Journal of Personality and Social Psychology
2002, Vol. 83, No. 3, 693–710

0022-3514/02/$5.00 DOI: 10.1037//0022-3514.83.3.693

Are Measures of Self-Esteem, Neuroticism, Locus of Control, and Generalized Self-Efficacy Indicators of a Common Core Construct?

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The authors present results of 4 studies that seek to determine the discriminant and incremental validity of the 3 most widely studied traits in psychology—self-esteem, neuroticism, and locus of control—along with a 4th, closely related trait—generalized self-efficacy. Meta-analytic results indicated that measures of the 4 traits were strongly related. Results also demonstrated that a single factor explained the relationships among measures of the 4 traits. The 4 trait measures display relatively poor discriminant validity, and each accounted for little incremental variance in predicting external criteria relative to the higher order construct. In light of these results, the authors suggest that measures purporting to assess self-esteem, locus of control, neuroticism, and generalized self-efficacy may be markers of the same higher order concept.

The process of identifying broad versus specific factors in psychology—resulting in the so-called bandwidth-fidelity paradox (John, Hampson, & Goldberg, 1991)—can be traced to the earliest stages of scientific psychology and was centered around such disparate concepts as the elements of human sensations (Titchener, 1910), the factorial structure of intelligence (Spearman, 1927), and the nature of attitudes (Fishbein & Ajzen, 1974). The recurrent broad versus specific debate caused Cronbach (1956) to label psychologists as either *splitters*—those who seek to make fine distinctions among psychological concepts by splitting them into constituent elements—or *lumpers*—those who seek to aggregate concepts by combining narrow concepts into broader ones. An integration of these approaches views individual differences hierarchically (Lubinski & Dawis, 1992), as has been the case in both the abilities (e.g., Carroll, 1993) and the personality (e.g., Digman, 1990) literatures.

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Personality psychology has been no exception in the struggle over broad versus specific factors. Although researchers in personality psychology have invested immense effort in seeking to identify thousands of specific traits (e.g., Allport & Odbert, 1936), others have argued that these labors have produced independent literatures that evolved from related traits with little consideration of their possible common core. As D. Watson and Clark (1984) commented, "distinct and segregated literatures have developed around a number of personality traits that, despite dissimilar names, nevertheless intercorrelate so highly that they must be considered measures of the same construct" (p. 465). Much earlier, Kelley (1927) cited the jangle fallacy in reference to the tendency of psychologists to discover new traits without consideration of similar personality constructs already in existence. Clearly, not all specific traits are indicators of a broader construct, but, by the same token, new and existing measures must be evaluated on the basis of a possible common core when there is reason (on empirical and/or theoretical grounds) to believe that such a commonality may exist.

If a broad factor does explain overlap in measures, then the unexplained nonerror variance that is unique to the measures must be examined (see Lubinski & Dawis, 1992). It is possible that the commonality in the measures, this general factor, is the only part (or the primary part) that is useful. As has long been a tradition in the abilities area (Humphreys, 1962), the nonerror uniqueness, or specific factor variance, is meaningful only to the extent that it shows differential or incremental validity beyond the commonality or general construct. As Dawis (1992), speaking to the individual-differences tradition in counseling psychology, noted, "one has to wonder how much of the effort is overlapping and redundant. Only occasionally does someone . . . attempt to assess the overlap among measures . . . psychologists may be charting the same area

but with instruments of different names" (p. 16). Redundancy runs through many psychological measures (Tellegen, 1993), and thus it is critical to evaluate and explain this redundancy.

In this study we investigate several widely studied traits whose possible common core deserves attention. Self-esteem, locus of control, and neuroticism (also known as emotional stability or emotional adjustment) are the most widely studied personality concepts in psychology. In a recent (April 9, 2001) search of the PsycINFO database (1887–present), we found 20,203 articles with *self-esteem* as a keyword, 20,026 articles with *neuroticism*/*emotional stability* as a keyword, and 13,428 articles with *locus of control* as a keyword. In comparison with other widely studied traits, we found 9,938 articles with *need for achievement* or *achievement motivation* as keywords and 6,754 articles with *extraversion* or *introversion* as keywords. Altogether, the three traits have been the subject of more than 50,000 studies.

Although these traits are usually investigated in isolation, in many cases they seem to operate similarly in theory. The connection between neuroticism and self-esteem has been discussed by a number of personality researchers. The two traits are conceptually related in that the positivity of self-description has been used to operationalize both self-esteem (e.g., Sherwood, 1967) and neuroticism (Young & Martin, 1981). In Eysenck's (1990) hierarchical model of neuroticism, self-esteem is a lower order indicator. Self-esteem appears to operate similarly to neuroticism in the prediction of personality disorders (D. C. Watson, 1998). In addition, Goldberg and Rosolack (1994) developed a theoretical structure of personality wherein neuroticism and self-esteem were included in the same structure.

Similarly, there are clear connections between self-esteem and locus of control. Brockner's (1979) behavioral plasticity hypothesis suggests that people with low self-esteem are generally more susceptible to self-relevant social cues than are individuals with high self-esteem. This type of behavior mimics individuals who have an external locus of control. Hjelle and Clouser (1970) found that internals who were presented with a compelling message were less likely to change their attitudes than were externals. Moreover, Biondo and MacDonald (1971) showed that internals not only were resistant to external influences but actually demonstrated psychological reactance (Brehm, 1966). These latter findings suggest a substantive overlap between measures of locus of control and self-esteem.

With regard to the relationship between locus of control and neuroticism, numerous studies have demonstrated that locus of control is negatively related to anxiety (e.g., Joe, 1971; Ray & Katahn, 1968), one of the principle elements of neuroticism (D. Watson & Clark, 1984). Archer (1979) argued that locus of control and anxiety are "potentially interactive and multidetermined phenomena" (p. 619), providing empirical evidence to support his contention. Furthermore, the relationship between locus of control and stress is strong, in some cases nearly as strong as the relationship between neuroticism and stress (Anderson, 1977). Thus, though the relationship between locus of control and neuroticism has not been considered theoretically, it appears that the traits operate similarly in terms of their relationships with relevant other variables.

