. Note, however, that neuroticism is conventionally viewed as a multifaceted construct that consists partly of the absence of optimism (i.e., pessimism). Thus, there is a distinct conceptual link between constructs. On the other hand, neuroticism also incorporates a host of other factors, such as self-doubt, emotional lability, and worry. Combining qualities in this way can create problems of interpretation (Carver, 1989) because it becomes very difficult to identify which components of neuroticism underlie a given effect. As a hypothetical example, it might be the pessimism facet of neuroticism that relates to such variables as active coping, planning, giving up, and positive reinterpretation. The emotional lability component may not be as good a predictor of these variables, but may relate well to other variables such as the experience of physical symptoms.

The other constructs under consideration here also have conceptual overlap with optimism, though in a different way. Self-mastery is the perception that one exerts control over the events in one's life (Pearlin & Schooler, 1978). This construct thus incorporates a strong sense of positive expectancy for the future, but weds to it a sense of personal responsibility for that expectancy. Self-esteem shares ground with optimism in a more diffuse way. Self-esteem represents a sense of self-worth, which carries the implication that one will be accepted rather than rejected by others, and that one is not a failure in one's life. These consequences, of course, involve positive versus negative outcomes, thus linking self-esteem conceptually to optimism. As with self-mastery, what seems to differentiate this concept from optimism involves (at least in part) a kind of ascription to the self. The ascription in this case, however, is not one of control but rather of an intrinsic tie between feelings of worth or the self's value and positive outcomes.

In sum, the alternative constructs being examined here all have conceptual as well as empirical overlap with optimism. Each, however, incorporates at least one additional quality that takes it beyond optimism. In the case of neuroticism, there may be several such qualities.

Our fourth and final observation is that results pertaining to the discriminant validity of the LOT have not all been completely negative. As noted earlier, Smith et al. (1989) found that the associations between self-blame and optimism (in both of their studies) and seeking of social support and optimism (in one of their studies) remained significant even when trait anxiety was controlled. Robbins et al. (1991) found that the association between optimism and health maintenance behaviors remained intact, even when the effects of manifest anxiety, instru-

mentality, anger, and alienation were simultaneously controlled. Indeed, of all the variables studied, optimism was one of only two that made significant independent contributions to the prediction of health maintenance behaviors. More recently, Aspinwall and Taylor (1992) have reported that optimism predicts adjustment to the first semester of college, independent of self-esteem, locus of control, and desire for control. Finally, Mroczek, Spiro, Aldwin, Ozer, and Bossé (1993) have found that optimism continues to predict psychological distress among middle-aged men, even after the distress measure is adjusted for differences in neuroticism. Given these various considerations, it seems premature to conclude that the LOT has no predictive validity independent of other measures. In the same way, it seems premature to close the book on optimism-pessimism as an independent construct.

In this article we address this set of questions further. For the past several years, we have been collecting information from large groups of respondents on a variety of personality variables, coping styles, and other outcome measures. The personality battery includes a measure of optimism-pessimism (the LOT) as well as measures of self-esteem, trait anxiety, self-mastery, and neuroticism. The measure of coping is broad in scope and covers a wide range of diverse coping tendencies. The other outcome measures include both physical symptoms (number and intensity) and a measure of depression.

The primary purpose of this article is to use the data we have assembled to reexamine the predictive validity of the LOT by using it and the other personality factors to predict variations in coping, symptoms, and depression. Two general sets of predictions are advanced. First, on the basis of findings reported by Smith et al. (1989), Robbins et al. (1991), and Mroczek et al. (1993), we expect that zero-order correlations between optimism and physical symptoms will be substantially reduced when the data are adjusted for trait anxiety and neuroticism. Second, we expect that other associations involving optimism, coping, and depression will remain strong, even after the data are adjusted for the various personality factors that have been measured.

Study 1: Reevaluating the Life Orientation Test

Method

Subjects and Procedure

A total of 4,309 undergraduates from Carnegie Mellon University and the University of Miami participated in the research (1,846 women, 2,417 men, and 46 participants who did not indicate their gender). Participation was in partial fulfillment of a psychology research requirement. All subjects completed a number of scales as part of a larger pre-testing packet. Packets were administered in large group testing sessions across successive semesters from 1988 to 1990. Because of time constraints, not all groups received all scales. As a result, sample sizes for analyses vary from analysis to analysis.

Measures

Optimism. Optimism was measured by using the LOT (Scheier & Carver, 1985). The LOT is an eight-item self-report measure (plus four filler items) assessing generalized expectancies for positive versus negative outcomes. Respondents were asked to indicate their degree of

agreement with statements such as "In uncertain times, I usually expect the best," and "I hardly ever expect things to go my way," using a 5-point response scale ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). Of the 8 scored items, 4 are worded in a positive direction and 4 are worded in a negative direction. After reversing the scoring for the negatively worded items, item scores were totaled to yield an overall optimism score with high scores representing greater optimism. In our sample, scores ranged from 0 to 32. Cronbach's alpha was .82.

Neuroticism. The Emotional Stability subscale of the Guilford-Zimmerman Temperament Survey (GZTS; Guilford, Zimmerman, & Guilford, 1976) was used to assess neuroticism. Participants were asked to indicate if a series of 30 statements were true for them, using a 3-point response scale (1 = *yes*, 2 = *no*, 3 = *uncertain*). Two sample items are "You are sometimes bubbling over with energy and sometimes very sluggish," and "Your mood often changes from happiness to sadness, or vice versa, without your knowing why." Item responses are first recoded as needed so that higher scores indicate higher levels of neuroticism. To recode, responses receiving a score of 1 or 2 are reversed, responses receiving a score of 3 are left the same. An overall neuroticism score is then computed by totaling the number of responses receiving a score of 1 (responses receiving a 2 or 3 do not contribute to the overall score). The Emotional Stability subscale of the GZTS has been recommended as a good measure of neuroticism by others (e.g., Costa & McCrae, 1985). Cronbach's alpha for the present sample was .85.

Self-mastery. Self-mastery was assessed by using Pearlin and Schooler's (1978) Self-Mastery Scale (SMS). This seven-item instrument assesses the extent to which a person generally feels as though he or she manifests personal mastery over life outcomes (e.g., "What happens to me in the future mostly depends on me," and "Sometimes I feel that I am being pushed around in life"). Its basic psychometric properties are well established (Pearlin & Schooler, 1978), and it has been used successfully in the past with several different community-based populations (e.g., Pearlin & Schooler, 1978). It was also the scale that Marshall and Lang (1990) used in their study exploring the predictive power of optimism and self-mastery with respect to depression. Cronbach's alpha for the SMS in the present sample was .75.

Self-esteem. Rosenberg's (1965) 10-item Self-Esteem Scale (or SES) was used to assess self-esteem. The scale, which provides a convenient measure of global attitudes about the self, has five negatively worded items and five positively worded items. Participants were asked to indicate their agreement on a scale of 1 (*strongly disagree*) to 4 (*strongly agree*) with statements such as "I feel I have a number of good qualities," and "At times, I think I am no good at all." This scale is one of the most widely used measures of self-esteem and has displayed good reliability and validity (Crandall, 1973; Rosenberg, 1965). In our sample, the scale had an internal reliability of .88.