Despite the prominence of these traits and some rather obvious connections between them, relatively few investigations have explicitly considered their interrelationships. Thus, in the majority of cases, these measures are studied in isolation. When two of the measures are included in the same study, in most cases they are viewed as entirely separate variables. For example, Abouserie (1994) used self-esteem and locus of control to predict stress without reporting the correlation between self-esteem and locus of control. Similarly, Horner (1996) used neuroticism and locus of control as separate predictors of illness, again without considering the relationship between the two measures. In a small number of cases, one measure is modeled as an influence on the other, often to confusing effect. For example, Wambach and Panackal (1979) investigated the main effect of neuroticism on locus of control, whereas Morelli, Krotinger, and Moore (1979) investigated locus of a control as a cause of neuroticism. Hojat (1983) even related all three of these measures—self-esteem, locus of control, and neuroticism—to an outcome (loneliness) without considering the relationship among them, whereas in an earlier study, he (Hojat, 1982) found that the three measures loaded on the same factor. Similarly, in the work area, in which many of these traits have been studied, nearly all of the studies that have included two of the measures have used them as separate predictors of various outcomes, such as attributions (Hesketh, 1984), career decision making (Kishor, 1981), unemployment (Tiggemann & Winefield, 1984), and job performance (Bhagat & Chassie, 1978).

This diffusion in the literature is not a problem if measures of these traits are orthogonal. However, if there is substantial communal or redundant variance shared by the measures, the problem is well summarized by Block (1995): "To the extent a variable correlates with other variables . . . it is said to be 'explainable' by these other variables and conveys no unique information" (p. 188). In such a case, at best, there is redundancy in that more measures are used than are necessary to account for psychological phenomena. At worst, the Tower of Babel problem noted by Block (1995) exists, whereby results with respect to one trait are ignored in research investigating the same phenomenon but using a different trait. The resulting jangle fallacy (Kelley, 1927) wastes scientific time and serves to "prevent the recognition of correspondences that could help build cumulative knowledge" (Block, 1995, p. 210).

Although we are aware of no personality research that explicitly considers the relationship among all three traits, in the industrial–organizational psychology literature, Judge, Erez, and Bono (1998) investigated these three traits in a combined sample of roughly 15,000 individuals. These authors have also included another trait: generalized self-efficacy. Generalized self-efficacy, representing a judgment of how well one can perform across a variety of situations (Smith, 1989), is less studied than are the other three traits. (A search revealed 172 articles considering the trait.) Judge, Erez, and Bono (1998) included it in their analysis because the appraisal of one's successfulness as a person should be highly related to self-esteem and locus of control. The correlations among the four personality measures in their sample ranged from .47 to .86, with an average correlation of .61. When they submitted these correlations to principal-components analysis, the four traits loaded on one factor that explained 71% of the variance in these traits. On the basis of their results, Judge, Erez, and Bono concluded that a common core to these measures exists.

Although the Judge, Erez, and Bono (1998) study is informative, it is only suggestive that there are strong empirical relations among measures of these traits and that measures of these specific traits may have an underlying broad common core. For us to conclude that researchers should treat these measures as indicators of a common construct, further study of the relationships among the measures is essential. Thus, the purpose of the present study is to investigate the discriminant and incremental validity and possible common core of self-esteem, locus of control, neuroticism, and generalized self-efficacy. In ascertaining the validity of these four traits, we provide answers to three relevant questions:

1. Do measures of the traits identified above display convergent validity? In other words, does it appear that measures of self-esteem, locus of control, neuroticism, and generalized self-efficacy indicate a common concept?

2. Do measures of the four traits display discriminant validity? If the measures display differential patterns of associations with other variables, this would argue that they are not alternative indicators of a common concept. In contrast, according to extrinsic convergent validity (Fiske, 1971), if the measures display similar patterns of correlations with other variables, they may be considered "empirically interchangeable" (Lubinski & Dawis, 1992, p. 20).

3. If the measures do indicate a common construct, what is the nature of this concept relative to the five-factor model of personality?

Study 1

As noted earlier, although most studies of the four traits did not include an examination of the relationships among the traits, there were a sufficient number of studies reporting a correlation between pairs of the measures to merit a cumulative description of these relationships. Accordingly, we conducted several targeted meta-analyses aimed at uncovering relationships among measures of the four traits. In these analyses, we sought to determine whether these relationships are generally strong enough to justify further investigation into the possible existence of a higher order factor.

Method

Literature Search

We conducted a search of the PsycINFO database (1966–2000) for articles addressing the relationship between any two of the four traits (self-esteem, locus of control, neuroticism, and generalized self-efficacy). We identified 10 journals (*Journal of Applied Psychology*, *Journal of Clinical Psychology*, *Journal of Consulting and Clinical Psychology*, *Journal of Counseling Psychology*, *Journal of Personality and Social Psychology*, *Journal of Psychology*, *Journal of Social Psychology*, *Perceptual and Motor Skills*, *Personality and Individual Differences*, and *Psychological Reports*) with the most articles addressing the relationships of interest. This search resulted in 258 articles. Of these articles, 49 were not relevant, as the relationships of interest were not addressed in the article or the article was not an empirical study. One hundred thirty-four articles addressed two or more of the traits but did not report a correlation between them or the information necessary to calculate a correlation. The remaining 75 articles produced 127 correlations among the personality measures. We found the largest number of correlations for the relationship between self-esteem and locus of control ($k = 47$) and the smallest number for the relationship between neuroticism and generalized self-efficacy ($k = 7$). Our goal was to identify a sufficient number of studies in the literature (where the traits are most often studied) to determine whether the four measures exhibited sufficient intercorrelations to justify an extensive examination of their communality.

Meta-Analysis

Whereas some models of meta-analysis produce population estimates that are limited to the studies included in the meta-analysis (i.e., fixed effect models), other models of meta-analysis (i.e., random effect [RE] models) are generalized to a superpopulation of all potential studies investigating relationships of interest (Bryk & Raudenbush, 1992; Hedges & Olkin, 1985; National Research Council, 1992). This latter method is preferred because studies that are included in the meta-analysis are perceived as a random sample taken from the population of all potential studies. Thus, inferences from this sample to the population of studies are subjected to the same significance tests as in other common statistical techniques that infer from samples to populations. Therefore, results obtained from such methods can be used to test relationships at the superpopulation level instead of in a single sample or in a sample that is limited to the studies included in the meta-analysis. Therefore, in the current study, we chose to use an RE model of meta-analysis to test the relationships among the four traits. This test is conducted at a population level that includes all potential and hypothetical studies that are designed to answer this question.