Trait anxiety. The trait form of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1974) was used to measure trait anxiety. This scale is composed of 20 Likert items evaluating the extent to which the respondents experience a variety of feelings such as happiness, self-confidence, tension, and disappointment (e.g., "I feel content," and "I worry too much over something that really doesn't matter"). The scale has been used extensively in prior psychosocial research and its psychometric properties have been well documented (see, e.g., Watson & Clark, 1984). Cronbach's alpha for the current sample was .89.

Depression. The Beck Depression Inventory (BDI) short form (Beck, Rial, & Rickels, 1974) was used to assess depression. The BDI assesses attitudes and symptoms derived from clinical observations that are typically observed in depressed psychiatric patients but not in non-depressed psychiatric patients (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The scale has been widely used and has well-established psychometric properties (Beck, Steer, & Garbin, 1988). The short form, 13-item version used in our study assessed attitudes and symptoms

across several different domains, including (but not limited to) mood, sense of failure, lack of satisfaction, social withdrawal, and indecisiveness. For each item, respondents were asked to choose from a group of four statements (rated 0 to 3 in depressive symptomatology) the statement that best described the way they were feeling that day. Scores for the present sample ranged from 0 to 39 (with higher scores indicating greater depression). Cronbach's alpha was .87.

Physical symptoms. Self-reports of physical symptoms were assessed with the Cohen-Hoberman Inventory of Physical Symptoms (CHIPS; Cohen & Hoberman, 1983). The CHIPS comprises a list of 38 commonly experienced physical symptoms (e.g., back pain, headache, and stuffy head or nose). Symptoms more psychological in nature (e.g., feeling depressed or anxious) are explicitly excluded from the list. Subjects were asked to indicate how much they had been bothered by each of the symptoms in the past 4 weeks, using a 5-point scale (1 = *not at all* to 5 = *extremely*). In past research (Cohen & Hoberman, 1983), the CHIPS was found to predict use of student health facilities among two separate samples of college students (Cohen & Hoberman, 1983), thereby supporting the construct validity of the scale.

Responses to the CHIPS were scored in two ways in our research. First, a measure of symptom intensity was computed by summing the degree to which subjects reported being bothered by each symptom across all 38 symptoms. Scores for symptom intensity ranged from 38 to 162. Second, a simple tally was made of the number of symptoms for which subjects indicated they were bothered to some degree, ignoring the extent to which they were bothered (i.e., a score of 1 was given for each item that received a response of 2 or more). Scores for number of symptoms ranged from 0 to 35 in the present sample.

Coping. Coping was measured by the COPE (Carver et al., 1989). The COPE is a 60-item, multidimension coping instrument designed to assess 15 conceptually distinct methods of coping. The 60 items represent a large range of coping responses including (but not limited to) active coping, positive reinterpretation and growth, seeking of social support for emotional reasons, denial, mental and behavioral disengagement, and focusing on and venting of emotions (e.g., "I do what has to be done, one step at a time," "I turn to work or other substitute activities to take my mind off things," and "I talk to someone about how I feel"). Participants were instructed to indicate how much they usually did each of the things that the items reflected when they encountered difficulties or problems in their lives, using a 4-point Likert scale (1 = *I usually don't do this at all* to 4 = *I usually do this a lot*). Cronbach's alpha for the 15 scales in the current study ranged from .37 (mental disengagement) to .93 (use of religion). With the exception of mental disengagement, the remainder of the alphas were all above .59, with the majority of the scales above .70. The average alpha across the 15 scales was .73.

Results

Correlations Among Predictors

The zero-order correlations among the five predictor variables are shown in Table 1.¹ As can be seen, all of the intercorrelations among the predictors were significant. It is also noteworthy, however, that the magnitudes of the correlations between the LOT and the other predictors were only in the moderate range (the average correlation between the LOT and the other predictors was .54, which was the lowest average correlation that was obtained). This generally suggests that the LOT had less in common with the other predictors than the other predictors had in common with each other, with the possible exception of self-mastery, which also had a relatively low average correlation (.56).²

Table 1
Correlations Among Predictor Variables

Variable	1	2	3	4	5
1. Optimism					
<i>r</i>	—	.55	-.59	-.50	.54
<i>N</i>		1,883	1,420	1,692	595
2. Self-mastery					
<i>r</i>		—	-.69	-.48	.58
<i>N</i>			572	569	624
3. Trait anxiety					
<i>r</i>			—	.74	-.72
<i>N</i>				1,423	181
4. Neuroticism					
<i>r</i>				—	-.66
<i>N</i>					181
5. Self-esteem					
<i>r</i>					—
<i>N</i>					

Note. All correlations specified here reached significance at $p < .001$, two-tailed.

Is Optimism a Predictor of Outcomes?

Zero-order correlations between predictors and outcomes are shown in Table 2. As can be seen, all of the predictors were moderately correlated with depression to about the same degree. Depression correlated highest with self-esteem and lowest with neuroticism. In addition, all of the predictors were significantly correlated with the two symptom measures. For symptom intensity, the highest correlations involved neuroticism and trait anxiety. The lowest correlation involved optimism. A similar ordering occurred for number of symptoms.

As a group, the predictor variables were also substantially correlated with different aspects of coping. All of the predictors correlated significantly with active coping, planning, positive reinterpretation and growth, denial, mental disengagement, and behavioral disengagement. Correlations between predictors and outcomes tended to be higher for the more negative coping tendencies (e.g., mental and behavioral disengagement) than for the more positive coping tendencies (e.g., active coping and planning).

With the exception of dispositional optimism, associations between the predictors and the remaining coping tendencies were more sporadic. For example, whereas four of the five pre-

¹ Portions of the analyses from Study 1 have been briefly described elsewhere (in Scheier et al., 1989, and in Scheier and Carver, 1992).

² Subsidiary analyses conducted separately by gender suggested that the associations between the predictors tended to be somewhat higher for women than for men, often significantly so, given the size of the samples. This pattern corresponds to the gender differences reported by Scheier and Carver (1985) on a similar set of data. Subsidiary analyses were always conducted on the data to assess the effects of gender. Very few other gender differences emerged, however, in either Study 1 or Study 2. For example, of the 72 partial correlations reported in Table 2, only one involved a significant difference due to gender. The few gender differences that did emerge seemed random in nature and were basically uninterpretable. As a result, gender is discussed only when there are meaningful differences to report.