Using the RE approach, we analyzed the data as follows. First, we corrected the correlations for unreliability by dividing the correlations by the square root of $\alpha_a \times \alpha_b$, where α_a and α_b represent the coefficient alpha reliability estimates of the two measures. The coefficient alphas used were those reported in the study for the measures. In cases in which no reliability estimates were reported, we used the average reliability estimate of the measure across the studies (Hunter & Schmidt, 1990). Second, because correlations come from a skewed distribution, we transformed them using two types of transformations: Hotelling's and the Fisher's r to Z. Transforming the correlations normalizes their distribution and stabilizes their variance. This allowed us to use maximum likelihood estimations procedures, which are efficient and consistent, to analyze the data (Bickel & Doksum, 1977). We conducted the meta-analysis of the transformed correlations using hierarchical linear modeling (HLM; Bryk, Raudenbush, & Congdon, 1996). In this program, the transformed data are entered into HLM as a variance-known problem structure. Finally, we then back-transformed the correlations from the HLM analysis into regular correlations using the formula recommended by Erez, Bloom, and Wells (1996, p. 289).

Results

Table 1 presents the estimated population correlations (ρ) among each of the measures as well as the 95% confidence intervals (CIs) around the population estimates. We created CIs by adding and subtracting 1.96 times the standard error from the estimated population correlations. As Table 1 illustrates, the correlations among the personality measures are relatively strong. This is particularly true with respect to the relations among neuroticism, self-esteem, and generalized self-efficacy, for which the estimated population correlations ranged from .62 to .85. Additionally, most of the correlations approached or exceeded the typical intercorrelations of different measures of the same construct (e.g., Lubinski, Tellegen, & Butcher, 1983). The correlations involving locus of control were smaller in magnitude, ranging from .40 to .56.

Table 1
Population Correlations Among Measures of the Four Traits

Trait	Locus of control				Emotional stability				Self-esteem			
	ρ	95% CI	k	N	ρ	95% CI	k	N	ρ	95% CI	k	N
Locus of control	—											
Emotional stability	.40	.33, .48	31	6,538	—							
Self-esteem	.52	.44, .59	47	14,691	.64	.48, .77	19	5,565	—			
Generalized self-efficacy	.56	.40, .69	13	3,088	.62	.44, .76	7	1,541	.85	.74, .91	9	2,431

Note. ρ = population correlation; 95% CI = 95% confidence interval around the population correlation; k = number of studies; N = total sample size for all studies combined.

Discussion

Though the weaker results with respect to locus of control are noteworthy, in general, the relatively high correlations among the four traits suggest that they may be alternative markers of a single underlying construct. The average correlation among the four measures is relatively strong ($r = .60$) and substantially higher than the correlations among most personality traits, such as the Big Five traits (median $r = .20$; Costa & McCrae, 1995). Furthermore, the average correlation among the measures is comparable to the average relationship between alternative measures of neuroticism (Digman, 1990; McCrae & John, 1992). Accordingly, it appears that the personality measures demonstrate sufficiently high convergence to warrant further investigation of their common core. In the next study, we use confirmatory factor analysis to explicitly address whether the measures indicate a single higher order construct and, if so, to estimate their relations with this higher order construct.

Study 2

Method

Participants and Procedure

Two independent samples of undergraduates enrolled at a Southeastern university completed a battery of personality and subjective well-being instruments in several class sessions. In Study 2a, these were 265 participants whose ages ranged from 18 to 40 ($M = 20.44$, $SD = 2.50$); 54% were female. In Study 2b, there were 901 participants whose ages ranged from 17 to 47 ($M = 20.70$, $SD = 2.26$); 58% were female. All participants received extra course credit for their participation.

Measures

Measures used in Study 2 are described below. With the exception of the measures of the four traits, the other measures (e.g., Big Five traits, happiness) are not analyzed in the results that follow. Analyses of these other measures are described in the results of Study 4.

Locus of control. Locus of control was measured with the Internality subscale of Levenson's (1981) Internal, Powerful Others, and Chance (IPC) Scale in Study 2a and with the full 24-item scale in Study 2b. Levenson's measure exhibits moderate reliability and has been used in a wide variety of samples (Levenson, 1981). Example items include, "Whether or not I get into a car accident depends mostly on how good a driver I am" and "My life is determined by my own actions." Responses were based on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The reliability of the scale was .69 for Study 2a and .84 for Study 2b.

Neuroticism. Neuroticism was measured with the 12-item Neuroticism scale from the NEO Five Factor Inventory (NEO–FFI; Costa & McCrae, 1992) in the two samples. In the present study, the reliability of the Neuroticism scale was .89 for Study 2a and .93 for Study 2b.

Self-esteem. Rosenberg's (1965) 10-item Self-Esteem Scale was used to measure self-esteem. This scale is the most common measure of self-esteem, and considerable empirical data support its validity (Blascovich & Tomaka, 1991). Example items include, "I feel that I have a number of good qualities" and "I feel that I am a person of worth, at least on an equal basis with others." Responses were evaluated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The reliability of the Self-Esteem Scale was .88 for Study 2a and .92 for Study 2b.

Generalized self-efficacy. In Study 2a, generalized self-efficacy was measured with a 10-item scale developed by Judge, Locke, Durham, and Kluger (1998). Example items include, "When I make plans, I am certain I can make them work" and "If something looks too complicated, I will not even bother to try it." Responses were evaluated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The reliability of this scale was .84. An 8-item scale that combined items from Jones (1986) and Sherer et al. (1982) was used for Study 2b. Example statements include, "When I decide to do something, I go right to work on it" and "New jobs are usually well within the scope of my abilities." Responses ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). The reliability of this scale was .94.

Other Big Five traits. The other Big Five personality traits were measured in Study 2b with the NEO–FFI (Costa & McCrae, 1992). The reliabilities of the remaining four factors were as follows: Agreeableness, $\alpha = .63$; Extraversion, $\alpha = .72$; Conscientiousness, $\alpha = .74$; Openness, $\alpha = .63$.

Happiness. Two instruments were used to measure happiness in Study 2b. Respondents completed a modified version of the Affect Balance Scale (see Diener, 1984), a list of 22 adjectives describing hedonic states (e.g., "sad," "happy," "pleased," "hopeless"; $\alpha = .88$). Second, a modified version of Underwood, Froming, and Moore's (1980) measure, containing nine items with which the respondent is asked to indicate his or her agreement (e.g., "I am usually quite cheerful"; $\alpha = .83$), was used.