Table 2
Correlations Between Predictor Variables and Outcomes

Outcomes	Optimism	Self-mastery	Trait anxiety	Self-esteem	Neuroticism
Depression					
<i>r</i>	-.42***	-.43***	-.49***	-.54***	.41***
<i>N</i>	1,900	1,306	547	604	545
Number of symptoms					
<i>r</i>	-.21***	-.27***	.47***	-.26***	.51***
<i>N</i>	1,015	443	315	443	591
Intensity of symptoms					
<i>r</i>	-.25***	-.28***	.47***	-.27***	.54***
<i>N</i>	1,015	443	315	443	591
Active coping					
<i>r</i>	.30***	.32***	-.28***	.25***	-.20***
<i>N</i>	813	375	394	375	393
Planning					
<i>r</i>	.30***	.27***	-.17***	.20***	-.10*
<i>N</i>	813	375	394	375	393
Suppression of competing activities					
<i>r</i>	.14***	.09	.00	.07	.02
<i>N</i>	815	375	396	375	395
Restraint					
<i>r</i>	.12***	.08	-.19***	.19*	-.17*
<i>N</i>	814	375	395	375	394
Positive reinterpretation and growth					
<i>r</i>	.47***	.34***	-.23***	.33***	-.20***
<i>N</i>	815	375	395	375	394
Use of humor					
<i>r</i>	.10**	.10	-.13**	.12*	-.10
<i>N</i>	815	375	396	375	395
Seeking instrumental social support					
<i>r</i>	.16***	.10	-.02	.08	.05
<i>N</i>	814	375	396	375	395
Seeking emotional social support					
<i>r</i>	.12***	.11*	.02	.07	.11*
<i>N</i>	815	375	396	375	395
Turning to religion					
<i>r</i>	.22***	.08	-.03	.06	-.05
<i>N</i>	816	375	397	375	396
Acceptance					
<i>r</i>	.10**	.11*	-.15**	.04	-.10*
<i>N</i>	816	375	397	375	396
Denial					
<i>r</i>	-.17***	-.17***	.32***	-.20***	.26***
<i>N</i>	815	375	397	375	396
Focusing on and venting of emotions					
<i>r</i>	-.10**	-.09	.32***	-.10	.42***
<i>N</i>	815	375	396	375	395
Mental disengagement					
<i>r</i>	-.18***	-.23***	.34***	-.17***	.42***
<i>N</i>	816	375	397	375	396
Behavioral disengagement					
<i>r</i>	.33***	-.41***	.45***	-.38***	.37***
<i>N</i>	816	375	397	375	396
Use of drugs or alcohol					
<i>r</i>	-.11**	.16**	.27***	-.08	.19***
<i>N</i>	816	375	397	375	396

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed.

dictors (self-mastery, trait anxiety, neuroticism, and optimism) were all significantly associated with drinking and substance abuse, only optimism correlated significantly with suppression of competing activities, seeking instrumental social support, and turning to religion. Indeed, of the five predictors, only optimism related significantly to every coping tendency that was assessed. Undoubtedly, this was due in part to the greater number of subjects who completed the LOT, but it was also due in part to the greater magnitude of the correlations.

Is Optimism a Unique Predictor of Outcomes?

The first four columns of Table 3 present partial correlations between optimism and the outcome variables, controlling for each of the other predictors in turn. As can be seen, many of the zero-order correlations involving optimism remain significant even after the other predictors are statistically controlled, albeit the correlations are usually reduced in magnitude. This characterization holds for associations involving depression and many aspects of coping, including active coping, planning, suppression of competing activities, positive reinterpretation and growth, seeking social support for instrumental reasons, and turning to religion. Taken in isolation, none of the other predictors was able to render the correlations between optimism and these various outcomes nonsignificant.

Associations involving number of symptoms and symptom intensity fared less well, particularly the associations involving symptom number. That is, with respect to symptom number, the correlation with optimism was reduced to nonsignificance if any of the other predictors was statistically controlled. With respect to symptom intensity, inclusion of either trait anxiety or neuroticism reduced the correlation with optimism to near zero. It is interesting that the correlation between optimism and symptom intensity remained significant even when the data were first adjusted individually for self-mastery and self-esteem.

The last column of Table 3 presents partial correlations between optimism and the outcomes, controlling for all four of the predictors simultaneously. This obviously is a much more stringent test of the unique predictive power of dispositional optimism, for the simple reason that as covariates are added there is less and less residual variance to predict. As can be seen, however, significant partial correlations were obtained between optimism and planning, positive reinterpretation and growth, seeking support for instrumental reasons, and turning to religion, even when the associations were adjusted for all four of the other predictors at once. Associations between optimism and active coping and between optimism and suppression of competing activities remained close to significance as well. We find these results particularly striking and quite inconsistent with the notion that dispositional optimism as measured by the LOT is nothing more than trait anxiety, self-esteem, self-mastery, or neuroticism under a different label.

Does Optimism Emerge as a Distinct Factor Among the Items in This Item Set, and Is This Factor a Predictor of Outcomes?

The partial correlations just reported begin to address the issue of the independence of optimism from the other concepts

under consideration. In the case of partial correlations, the sole concern is whether or not optimism as assessed by the LOT is a unique and independent predictor of outcomes. There is another way to address the contribution being made by optimism, however, and that is through the use of factor analysis. That is, recall our suggestion that characteristics such as neuroticism are multifaceted, and that optimism comprises only one of many different facets. The critical question, then, is to determine the importance of the optimism–pessimism component in producing the associations that are observed. One way of getting information relevant to this point is to factor analyze the items on the LOT along with the items contained on the other predictors. If the optimism component is important, the optimism items ought to emerge as distinct, factor analytically, from the items comprising the other scales. Moreover, factor scores computed on the basis of such an optimism factor should account for a significant amount of variance in the outcomes.

To explore these possibilities, several sets of factor analyses were conducted on the data set. One set of analyses (conducted on a sample of 1,312) grouped together items from the LOT, GZTS, and STAI. The second set of analyses (conducted on a sample of 845) grouped together items from the LOT, SES, and SMS. Separate analyses were run on these two subsets of items because an insufficient number of subjects had been administered all five predictors. Thus, a combined factor analysis would not have been meaningful. The predictors were grouped as they were because self-esteem and self-mastery tend to measure more positive aspects of behavior, whereas trait anxiety and emotional instability tend to measure aspects of behavior that are more negative in nature (cf. Marshall et al., 1992).

Initial analyses were conducted, using a principal components extraction technique, followed by a Varimax rotation to achieve a final solution. The number of factors retained for final rotation in these analyses was determined by setting the eigenvalue at 1.0. The item set containing the LOT, GZTS, and STAI yielded 13 factors. Five factors emerged from the item set containing the LOT, SES, and SMS. The findings from the two data sets were highly similar, however, with respect to the items composing the LOT. In each case, two factors emerged, the first of which was defined by the positively worded LOT items (i.e., the optimism items), the second of which was composed of the negatively worded LOT items (i.e., the pessimism items).^{3,4} In each case, the absolute loading for each LOT item was above .58 on its relevant factor (the average loading for the LOT items across the two factors and across the two data sets was .69).

Although these initial analyses yielded interpretable results with respect to the items from the LOT, they were not totally satisfactory for other reasons. Most important, there seemed to be an over-extraction of factors. That is, for each data set, factors emerged that were defined by only one or two items each. As a result, follow-up analyses were performed, in which only three factors were retained for final rotation. The decision to retain

³ It is not uncommon for the positively and negatively worded Life Orientation Test items to load on separate factors. We have obtained such solutions in the past (Scheier & Carver, 1985), as have others (e.g., Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992).

⁴ An item was said to define a factor if it loaded higher on that factor than on any other factor in the analysis.

Table 3
Partial Correlations Between Optimism and Outcomes

Outcome	Variable controlled for				
	Self-mastery	Trait anxiety	Self-esteem	Neuroticism	All variables
Depression					
<i>r</i>	-.24***	-.19***	-.18***	.28***	-.11
<i>N</i>	1,303	544	592	542	175
Number of symptoms					
<i>r</i>	-.08	.09	-.09	.06	.04
<i>N</i>	440	312	312	588	175
Intensity of symptoms					
<i>r</i>	-.12**	.04	-.12**	.03	.09
<i>N</i>	440	312	440	588	175
Active coping					
<i>r</i>	.16**	.17***	.20***	.24***	.13
<i>N</i>	372	391	372	390	175
Planning					
<i>r</i>	.19***	.25***	.23***	.29***	.20**
<i>N</i>	372	391	372	390	175
Suppression of competing activities					
<i>r</i>	.11*	.17***	.13*	.18***	.14
<i>N</i>	372	393	372	392	175
Restraint					
<i>r</i>	.09	.01	.07	.07	.03
<i>N</i>	372	392	372	391	175
Positive reinterpretation and growth					
<i>r</i>	.36***	.43***	.37***	.43**	.36***
<i>N</i>	372	392	372	391	175
Use of humor					
<i>r</i>	.06	.03	.04	.06	.02
<i>N</i>	372	393	372	392	175
Seeking instrumental social support					
<i>r</i>	.13*	.19***	.14**	.21***	.16*
<i>N</i>	372	393	372	392	175
Seeking emotional social support					
<i>r</i>	.08	.17***	.11*	.21***	.13
<i>N</i>	372	393	372	392	175
Turning to religion					
<i>r</i>	.22***	.25***	.23***	.23***	.24***
<i>N</i>	372	394	372	393	175
Acceptance					
<i>r</i>	.05	.01	.10	.06	.03
<i>N</i>	372	394	372	393	175
Denial					
<i>r</i>	-.10	.02	-.08	-.06	.01
<i>N</i>	372	394	372	393	175
Focusing on and venting of emotions					
<i>r</i>	-.06	.12*	-.06	.14**	.09
<i>N</i>	372	393	372	392	175
Mental disengagement					
<i>r</i>	-.07	.02	-.11*	.03	.03
<i>N</i>	372	394	372	393	175
Behavioral disengagement					
<i>r</i>	-.14**	-.10	-.17***	-.19***	-.04
<i>N</i>	372	395	372	393	175
Use of drugs and alcohol					
<i>r</i>	-.03	.07	-.08	-.02	.04
<i>N</i>	372	394	372	393	175

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed.

three factors was prompted by two considerations. First, the items on which each data set was based came from three separate scales. Second, scree tests (Cattell, 1966) on the analyses just reported suggested the viability of a three-factor solution in each case.

The results of these three-factor analyses yielded simpler and more interpretable solutions. With respect to the analysis involving the LOT, SES, and SMS, the first factor was defined by nine items from the SES and one item from the SMS (which loaded lowest of the nine items). This Self-esteem factor accounted for 31.9% of the variance. The second factor was totally defined by the eight items from the LOT. Factor loadings for the LOT items on this Optimism factor ranged from .49 to .74 (averaging .60). The Optimism factor accounted for an additional 8.1% of the variance. The final factor was defined by six items from the SMS and one item from the SES (which loaded second lowest of the seven items). This Self-mastery factor accounted for an additional 6.2% of variance.

In the analysis involving the LOT, GZTS, and STAI, the first factor was defined by 23 items (8 items from the LOT, 9 items from the STAI, and 6 items from the GZTS). GZTS and STAI items loading high on this factor tended either to reflect explicitly an optimistic orientation (e.g., "You have usually been optimistic about your future") or reflect a positive mood state (e.g., "I am happy"). The eight LOT items were among the 11 highest loading items on this factor (factor loadings for the LOT items ranged from .51 to .71, averaging .61). The three highest loading items on this factor all came from the LOT. This Optimism factor accounted for 23.1% of the variance. The second factor was defined by 20 items (16 from the GZTS and 4 from the STAI). Given the high number of GZTS items defining the factor, it is not surprising that the factor tended to reflect emotional lability. The two highest loading items were "Your mood often changes from happiness to sadness, or vice versa, without your

knowing why," and "You have frequent ups and downs in mood, sometimes with and sometimes without apparent cause." This Emotional Instability factor accounted for an additional 5.2% of the variance. The final factor to emerge from this analysis involved feelings of worry, dread, and excessive rumination. It was defined by eight items from the GZTS and seven items from the STAI. Illustrative items loading high on the Worry factor include "Disappointments affect you so little that you seldom think about them twice" (negatively weighted), "You give little thought to your failures after they are just passed" (negatively weighted), and "I worry too much over something that doesn't matter." The Worry factor accounted for an additional 3.5% of the variance among the items in this item set.

To determine whether the Optimism factors in these data sets contributed significantly to the prediction of outcomes, we generated factor scores reflecting the Optimism factor for each set of data. Because the Varimax final rotations were based on initial principal components analyses, the factor scores defining the Optimism factor in each data set should have been statistically independent from the factor scores defining the remaining two factors. Consistent with this expectation, intercorrelations among the three sets of factor scores from each set of data were all found to be zero. The first column of Table 4 presents correlations between Optimism factor scores and outcomes for the data set involving the LOT, SMS, and SES (correlations between outcomes and scores on the Self-esteem and Self-mastery factors are also presented in Table 4). As can be seen, the Optimism factor scores fared fairly well in this data set, correlating significantly with 12 of the 18 outcomes that were assessed. Table 5 presents correlations between Optimism factor scores and outcomes for the data set involving the LOT, STAI, and GZTS (correlations between outcomes and scores on the Emotional Lability and Worry factors are also presented in Table 5). Optimism factor scores fared even better in this data set, correlating

Table 4
Correlations Between (Positive Scale) Factor Scores and Outcomes

Outcome	Factor		
	Optimism	Self-Esteem	Self-Mastery
Depression	-.27***	-.38***	-.38***
Intensity of symptoms	-.05	-.16**	-.24***
Number of symptoms	-.09	-.14***	-.25***
Active coping	.27***	.16**	.22***
Planning	.29***	.12*	.15**
Suppression of competing activities	.19***	.02	.00
Restraint coping	.12*	.09	.02
Positive reinterpretation and growth	.47***	.18***	.17***
Use of humor	.13*	.08	.00
Seeking instrumental social support	.18***	.05	.00
Seeking emotional social support	.12*	.06	.01
Turning to religion	.29***	-.03	.03
Acceptance	.10	.00	.07
Denial	-.05	-.17***	-.18***
Focusing on and venting of emotions	-.07	-.03	-.11*
Mental disengagement	-.15**	-.06	-.23***
Behavioral disengagement	-.20***	-.29***	-.32***
Use of drugs or alcohol	-.04	-.02	-.18***

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed.

Table 5
Correlations Between (Negative Scale) Factor Scores and Outcomes

Outcome	Factor		
	Optimism	Emotional Lability	Worry
Depression	-.48***	.31***	.05
Intensity of symptoms	-.23***	.37***	.26***
Number of symptoms	-.23***	.38***	.25***
Active coping	.40***	-.06	-.04
Planning	.32***	-.03	.05
Suppression of competing activities	.14**	.08	.07
Restraint coping	.17***	-.01	-.17***
Positive reinterpretation and growth	.47***	.01	-.02
Use of humor	.17***	.10	-.19***
Seeking instrumental social support	.25***	.10	.15**
Seeking emotional social support	.21***	.12*	.20***
Turning to religion	.23***	.04	.09
Acceptance	.19***	.05	-.15**
Denial	-.16**	.30***	.11*
Focusing on and venting of emotions	-.07	.27***	.40***
Mental disengagement	-.15**	.42***	.17***
Behavioral disengagement	-.42***	.30***	.13*
Use of drugs or alcohol	-.12*	.24***	.10

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed.

significantly with all but one of the 18 outcomes. The sole exception was the Coping subscale assessing focusing on and venting emotion.