Life satisfaction. Life satisfaction was measured with the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985), a five-item measure of life satisfaction, consisting of such statements as, "In most ways my life is close to ideal." The reliability for this scale was .85 in Study 2a and .84 in Study 2b.

Stress. Total life stress was measured by the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). The 13-item scale measures the degree of subjective stress the individual currently perceives in his or her life. Responses were anchored on a 1 (*never*) to 5 (*very often*) scale; example questions include, "In the last month, how often have you felt

nervous and 'stressed'?" and "In the last month, how often have you found that you could not cope with all the things that you had to do?" In Study 2a, the reliability for this scale was .78; in Study 2b, it was .83.

Strain. Strain was measured by a scale originally used in the Quality of Employment Surveys (QES; Quinn & Staines, 1979). Similar to other measures of somatic symptoms, the QES scale asks the respondent to indicate the degree to which they have experienced 16 somatic symptoms within the last year (e.g., difficulty breathing, excessive fatigue, insomnia, heart palpitations, angina, hands sweating). The frequency of occurrence of each symptom was rated on a 1 (*never*) to 4 (*often*) scale. In Study 2a, α = .82, and in Study 2b, α = .80.

Analyses

Confirmatory factor analysis, conducted using LISREL 8 (Jöreskog & Sörbom, 1996), was used to test the underlying structure of the scales. A variance–covariance matrix was entered as input into the program. Several researchers have argued that fitting measurement models with large numbers of items is an overly stringent approach that may yield poor fit (e.g., Bagozzi & Heatherton, 1994; Kishton & Widaman, 1994; Quintana & Maxwell, 1999). Instead, researchers should use item parcels to represent the indicators of the latent constructs. Accordingly, we assigned items randomly to a number of sets to form the item-parcel indicators of the latent variables. For example, two sets of three and one set of four randomly selected items formed the three indicators of the self-esteem construct. Thus, the four traits were represented as latent variables, with the item parcels as indicators of the latent variables.

The potential for structural relations between higher and lower order latent variables is a critical issue in factor analysis, because second-order factors may account for correlated errors that are very common in first-order confirmatory factor analysis (Gerbing & Anderson, 1984). For example, self-esteem, generalized self-efficacy, locus of control, and neuroticism are conceptualized as distinct or separate traits, yet Study 1 showed that measures purporting to assess these concepts are empirically related. Thus, in a first-order factor analysis of these variables, we may find highly correlated errors among the corresponding latent constructs. This finding could be explained by a common second-order factor. Accordingly, we conducted a second-order factor analysis to investigate whether such a second-order factor existed and whether it explained the relationships among self-esteem, generalized self-efficacy, locus of control, and neuroticism. To compare the fit of the two models (first vs. second order), we report the following fit statistics: chi-square with corresponding degrees of freedom, root-mean-square error of approximation (RMSEA), nonnormed fit index (NNFI), incremental fit index (IFI), and the parsimony normed fit index (PNFI), which corrects fit statistics for saturation of estimated paths in confirmatory factor analysis models (Bollen, 1989).

Results

In this analysis we compared a first-order factor model in which the factors were not allowed to correlate with a second-order factor model. A second-order factor model is mathematically equivalent to a first-order correlated factor model (Bollen, 1989). However, a second-order factor model, if it is tenable, is preferable to a correlated factor model because it more explicitly considers the structural nature of the constructs (Gerbing & Anderson, 1984). In the first-order model, all the scale item parcels were loaded on their respective construct (i.e., locus of control item parcels were constrained to load on a locus of control construct). The fit indices for the first-order model of Study 2a were as follows: $\chi^2(48, N = 251) = 410.45$, *ns*, RMSEA = .28, NNFI = .62, IFI = .72, PFNI = .51. In Study 2b, the fit statistics were as follows: $\chi^2(48, N = 883) = 1{,}777.94$, *ns*, RMSEA = .34, NNFI = .72, IFI = .80, PFNI = .58. These statistics indicate a poor fit for the first-order factor model across the two studies.

The relatively poor fit of the first-order factor models can be attributed to the substantial relationships among the four scales. Indeed, the average correlation among the first-order factors was .63 in Study 2a and .51 in Study 2b. Thus, although the first-order confirmatory factor analysis revealed that the four dispositions loaded on their corresponding factors, the factors were strongly related. In addition, the modification indices implied that most of the indicators should load on more than one factor. In the second-order model, the latent constructs themselves were allowed to load on a second-order latent factor. In Study 2a, the fit statistics of this model were as follows: $\chi^2(44, N = 251) = 96.02$, *ns*, RMSEA = .05, NNFI = .94, IFI = .96, PFNI = .62. In Study 2b, the fit statistics were as follows: $\chi^2(44, N = 883) = 541.08$, *ns*, RMSEA = .07, NNFI = .91, IFI = .94, PFNI = .63. These fit statistics represent a dramatic improvement over the first-order factor model and suggest that the second-order model is preferable. In Study 2a, the loadings of the four latent constructs on the second-order factor were as follows: locus of control, .82 ($p < .01$); neuroticism, −.63 ($p < .01$); generalized self-efficacy, .77 ($p < .01$); and self-esteem, .93 ($p < .01$). In Study 2b, the loadings were as follows: locus of control, .54 ($p < .01$); neuroticism, −.74 ($p < .01$); generalized self-efficacy, .75 ($p < .01$); and self-esteem, .84 ($p < .01$). These results indicate that there is substantial convergent validity among the four measures and that self-esteem, generalized self-efficacy, locus of control, and neuroticism converge to form a higher order factor that is indicated by and explains the relationships among the four lower level measures.

Discussion

Results of Study 2 demonstrate that measures of the four traits are not independent and that a single second-order factor accounts for this dependence. In light of these results, it does not appear reasonable to conceptualize these measures as assessing entirely separate and distinct constructs. The results demonstrate convergent validity from the standpoint of a higher order factor. Specifically, measures of the four traits display sufficiently high intercorrelations to suggest a higher order construct. On the other hand, the results presented to this point are limited in that they do not explicitly address the possible distinctiveness among the measures. It is possible that the scales indicate a higher order factor but are distinct in terms of their relationships with other theoretically relevant constructs. In this case, if convergent and discriminant validity are both present, a strong case can be made in favor of a general construct but also for the distinctiveness of the dimensions. Accordingly, because convergent and discriminant validity provide different information about construct validity, each analysis is critical. Having investigated convergent validity in this study, in the next two studies we turn to discriminant validity. In Study 3, we investigate discriminant validity across sources of the traits. In Study 4, we investigate discriminant validity by comparing the relations of the personality measures with other relevant variables.