It is also informative to compare the magnitude and pattern of correlations that were obtained for the various factors that were extracted in these analyses. With respect to the magnitude of the correlations, it is clear that the Optimism factor in each data set predicted about as much unique variance across outcomes as did the remaining two factors that were extracted. Indeed, in both sets of data the average of the absolute values of the correlations involving the Optimism factor was higher than the averages of the absolute values of the two remaining factors that were extracted (sometimes almost twice as high).

The data also produced some interesting patterns of associations. Consider first the analyses involving the scales assessing positive attributes (see Table 4). The most interesting pattern here concerned the set of associations involving social support. As can be seen, only the Optimism factor predicted a significant amount of unique variance in the tendency to seek social support, and it did this with respect to both facets of support seeking that were measured. Factor scores from the two remaining factors failed to predict either facet. This suggests that the Optimism component of these composite scales may be a more important correlate of these aspects of social support than either the Self-mastery or the Self-esteem component. Of lesser interest in this data set are the unique associations that emerged between the Optimism factor and restraint coping, suppression of competing activities, use of humor, and the use of religion. Neither the Self-mastery nor the Self-esteem factor was significantly related to any of these other outcomes.

An interesting pattern of associations also emerged with respect to the analyses involving the scales that assessed negative characteristics (see Table 5). Within this data set, the Optimism factor seemed the sole predictor of more active forms of coping.

That is, it correlated significantly with active coping per se, and with two additional coping tendencies that are often associated with active coping: planning and the suppression of competing activities. Neither the Emotional Lability factor nor the Worry factor were significantly related to any of these aspects of active coping. In addition, the Optimism factor was the only factor that significantly predicted variations in the use of positive reinterpretation and growth; Emotional Lability and Worry did not.

In closing this section on factor analysis, we should note that the absolute value of the correlation between the Optimism factor scores and raw LOT scores was .89 in each of the two sets of data that were analyzed. This reinforces the notion that the Optimism factors were indeed Optimism factors. It also reinforces the idea that the Optimism factors that emerged can be closely approximated by using raw scores on the LOT.

Discussion

The primary purpose behind these analyses was to reevaluate the predictive validity of dispositional optimism as assessed by the LOT. The general conclusion we would like to draw from the analyses is that the LOT is a viable instrument for assessing people's generalized sense of optimism. Three sets of findings support this conclusion. First, correlations between optimism and the remaining predictors under consideration here were all in the moderate range. Thus, the amount of shared variance between optimism and the other predictors was also only moderate. Although previous studies have sometimes obtained higher correlations (e.g., Smith et al., 1989), these higher correlations have tended to come from studies with smaller sample sizes. Studies using larger samples have tended to provide values closer to the ones obtained here. For example, Mroczek et al. (1993) reported a correlation of $-.37$ between optimism (as

measured by the LOT) and neuroticism (as measured by a short form of the Eysenck Personality Inventory) in a community sample of 1,192 middle-aged men. Findings such as these and those reported here suggest that the higher correlations that have sometimes been obtained in the past are best attributed to perturbations in sampling.

Second, many of the zero-order correlations between dispositional optimism and the outcomes of interest remained significant when the influence of the other predictors was partialled out. The partial correlations were strongest for aspects of coping. These results stand in contrast to those obtained by Smith et al. (1989). In our view, there are at least two potential reasons for the discrepancies. First, as just noted, the zero-order correlations between optimism and trait anxiety were lower in our sample, providing more residual variance to be predicted. Second, the measure of coping used in our study was more comprehensive than that used by Smith et al. (1989). Either or both of these differences may have contributed to the differences in findings.

The results were weakest with respect to reporting of physical symptoms. In the case of symptom reporting, controlling for other predictors typically eliminated significant associations with optimism. Reductions in the magnitude of the associations were particularly evident and most consistent when trait anxiety and neuroticism were controlled. This aspect of our findings closely parallels the findings reported previously by Smith et al. (1989), Robbins et al. (1991), and Mroczek et al. (1993). It seems likely that most of the variance in the optimism-symptom reporting relationship is due to shared variance with trait anxiety, neuroticism, and other conceptually similar variables. In this regard, it is interesting that trait anxiety and neuroticism are both variables that are intimately tied to affective experience. Perhaps it was these ties to affective experience that caused trait anxiety and neuroticism to have the effect that they did on symptom reporting (cf. Costa & McCrae, 1985; Watson & Pennebaker, 1989).

A final point involves the factor analyses that were conducted. Criticisms of the LOT have often ascribed its effects to positive response bias. It is instructive in this regard that the factor analyses did not yield a single factor reflecting positivity-negativity. Rather, when items comprising the various predictors were subjected to factor analysis, a distinct Optimism factor emerged in each case, which correlated in the high .80s with raw LOT scores. Moreover, this Optimism factor predicted a significant amount of variance in many of the outcomes that were measured. Because the Varimax rotation method used to derive the factor scores was based on a principal components analysis, the variance attributable to the Optimism factor was wholly independent of the variance attributable to the other factors that emerged.

Taken together, these three considerations clearly suggest that the LOT has a good deal of predictive validity, and that dispositional optimism as assessed by the LOT deserves continued development as an independent theoretical construct.

Study 2: Some Suggestions for Improvement—The Revised Life Orientation Test

The work reported in this article was prompted primarily by prior research questioning the predictive validity of the LOT

with respect to a set of competing predictors. Thinking about the third variable problem, however, led us to a more general consideration of the conceptual properties of the LOT. More specifically, we began to reexamine the question of how well the items on the scale were measuring what they were intended to be measuring: generalized expectations of good versus bad outcomes in life.

Scheier (1988) has been critical in the past of scales whose meaning is obscured by the presence of items that have little to do with the constructs ostensibly being measured. For example, it is not uncommon to find items such as "I feel blue" on anxiety questionnaires, and items such as "You have usually been optimistic about your future" on scales measuring emotional instability. Such practices guarantee that such measures of anxiety will correlate with measures of depression, in the case of the former example, and that such measures of emotional instability will correlate with measures of optimism, in the case of the latter example. It is obviously better to construct scales in which such built-in confounds are kept to a minimum. Only by minimizing the overlap in item content can accurate estimates be obtained of the degree of correlation between constructs.

Examination of the LOT with these considerations in mind led us to identify two problematic items, both of which come from the half of the items that are worded in a positive direction. The items are the following: "I always look on the bright side of things," and "I'm a believer in the idea that 'every cloud has a silver lining.'" What is obvious to us in retrospect is that neither item explicitly refers to the expectation of positive outcomes. Rather, each refers to a particular way of reacting to problems and stress—putting problems in the best possible light and searching for hidden benefits and meaning when difficulties arise.

The content of these two items is particularly bothersome, for the following reason. When we first constructed the LOT, we were not thinking in terms of identifying mediators of optimism effects. We were simply trying to devise a scale that assessed optimism as clearly as possible. Since the scale was published, however, coping has emerged as an important mediator of optimism effects (see, e.g., Carver et al., 1993; Scheier & Carver, 1992). Indeed, one specific, important mediator of optimism effects is the proclivity to engage in positive reinterpretation and growth. The two problematic LOT items are directed at exactly this tendency. Thus, any correlation between optimism, as assessed by the LOT, and scales measuring positive reinterpretation and growth will be suspect because of the presence on the LOT of two items measuring the same tendencies.

The analyses that were reported earlier in this article relied on the LOT as it was originally devised. We followed this course of action because this is the version of the scale that people have relied on in the past and are continuing to rely on in their current and ongoing research. It is also the version of the scale on which previously published findings have been based. For these reasons, we thought it was important to show that the original version of the scale held up to the challenges it has received.

Because of the concerns we just raised, however, we also went back and reanalyzed the data to see whether the associations between optimism and positive reinterpretation and growth would remain significant if the original eight-item version of the LOT were replaced by a six-item version in which the two

problematic (coping) items were removed. Both the zero-order correlation and all of the partial correlations involving positive reinterpretation and growth remained significant after the two items were removed. Removal of the items did cause the correlations to drop by about .10 in value, however, a difference that was often statistically significant. Thus, the presence of the two items on the scale does seem to bias the magnitude of the correlations that are observed.⁵

Given the points made in the preceding paragraphs, we believe it is unwise to continue to incorporate the two items in question when computing scores on the LOT. Elimination of these items, however, leaves only two positively worded items on the scale. Some researchers consider it advantageous to compute separate scores for the positively worded and negatively worded items, either to test the subsets separately (e.g., Marshall et al., 1992) or to calculate a balance score between positive and negative items (cf. Michelson, Schwartz, & Marchione, 1991; Schwartz, 1993). Having only two positively worded items makes it difficult to compute separate scores.

These various considerations have led us to begin gathering data on a revised Life Orientation Test (or LOT-R).⁶ This revised instrument contains one new positively worded expectancy item, which increases the number of scorable, positively worded items to three. In addition, we recommend eliminating one of the negatively worded items from the scoring of the revised instrument, so that equal numbers of positively and negatively worded items are used in the calculation of scores. In the next section, we describe the administration instructions, scoring procedures, and psychometric properties for the LOT-R.

Method

Subjects and Procedures

A total of 2,055 undergraduates (622 women, 1,394 men, and 39 who did not indicate their gender) from Carnegie Mellon University participated in the research. Participation was in partial fulfillment of a psychology research requirement. In large group testing sessions conducted across successive semesters from the fall of 1990 to the spring of 1993, participants completed a number of scales as part of a larger pretesting packet. Participants always completed the revised LOT, but because of time constraints not all participants completed all of the other scales. As a result, sample size varies from analysis to analysis.

Scale Format and Administration Instructions for the Revised LOT

Items comprising the revised LOT are presented in Table 6. Note that only 6 of the 10 items on the revised LOT are used to derive an optimism score. Four of the items are filler items and are not used in scoring. Of the 6 items that are scored, 3 are keyed in a positive direction and 3 are keyed in a negative direction. Respondents are asked to indicate the extent of their agreement with each of the items, using the following response format: 0 = *strongly disagree*, 1 = *disagree*, 2 = *neutral*, 3 = *agree*, and 4 = *strongly agree*. Additional instructions caution respondents to be as accurate and honest as they can throughout, and to try not to let their answers to one question influence their answers to other questions. They are explicitly told that there are no right or wrong answers. Negatively worded items (i.e., Items 3, 7, and 9) are reverse coded before scoring. Responses to these items are then summed with the par-

Table 6
Items Composing the Revised Life Orientation Test

Item
1. In uncertain times, I usually expect the best.
2. It's easy for me to relax. (Filler item)
3. If something can go wrong for me, it will. ^a
4. I'm always optimistic about my future.
5. I enjoy my friends a lot. (Filler item)
6. It's important for me to keep busy. (Filler item)
7. I hardly ever expect things to go my way. ^a
8. I don't get upset too easily. (Filler item)
9. I rarely count on good things happening to me. ^a
10. Overall, I expect more good things to happen to me than bad.

^a These items were reverse scored before scoring and analyses.

ticipant's responses to Items 1, 4, and 10 to compute an overall optimism score. Thus, scores in principle can range from 0 to 24.

Other Scales Administered

To begin to examine the convergent and discriminant validity of the revised LOT, we asked subjects to complete several additional questionnaires in addition to the LOT-R. A major subset of these additional questionnaires was composed of the scales used as alternative predictor variables in Study 1. More specifically, self-mastery was assessed with Pearlin and Schooler's (1978) Self-Mastery Scale (SMS), trait anxiety was assessed with Spielberger et al.'s (1974) State-Trait Anxiety Inventory (STAI), neuroticism was assessed with the Guilford-Zimmerman Temperament Survey (GZTS; Guilford et al., 1976), and self-esteem was measured with Rosenberg's (1965) Self-Esteem Scale (SES). Cronbach's alphas for the four scales in the current sample were .75, .88, .86, and .89, respectively.

As an additional measure of neuroticism, a subset of respondents also completed a 10-item version of the Neuroticism Scale of the Eysenck Personality Questionnaire (EPQ; Eysenck, 1958; Goh, D. King, & L. King, 1982). In the 10-item version completed in our research, participants were asked to respond *yes* or *no* to statements such as "Do you

⁵ This same characterization generally holds for the other analyses involving the Life Orientation Test (LOT) that were reported. With few exceptions, associations that were significant when using the eight-item scale remained significant when using the corrected six-item scale, but the correlations involving the six-item scale tended to be slightly smaller in magnitude. In the case of depression and symptom reporting, differences between the correlations when using the two versions of the LOT were nonsignificant. With respect to coping tendencies, 9 of the 14 remaining coping dimensions (other than positive reinterpretation and growth) were significantly less correlated with the altered LOT than they were with the original LOT, three coping dimensions (denial, mental disengagement, and behavioral disengagement) were correlated significantly more with the altered LOT than they were with the original scale, and two coping dimensions (focusing on and venting of emotions, and use of drugs or alcohol) produced no significant differences.

⁶ It is unfortunate that data collection on the revised Life Orientation Test (LOT-R) only began after the data reported in Study 1 had already been collected. As a result, we cannot compare the predictive validity of the original LOT to the revised LOT with respect to depression, symptoms, and coping. Given the high correlation between the original and revised LOT, however (in the .90s), we have no reason to believe that the revised scale would have produced any appreciable differences in the findings.

Table 7
Factor Loadings for the Revised Life Orientation Test

Item	Factor 1
1	.58
3 ^a	.66
4	.66
7 ^a	.79
9 ^a	.74
10	.72

Note. Item numbers refer to items as specified in Table 6.

^a Items reversed before analyses.

ever feel 'just miserable' for no good reason?" and "Would you call yourself a nervous person?" Cronbach's alpha for this sample was .86.

Results

Factor Structure

A principal components factor analysis, using a Varimax final rotation technique, was conducted on a combined sample of 2,055 undergraduate women and men (see Table 7). The number of factors retained for final solution was determined by setting the eigenvalue criterion at 1.0. The six LOT-R items yielded one factor accounting for 48.1% of the variance. As can be seen in Table 7, all items loaded at least .58 on this factor. The mean factor loading was .69. The same one-factor solution also emerged from a subsequent principal components factor analysis using an oblique rotation technique. This single factor also accounted for 48.1% of the variance.