Study 3

In Study 3, we investigate the discriminant validity among measures of the four traits using the multitrait–multimethod (MTMM) technique (D. T. Campbell & Fiske, 1959). As Lucas, Diener, and Suh (1996) have noted, it is important to investigate discriminant validity using multiple approaches. Thus, in three separate studies we used multiple measures of the four traits in testing their convergent and discriminant validity. In Study 3a, participants completed measures of the four traits, and we also obtained two informant reports from family members or friends. In Study 3b, participants provided several measures for each trait, and we also obtained an informant report. In Study 3c, participants completed measures for the traits on two occasions 3 months apart.

Method

Participants and Procedure

Participants in Studies 3a–3c were undergraduates at a large Midwestern university. Extra credit points were offered in exchange for participation. There were 325 participants in Study 3a, split roughly equally between men and women (47% female) and mostly Caucasian (86%). The average age of participants was 20.70 years. There were 126 participants in Study 3b. They were 57% male and 86% Caucasian, with an average age of 21.33 years. In Study 3c, there were 72 participants, 52% of whom were men, 89% of whom were Caucasian, and who had an average age of 20.50 years.

The procedures for Study 3a and 3b were equivalent. Participants completed surveys in a classroom setting. To allow matching of self- and other reports of personality, we asked participants to put a five-digit identification number on their own survey and on each of their significant other surveys. Significant others returned their surveys directly to the research team in postage paid envelopes that were distributed with the surveys. Thus, participants did not have access to the surveys completed by their peers. Significant other surveys for Study 3a were received for 301 of the 325 participants (92%). Sixty-three percent of the significant others reported knowing the student participant "very well," and 24% reported that they knew the student participant "fairly well." For Study 3b, 82% of significant others reported knowing the participant "very well, we are close."

The same procedures were followed in Study 3c, with the exception that no significant other measures were completed, but the measures were collected over time. Participants completed measures of the four constructs using one measure of each trait at Time 1. At Time 2, participants completed the same measure as well as an additional measure of each trait. Three months separated the two occasions on which participants completed the two questionnaires.

Measures

Because of the large number of measures and sources used in assessing the traits, reliability estimates of the scales are not reported here but are provided in the tables (see Tables 2, 3, and 4).

Locus of control. Locus of control was measured with the Internality subscale of the IPC Scale in Study 3a (self and peers), Study 3b (self and peer), and Study 3c (Time 1 and Time 2). Locus of control also was measured with seven items from Rotter's (1966) locus of control scale in Study 3a (self and peers), Study 3b (self), and Study 3c (Time 2). To simplify presentation of the results, for Study 3a, we combined the IPC Scale and the Rotter scale to form a single measure for the self- and peer reports.

Neuroticism. In Study 3a (self and peers), Study 3b (self and peer), and Study 3c (Time 1 and Time 2), neuroticism was measured with the Neuroticism scale from the Eysenck Personality Inventory (Eysenck & Eysenck, 1968). The 12-item scale asks participants to respond to statements such as, "I am a nervous person" and "I am a worrier" on a 5-point response scale (1 = *strongly disagree* to 5 = *strongly agree*). In Study 3a, neuroticism also was assessed with the 20-item Neuroticism scale from the International Personality Item Pool (IPIP; Goldberg, 1996). Sample items include "I often feel blue," "I panic easily," and "I rarely get irritated" (reverse scored). Participants responded using the same 5-point scale as for the other personality items. In addition, neuroticism was measured in Study 3a (self and peers) with scales from the Revised NEO Personality Inventory (NEO–PI–R; Costa & McCrae, 1992). This scale includes 40

Table 2
Multitrait–Multimethod Matrix of the Four Traits Measured in Study 3a

	Self-report				Peer 1				Peer 2			
Source and trait	1	2	3	4	1	2	3	4	1	2	3	4
Self-report												
1. Locus of control	(.76)											
2. Emotional stability	.20	(.96)										
3. Self-esteem	.26	.69	(.88)									
4. Gen. self-efficacy	.37	.48	.74	(.85)								
Peer 1												
1. Locus of control	**.25**	.02	.14	.10	(.77)							
2. Emotional stability	.05	**.45**	.28	.18	.24	(.96)						
3. Self-esteem	.07	.36	**.42**	.30	.43	.67	(.91)					
4. Gen. self-efficacy	.06	.19	.28	**.28**	.48	.55	.79	(.89)				
Peer 2												
1. Locus of control	**.22**	.15	.15	.18	**.35**	.17	.28	.25	(.82)			
2. Emotional stability	.00	**.45**	.32	.15	.03	**.41**	.30	.20	.32	(.96)		
3. Self-esteem	.02	.32	**.36**	.22	.09	.26	**.37**	.30	.41	.74	(.92)	
4. Gen. self-efficacy	.07	.24	.37	**.34**	.17	.24	.36	**.39**	.50	.57	.80	(.89)

Note. $N = 270$. Heterotrait–monosource correlations are underlined. Monotrait–heterosource correlations are in boldface. Coefficient alpha reliability estimates are in parentheses. Correlations greater than .15 are significant at the .05 level. Correlations greater than .18 are significant at the .01 level. Gen. = generalized.

Table 3
Multitrait–Multimethod Matrix of the Four Traits Measured in Study 3b

	Self-report scales 1				Self-report scales 2				Significant other			
Source and trait	1	2	3	4	1	2	3	4	1	2	3	4
Self-report scales 1												
1. Locus of control	(.60)											
2. Emotional stability	.15	(.89)										
3. Self-esteem	.26	.56	(.89)									
4. Gen. self-efficacy	.38	.52	.77	(.89)								
Self-report scales 2												
1. Locus of control	**.39**	.27	.24	.21	(.70)							
2. Emotional stability	.15	**.72**	.70	.58	.23	(.84)						
3. Self-esteem	.18	.68	**.75**	.66	.20	.63	(.76)					
4. Gen. self-efficacy	.43	.38	.65	**.70**	.28	.47	.52	(.92)				
Significant other												
1. Locus of control	**.31**	.21	.12	.13	**.20**	.14	.07	.13	(.63)			
2. Emotional stability	.19	**.28**	.24	.17	.12	**.35**	.24	.17	.28	(.86)		
3. Self-esteem	.21	.19	**.28**	.25	.16	.31	**.24**	.17	.49	.52	(.87)	
4. Gen. self-efficacy	.12	.15	.20	**.19**	.07	.23	.16	**.11**	.46	.47	.81	(.84)

Note. $N = 124$. Heterotrait–monosource correlations are underlined. Monotrait–heterosource correlations are in boldface. Coefficient alpha reliability estimates are in parentheses. Correlations greater than .18 are significant at the .05 level. Correlations greater than .23 are significant at the .01 level. Gen. = generalized.

items that measure the six facets of Neuroticism. For Study 3b and 3c, the 12-item Neuroticism scale of the NEO–FFI (described in Study 2) was used. For Study 3a, again to simplify presentation of the results, the three neuroticism measures were combined to form one measure for self-reports and one for each of the two peers.

Self-esteem. Self-esteem was measured with the 10-item Rosenberg (1965) Self-Esteem Scale in Study 3a (self and peers), in Study 3b (self and peer), and in Study 3c (Time 1 and Time 2). In Study 3a (self and peers), in Study 3b (self), and in Study 3c (Time 2), self-esteem also was measured with the 10-item Coopersmith (1967) Self-Esteem Inventory. The same 5-point scale was used as for the other personality items. Items from the Coopersmith Inventory included "I often wish I were someone else" (reverse scored) and "I'm pretty happy." Here again, the Rosenberg and Coopersmith scales were combined to form one measure in Study 3a for the self-report and the two peer reports.

Generalized self-efficacy. Generalized self-efficacy was measured with the Judge, Locke, et al. (1998) scale in Study 3a (self and peers), in Study 3b (self and peer), and in Study 3c (Time 1 and Time 2). In Study 3a (self and peers), Study 3b (self), and Study 3c (Time 2), generalized self-efficacy also was measured with an eight-item measure developed by Chen, Gully, and Eden (2001). Sample items include "In general, I think I can obtain outcomes which are important to me" and "I am confident that I can perform effectively on many different tasks." Participants were asked to indicate the extent to which they agree with

Table 4
Multitrait–Multimethod Matrix of the Four Traits Measured in Study 3c

	Scales 1, Time 1				Scales 1, Time 2				Scales 2, Time 2			
Source and trait	1	2	3	4	1	2	3	4	1	2	3	4
Scales 1, Time 1												
1. Locus of control	(.54)											
2. Emotional stability	.15	(.90)										
3. Self-esteem	.34	.47	(.82)									
4. Gen. self-efficacy	.36	.45	.72	(.83)								
Scales 1, Time 2												
1. Locus of control	**.48**	.11	.31	.36	(.65)							
2. Emotional stability	.07	**.78**	.40	.46	.08	(.90)						
3. Self-esteem	.23	.45	**.66**	.65	.38	.58	(.87)					
4. Gen. self-efficacy	.21	.39	.54	**.62**	.35	.61	.81	(.90)				
Scales 2, Time 2												
1. Locus of control	**.24**	.23	.30	.25	**.48**	.15	.30	.19	(.76)			
2. Emotional stability	.25	**.63**	.61	.65	.26	**.70**	.72	.69	.26	(.88)		
3. Self-esteem	.27	.50	**.62**	.53	.44	.57	**.75**	.63	.31	.69	(.79)	
4. Gen. self-efficacy	.47	.26	.56	**.53**	.60	.43	.65	**.70**	.41	.51	.59	(.89)

Note. $N = 72$. Heterotrait–monosource correlations are underlined. Monotrait–heterosource correlations are in boldface. Coefficient alpha reliability estimates are in parentheses. Correlations greater than .23 are significant at the .05 level. Correlations greater than .31 are significant at the .01 level. Gen. = generalized.

each statement on the same 5-point scale used for the other personality measures. The Judge, Locke, et al. (1998) and Chen et al. (2001) scales were combined to form one measure in Study 3a for the self-report and the two peer reports.

Other Big Five traits. The Big Five traits were measured with scales from the NEO–PI–R in Study 3a and the NEO–FFI in Studies 3b and 3c. In the three studies, only focal participants completed these measures. The reliabilities of the four factors in Study 3a and 3b were, respectively, Agreeableness, .87 and .87; Extraversion, .88 and .75; Conscientiousness, .91 and .90; Openness, .89 and .68.

Life satisfaction. Life satisfaction was measured in Study 3b with the SWLS (Diener et al., 1985). The reliability for this scale was .85.

Happiness. Happiness was measured in Study 3b with a modified version of Underwood et al.'s (1980) survey ($\alpha = .90$).

Analysis

In this study we describe two methods of estimating the convergent and discriminant validity of the measures using the MTMM framework. First, we present the results of a traditional MTMM, as described by D. T. Campbell and Fiske (1959). Second, we discuss the results of a more modern and complex confirmatory factor analysis approach to the MTMM framework. Although the traditional approach to MTMM has the advantage of being rather easy to follow, it does have several shortcomings (Kenny, 1979). For example, there is no acceptable significance test to compare the correlations, and estimates of the amount of variance explained by method versus trait cannot be obtained from the matrix (see Widaman, 1985). To mitigate these problems, Widman (1985) has suggested a general procedure of confirmatory factor analysis that specifies a set of models to test MTMM data. In this method, 16 hierarchically nested models that range from a null model (in which all the indicators of traits and methods are unrelated) to a complete model (in which all the indicators of traits load on their corresponding traits and are allowed to correlate and all indicators of methods load on their corresponding methods and are allowed to correlate). Intermediate models vary with regard to the number of separate traits and separate methods that are specified. For example, a complete model in our study would specify four trait factors (self-esteem, self-efficacy, locus of control, and neuroticism), where each trait has three trait indicators loading on it. This model would also specify three method factors (e.g., self, Peer 1, Peer 2), each with four indicators loading on it. Kenny and Kashy (1992) have argued that the application of the Widman (1985) method is problematic because many of the models are underidentified and therefore do not converge. They suggest an alternative, the correlated uniqueness model, which is not subject to identification problems. Similar to the complete model, in the correlated uniqueness model the traits' indicators are loaded on their corresponding trait factors, and the factors are allowed to correlate. However, no method factors are specified, but instead the disturbances are allowed to correlate among measures of the same method. Accordingly, in this study, we used the Kenny and Kashy approach to MTMM.