The preceding analyses explored the factor structure of the LOT-R items in isolation. In addition, two principal components factor analyses, using Varimax final rotation techniques, were conducted on data sets involving two slightly different subsets of items from all of the scales that were administered. One of these analyses was conducted on a sample of 387 undergraduate men and women, and included items from the LOT-R, STAI, SMS, SES, and GZTS. The second analysis was conducted on a sample of 933 undergraduate men and women, and included items from the LOT-R, STAI, SMS, SES, and EPQ. The number of factors retained for final rotation in these analyses was determined by setting the eigenvalue at 1.0. In the case of the sample involving the GZTS, a single Optimism factor emerged, which incorporated five of the six items from the revised LOT (the lowest factor loading for the five items was .38). The sixth item loaded -.439 on a factor defined by itself, but it also loaded .435 on the Optimism factor. In the case of the sample involving the EPQ, a single Optimism factor emerged, which was defined by all six of the items on the LOT-R (the lowest factor loading was .55).

These analyses were subsequently repeated, retaining five factors for final rotation. We decided to retain five factors because the items composing the data set came from five separate scales. In addition, scree tests (Cattell, 1966) on the analyses just reported suggested the viability of a five-factor solution. The results in each case were similar to the results observed in the initial analyses. In the case of the sample involving the GZTS,

five of the six LOT-R items loaded on a single Optimism factor (the lowest loading was .32). The remaining item loaded .330 on a separate factor but also loaded .327 on the Optimism factor. In the case of the sample involving the EPQ, a single Optimism factor emerged, which included all six of the items from the LOT-R (the lowest factor loading was .42).

In addition to these exploratory factor analyses, the data were further examined by confirmatory factor analytic procedures (Jöreskog & Sörbom, 1978; Kenny, 1979), using LISREL VI (Jöreskog & Sörbom, 1986). Because of the complexity of the combined item set, confirmatory analyses were limited to the six items comprising the LOT-R. Initially, two simple measurement models were tested, one loading all items on a single factor and one loading the positively and negatively worded items onto separate factors. The models were evaluated by using criteria described by Bentler and Bonett (1980), Jöreskog and Sörbom (1986), and Bollen (1989). The single-factor solution yielded a reasonably good fit to the data, $\chi^2(9, N = 2,055) = 159.22, p = .001$; $\Delta_1 = .95, \Delta_2 = .95$, root mean square residual (RMR) = .048, as did the two-factor model, $\chi^2(8, N = 2,055) = 43.59, p = .001, \Delta_1 = .99, \Delta_2 = .99$, RMR = .024. Evaluation of the difference in fit between the two models by a hierarchical or nested test (Bentler & Bonett, 1980) suggested that the two-factor solution was superior, $\chi^2(1, N = 2,055) = 115.63, p < .001$.

Further examination of the covariance matrices from these analyses, however, revealed a pattern of unexpected disturbance in the data similar to that reported by Scheier and Carver (1985). Specifically, there was a higher degree of shared disturbance among positively phrased items than among negatively phrased items. One explanation is that responses to positively worded items are more straightforward than responses to negatively worded items because of differences in semantic complexity. This may result in greater measurement error due to factors such as response styles (e.g., yea saying).

As a result of these observations, the simple one- and two-factor models described above were modified to allow for the correlated error among the positively phrased items. The models were then re-evaluated. The single-factor solution yielded a fit to the data that was substantially better than the one that was obtained when the correlated error was not included, $\chi^2(6, N = 2,055) = 16.51, p = .01, \Delta_1 = .99, \Delta_2 = .99$, RMR = .012. The two-factor solution with the same constraints also yielded an acceptable fit, $\chi^2(5, N = 2,055) = 16.51, p = .01, \Delta_1 = .99, \Delta_2 = .99$, RMR = .012. In this case, however, the difference in fit between the one- and two-factor models was trivial and nonsignificant.

Internal Consistency and Test-Retest Reliability

Table 8 presents the corrected item-scale correlations for the LOT-R in addition to the Cronbach's alpha for the scale if individual items were removed. As can be seen, item-scale correlations ranged from .43 to .63, suggesting that each item is partially measuring the same underlying construct, but not to such an extent as to be redundant with other items. In addition, all of the items seem to add equivalently to Cronbach's alpha. That is, the drop in alpha level was relatively comparable as individual items were removed from the scale (see last column of Table 8). Cronbach's alpha for the entire six items was .78, suggesting

Table 8
Internal Consistency and Test-Retest Reliability of the Revised Life Orientation Test

Item	Corrected item-scale correlation	Alpha with item removed
1	.43	.77
3 ^a	.48	.76
4	.50	.75
7 ^a	.63	.72
9 ^a	.57	.73
10	.56	.74

Cronbach's alpha = .78

Test-retest reliability = .68 (4 months)

= .60 (12 months)

= .56 (24 months)

= .79 (28 months)

Note. Item numbers refer to items as specified in Table 6.

^a Items reversed before analyses.

that the LOT exhibits an acceptable level of internal consistency.

One further issue of reliability involves the stability of individual LOT-R scores over time. To investigate the test-retest reliability of the LOT-R, we examined the scores for different samples of college undergraduates who completed the scale at two points in time separated by different time intervals. The test-retest intervals for the four groups were 4 months ($N = 96$), 12 months ($N = 96$), 24 months ($N = 52$), and 28 months ($N = 21$). As shown in Table 8, the test-retest correlations were .68, .60, .56, and .79, respectively. Taken together, these findings suggest that the LOT-R is fairly stable across time.

Convergent and Discriminant Validity

Table 9 presents, separately by gender, the correlations between the LOT-R and several related scales, including neuroticism (measured in two different ways), self-mastery, self-esteem, trait anxiety, and the original LOT. There are several points to be made about the correlations presented in Table 9. First, and perhaps most important, all of the correlations (except those with the original LOT) are relatively modest in size. The correlations among men ranged from a high of $-.52$ with trait anxiety to a low of $-.36$ with neuroticism as measured by the EPQ. The range of correlations among women was similar, ranging from a high of $.54$ with self-esteem to a low of $-.36$ with neuroticism, again as measured by the EPQ. Second, differences in correlations between men and women were negligible. None of the six pairs of correlations presented in Table 9 are significantly different. Finally, the correlation between the revised LOT and the original LOT was quite high for both men and women, suggesting that the two versions of the scale are assessing highly similar characteristics. These high correlations are not surprising, given that the two versions of the scale share five items in common.⁷

Norms

To investigate norms for men and women, we computed means and standard deviations separately for each gender. Anal-

yses were completed on two independent samples: College students and patients awaiting coronary artery bypass surgery. The patient group ranged in age from 36 to 82 years (mean = 64.3 years). Thirty-three percent of the group had some education beyond high school. Approximately 80% of the sample was married. Table 10 presents the normative data for these two samples. These norms are the only ones currently available for the LOT-R. Norms for other age, class, and occupational groupings will become available as the scale is used on a wider basis. Given that the scale has already been successfully administered to two very diverse populations, one community-based and non-college-educated, we do not anticipate difficulty in administering the scale to samples with very different backgrounds.

Discussion

Our intention in removing the two coping items from the original LOT was to create a scale that focused more exclusively on expectations of good versus bad outcomes. At the same time, we wanted the psychometric properties of the revised LOT to remain sound, and to be balanced in terms of positively worded versus negatively worded items. Only one item was added because we wanted to make sure that the items remained centered on expectancies, and it is difficult to write items that are narrow in focus but not highly similar or identical to each other. Although a six-item scale may suffer slight psychometric disadvantages compared with a scale that contains more items, a shorter scale has certain advantages that a longer scale does not. For example, brevity can facilitate use of the scale in research. Ease of administration can be especially critical in projects that contain long protocols in which subject burden is an important consideration.