Results

Correlations among the personality measures, broken down by source (self- vs. peer report) and time (for Study 3c) are provided in Tables 2–4. Correlations between the same construct measured with different sources (convergent validity coefficients) are shown in boldface type. Correlations among different traits measured with the same source are underlined. As can be seen across the three tables, the strongest correlations tend to be those among the four traits within a source (e.g., $r = .69$ between self-reported self-esteem and emotional stability in Study 3a). In general, the correlations involving locus of control were appreciably weaker than the correlations among the other three traits. Also relatively strong in magnitude were the same trait–same source correlations, which consisted of different measures of the same traits (e.g., $r = .72$ between the two different self-reported measures of emotional stability in Study 3b). Here again, though, the correlation involving locus of control was weaker. The same trait–different source correlations were generally moderate in magnitude, ranging from .11 for the relationship between the second self-reported measure of generalized self-efficacy and significant other reported generalized self-efficacy in Study 3b to .45 for the relationship between self-report and Peer 1 emotional stability for Study 3a.

Finally, the correlations of same trait–different time in Study 3c were moderate to strong in magnitude, ranging from .24 for locus of control measured by different scales to .78 for emotional stability measured by the same scale (see Table 4). With the exception of the correlation between locus of control and emotional stability (.07), the different trait–different time correlations were generally moderate in magnitude. These correlations ranged from .21 for the relationship between locus of control and self-efficacy to .56 for the relationship between self-esteem and self-efficacy. Here again, the relationships between locus of control and the other measures were generally weaker than the other relationships.

Because of space limitations, results of the correlated uniqueness model are not reported in tabular form but are summarized here. Except for one case (loadings of significant other self-efficacy on self-efficacy trait in Study 3b), all the loadings of the trait indicators on the trait factors were significant. Thus, the data across studies show strong convergence validity among the indicators of the traits assessed by different methods. However, because in most cases the trait factors' covariances were significantly correlated with each other, the results across studies do not show discriminant validity among the personality measures. Method effects were represented by the degree of covariation among the unique factors. In Study 3a, all the relationships among the unique factors were significant, showing strong method effects. However, most of unique factors' covariances in Studies 3b and 3c were not significant, indicating that the trait factors and the relationship among the measures were not due to method effects.

To further investigate the hypothesis that the trait factors and the relationships among the measures were due to common method effects, we also compared the model recommended by Kenny and Kashy (1992) with a model in which method factors instead of trait factors were specified. The indicators were loaded on corresponding method factors, and the disturbances were allowed to correlate among measures of the same trait. The Kenny and Kashy model produced the following fit indices: for Study 3a, $\chi^2(30, N = 270) = 51.28$, *ns*, RMSEA = .05, NNFI = .97, IFI = .99, PFNI = .44; in Study 3b, $\chi^2(30, N = 124) = 42.90$, $p = .06$, RMSEA = .05, NNFI = .96, IFI = .98, PFNI = .43; and in Study 3c, $\chi^2(30, N = 72) = 53.85$, *ns*, RMSEA = .09, NNFI = .90, IFI = .96, PFNI = .40. These indices suggest good fit of the model to the data across studies and indicate that the trait factors represent the relationships in the data well. In contrast, the fit indices of the alternative model, for which method factors instead of trait factors were specified, suggested an inadequate fit of the model to the data across studies. The fit indices were as follows: in Study 3a, $\chi^2(39, N = 270) = 227.57$, *ns*, RMSEA = .12, NNFI = .79, IFI = .88,

PFNI = .51; in Study 3b, $\chi^2(39, N = 124) = 311.32$, *ns*, RMSEA = .18, NNFI = .44, IFI = .65, PFNI = .40; and in Study 3c, $\chi^2(39, N = 72) = 130.40$, *ns*, RMSEA = .14, NNFI = .72, IFI = .84, PFNI = .47. These results suggest that method factors do not represent the data adequately. In sum, the results of the confirmatory factor analysis models suggest that the different indicators of traits converge to represent the traits, that there was no discriminant validity among the traits, and that these results cannot be attributed to common method effects.

Discussion

Results of Study 3 indicate that in most cases and across three different methods, the heterotrait–monomethod correlations generally (though not always) were stronger than the monotrait–heteromethod correlations. Specifically, the correlations among purportedly different traits measured by the same source tended to be stronger than the correlations among the same traits measured by different sources. This suggests a lack of discriminant validity among the traits. This discriminant validity can emanate from two sources. First, the measures may lack discriminant validity because strong method (source) effects overwhelm the trait effects. Second, the measures may lack discriminant validity because their intercorrelations are so strong that they suggest that the traits are not discriminable across methods or sources. The confirmatory factor analysis results suggest that the second explanation regarding lack of discriminant validity among the trait measures is a more tenable explanation. Beyond the evidence provided to this point, discriminant validity also requires demonstration that the pattern of measures' correlations with other constructs is similar and conforms to theoretical propositions (J. D. Campbell et al., 1996). Thus, in the final study, we further investigate discriminant validity by correlating the measures with variables within a nomological network.

Study 4

A comprehensive nomological network should have, in principle, hundreds of empirical relationships. As this cannot be achieved in a single study, we chose to include in our nomological network the most frequently investigated correlates of neuroticism. This allows us to compare the relations of neuroticism measures and its correlates with the relations between measures of the other three traits and those same correlates.

First, we investigate the relationship between measures of the four traits and the Big Five personality traits (other than, obviously, Neuroticism). Following the literature on the relationship between neuroticism and measures of subjective well-being (DeNeve & Cooper, 1998), we expected the four personality scales to be moderately to strongly related to various measures of subjective well-being (i.e., mood measures, life satisfaction, and job satisfaction). Following the same logic and the literature on the relationship between emotional stability (the reverse of neuroticism) and stress and strain, we also expect the four scales to moderately and negatively correlate with measures of stress and strain.

We tested these hypotheses using data from the samples described in Studies 2 and 3. However, because these samples consisted of students, we decided to also use (Study 4) two samples consisting of employees of two different organizations to increase the generalizability of our findings. Thus, components of the nomological network are tested on seven samples with a variety of measures.

Method

Participants and Procedure

Participants for Study 4a were pharmaceutical salespersons employed by a large corporation headquartered in the eastern United States. A total of 256 sales representatives from the organization were surveyed. Survey materials were sent to the homes of all potential respondents. In total, 175 of the 256 employees returned usable survey packets, for a response rate of 68%. A majority ($n = 131$, or 75%) of respondents were male. The mean age of respondents was 42.10 years ($SD = 11.04$), and respondents reported having been employed in their current position for an average of 10.15 years.