It is fortunate that the revised LOT does not appear to have suffered much, despite its brevity. Internal consistency and test-retest reliability remain high. In addition, the revised scale shares only a modest amount of variance with scales measuring conceptually related concepts—a point we find particularly noteworthy in light of the criticisms toward which the first part of this article was directed. That is, the modest amount of variance shared between the LOT-R and these other constructs should make it easy for future research to disentangle the effects of optimism from them. Finally, we should mention that we have been able to revise the LOT without distancing ourselves too far from the original scale on which the revision was based. The correlation between the LOT-R and the original LOT is quite high. This high correlation helps ensure continuity of findings and understanding as the revised scale slowly replaces the original instrument as the assessment device of choice.

⁷ For comparison purposes, correlations were also computed between the original Life Orientation Test (LOT) and the various predictors that were assessed. The correlations between the original LOT and these predictors were all higher than the comparable correlations for the revised LOT that are presented in Table 7. Although the absolute size of the differences between correlations tended to be small (ranging from .005 to .037), the differences often proved statistically significant given the size of the sample involved. Thus, the LOT-R does seem to enjoy a slight comparative edge over the original LOT in terms of the amount of variance that it shares with related predictors.

Table 9
Correlations Between Revised Life Orientation Test and Conceptually Related Scales by Gender

Conceptually related scales	Women	Men	Combined
Original Life Orientation Test			
<i>r</i>	.95	.95	.95
<i>N</i>	622	1,394	2,055
Self-Mastery Scale			
<i>r</i>	.46	.51	.48
<i>N</i>	622	1,394	2,055
Trait version of the State-Trait Anxiety Inventory			
<i>r</i>	-.54	-.52	-.53
<i>N</i>	616	1,382	2,033
Rosenberg's Self-Esteem Scale			
<i>r</i>	.54	.50	.50
<i>N</i>	411	982	1,420
Neuroticism assessed by Guilford-Zimmerman Temperament Survey			
<i>r</i>	-.49	-.40	-.43
<i>N</i>	323	694	1,041
Neuroticism assessed by items from Eysenck Personality Questionnaire			
<i>r</i>	-.36	-.37	-.36
<i>N</i>	293	686	991

Note. All correlations specified here reached significance at $p < .001$, two-tailed.

The factor structure of the revised LOT deserves special comment. As noted earlier, it is not uncommon for the original LOT to yield two separate factors, one for positively worded items and one for negatively worded items (e.g., Marshall et al., 1992; Scheier & Carver, 1985). Indeed, an exploratory factor analysis of the eight items of the original LOT in the data set used in Study 2 again yielded two separate factors. Less clear is the proper meaning to be attached to these two separate factors. For simplicity, we have opted to view optimism and pessimism as opposite poles of the same dimension, attributing the two-factor structure to differences in item wording rather than more meaningful item content (Scheier & Carver, 1985). Others have taken a different view (Marshall et al., 1992), noting that the optimistically oriented set of items seems to correlate with a different group of personality characteristics than does the pessimistically oriented set of items.

In contrast to analyses involving the original scale, factor analyses of the revised LOT seem to point in the direction of a one-factor structure, but not strongly so. Exploratory analyses using both orthogonal and oblique rotation techniques on the

LOT-R items in isolation yielded a one-factor solution. One-factor solutions were also reached when factor analyses were done on all of the items from all of the related scales simultaneously. Results from the confirmatory factor analyses on the six items comprising the LOT-R were more mixed, however. That is, in absolute terms, both the one-factor and the two-factor model provided an acceptable fit to the observed data. When correlated error was not included, the two-factor solution proved statistically superior. When models were compared allowing for correlated error, the difference between the one- and two-factor models proved negligible.

Does this mean that the revised LOT should be scored in a bipolar fashion, using one overall score, or should two separate scores be computed, one for the positively worded items (yielding an optimism score) and one for the negatively worded items (yielding a pessimism score)? Given that the data for the revised scale do provide some justification for treating optimism and pessimism as bipolar, our own approach is to rely on an overall score for primary analyses, but to follow up these primary analyses with subsidiary analyses in which the positively and negatively worded items are examined separately. Although in the past such separate analyses have generally failed to yield appreciably different results (e.g., Carver et al., 1993), one can imagine that in certain contexts the absence of optimism may not yield the same results as the presence of pessimism (cf. Marshall et al., 1992). Although perhaps infrequent, such differential effects can only be identified by analyzing the positive and negative items separately.

Concluding Comment

For any personality construct, there are many alternative variables that might be invoked as competitors in the effort to

Table 10
Norms for the Revised Life Orientation Test

Sample	<i>N</i>	<i>M</i>	<i>SD</i>
College students	2,055	14.33	4.28
Women	622	14.42	4.12
Men	1,394	14.28	4.33
Bypass patients	159	15.16	4.05
Women	37	14.92	3.97
Men	122	15.24	4.09

predict and understand behavior. In the case now under discussion, the variable that may be of greatest interest is neuroticism. Neuroticism holds appeal in part because of its long history as a construct in personality psychology, and in part because of its place in the list of five "supertraits" that some people believe capture most important aspects of personality (e.g., Digman, 1990; John, 1990). The data reported in Study 1, however, revealed unique associations from optimism to depression and to several aspects of coping, even after controlling for neuroticism (as well as the other predictors that were assessed). These findings emerged whether optimism was operationalized with the original LOT, with an alternative item set in which two problematic coping items were removed, or with factor scores from joint analyses of the original LOT and measures of neuroticism and trait anxiety. The data join with findings of other researchers (e.g., Mroczek et al., 1993) in indicating that optimism and neuroticism are not interchangeable.

As noted in the introduction, however, there is another important conceptual issue that stands somewhat behind the scenes here. Neuroticism is usually viewed as a multifaceted construct that consists partly, though not entirely, of pessimism (an assumption confirmed in our factor analysis). To ask whether an effect of pessimism is really an effect of neuroticism (as is sometimes done) begs, in return, a complementary question about the effects of neuroticism. Specifically, when examining effects of neuroticism (e.g., Bolger, 1990; Bolger & Schilling, 1991), one might ask whether all facets of neuroticism are important to the effects, or only the part of neuroticism that is related to optimism and pessimism. This question can be addressed only if researchers will examine their data in more differentiated ways than has been true in the past. Thus, rather than suggest that variables be combined into higher and higher order, superordinate constructs, which appears to be the prevailing trend, we suggest that researchers interested in neuroticism decompose their variables into more basic units, such as optimism-pessimism, to determine more precisely the exact source of the associations that emerge.

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Received July 26, 1993

Revision received June 10, 1994

Accepted July 5, 1994 ■

1995 APA Convention *Call for Programs*

The *Call for Programs* for the 1995 APA annual convention appears in the September issue of the *APA Monitor*. The 1995 convention will be held in New York, New York, from August 11 through August 15. The deadline for submission of program and presentation proposals is December 2, 1994. Additional copies of the *Call* are available from the APA Convention Office, effective in September. As a reminder, agreement to participate in the APA convention is now presumed to convey permission for the presentation to be audiotaped if selected for taping. Any speaker or participant who does not wish his or her presentation to be audiotaped must notify the person submitting the program either at the time the invitation is extended or before the December 2 deadline for proposal submission.