Participants in Study 4b were all of the employees of three locations of a Midwestern food service company. Participants worked in jobs ranging from truck driver and warehouse employee to manager and sales representative. Of the 365 employees in the organization, 280 returned completed surveys, for a response rate of 77%. Surveys were administered to employees on the job. Completed surveys were placed into sealed envelopes and returned to us in postage paid envelopes. Participants were promised confidentiality for their responses.

Measures

All the measures of Study 4a were rated on a scale ranging from 1 (*strongly disagree*) to 9 (*strongly agree*). Except where we indicate otherwise, in Study 4b we used the scales as described in the previous studies.

Locus of control. In both studies, locus of control was measured with Levenson's (1981) IPC Scale. In Study 4a, the reliability was .70; in Study 4b, it was .57.

Self-esteem. In both studies, self-esteem was measured with Rosenberg's (1965) Self-Esteem Scale. In Study 4a, $\alpha = .80$, and in Study 4b, $\alpha = .82$.

Generalized self-efficacy. In both studies, self-efficacy was measured with Judge, Locke, et al.'s (1998) scale. In Study 4a, $\alpha = .80$; in Study 4b, $\alpha = .85$.

Big Five traits. The Big Five were measured in Study 4a and Study 4b with the NEO–FFI. The reliabilities of the five factors in Study 4a were as follows: Neuroticism, .84; Agreeableness, .71; Extraversion, .79; Conscientiousness, .84; and Openness, .73. In Study 4b, only three of the five traits were measured. The reliabilities were as follows: Neuroticism, .87; Extraversion, .78; and Conscientiousness, .87.

Job satisfaction. Job satisfaction was measured in Studies 4a and 4b using five items from the Brayfield and Rothe (1951) measure of overall job satisfaction. In Study 4b, respondents used a 7-point Likert type scale (1 = *strongly disagree* to 7 = *strongly agree*). The reliabilities for this scale were .82 and .83 in Studies 4a and 4b, respectively.

Life satisfaction. In Study 4a, life satisfaction was measured with the SWLS (Diener et al., 1985; $\alpha = .81$).

Stress. Stress was assessed with a brief, four-item measure developed by Motowidlo, Packard, and Manning (1986). Sample items from this measure include "I feel a great deal of stress because of my job" and "I almost never feel stressed at work" (reverse scored). The reliability of the stress scale was .80.

Strain. Strain was measured in Study 4a by the somatic symptoms scale used in Study 2 (QES; Quinn & Staines, 1979). The reliability estimate was .87.

Results

Tables 5, 6, and 7 contain the zero-order correlations among the measures of the four traits and the Big Five personality factors, several measures of subjective well-being, and stress and strain. To facilitate interpretation of these correlations, we created another table that contains the weighted average of these correlations across the seven studies (correlations were weighted by sample size). The results of this analysis are presented in Table 8. As with research on other psychological concepts (e.g., Lubinski et al., 1983; Schmidt, Lubinski, & Benbow, 1998), the correlational profiles of the four measures with the variables appeared to be similar, suggesting extrinsic convergent validity. The presence of extrinsic convergent validity leads to the conclusion that the "corresponding measures are conceptually near equivalent" (Lubinski et al., 1983, p. 432).

Besides simply comparing predictor–criterion correlation coefficients, we conducted the regression procedure recommended by Sanders, Lubinski, and Benbow (1995) to determine the contribution of each single trait over the prediction of the general common factor. This procedure determines whether the individual trait measures indeed explain variance in constructs of interest after the general common factor found in Study 2 is controlled for. First, a principal-components analysis of the four measures identified only one factor, across the seven samples, with an eigenvalue greater than 1.0. This factor explained from 57% to 67% of the variance, with an average of 61%. Thus, we created a factor score for the general factor in each sample by multiplying the four measures by their factor weights from the principal-components analysis.

Second, we regressed each variable of interest (e.g., life satisfaction) on the general common factor in the first step of a regression and then entered the individual measure on the second step. If the individual trait measure explains unique variance after the general factor is controlled for, we can conclude that the individual trait captures something that is psychologically meaningful (unique), separately from what the general factor explains. However, if the variance explained is not significant, we can conclude that the individual trait does not add anything psychologically meaningful beyond what is contributed by the general factor. These results were repeated four times to compare the contribution of each of the four traits with the prediction beyond the general factor. The results of these analyses are presented in Tables 9, 10, and 11.

Big Five Traits

Examination of Tables 5–8 reveals that, across all studies, the relationships among the four core traits and the Big Five dimensions were positive and varied from weak to moderate in magnitude. Table 8 shows that the relationships of Conscientiousness and Extraversion with the four traits were somewhat stronger (i.e., .26–.43) than the relationships of Openness and Agreeableness with the four measures (i.e., .14–.33); however, even the former relationships were moderate in magnitude. More important, the signs and magnitudes of the correlations between the measures of the four core traits and the Big Five traits were similar, suggesting a lack of discriminant validity among the measures of the four traits.

The regression analysis results reported in Tables 9–11 provide a more explicit test of discriminant validity. (We should note, in performing these analyses, that we do not necessarily see the core traits as causes of the Big Five traits. The purpose is to investigate shared variance, and, toward that goal, which variables are independent and dependent is not of substantive importance.) Using the results reported in these tables, we calculated the average multiple correlation squared that the general factor contributed to the explanation of the Big Five dimensions. We compared this variance explained with the contribution of each separate trait measure to the variance explained, controlling for the contribution of the general factor. Across the studies, the average variance explained in Conscientiousness by the general factor was $R^2 = .20$. In comparison, the individual traits contributed relatively little unique variance when we controlled for the general factor ($R^2 = .01$–$.04$). Similarly, on average, the general factor explained 18% of the variance in Extraversion. Individually, the traits explained little incremental variance in Extraversion that, on average, did not exceeded .01. The general factor explained less variance in Agreeableness ($R^2 = .08$) and Openness ($R^2 = .07$) than in Conscientiousness and Extraversion. Similar to the results reported above, individually, each of the four personality measures explained little variance in Agreeableness and Openness when we con-

Table 5
Relationship Among Measures of the Four Traits and Other Variables (Study 2)

	Study 2a				Study 2b			
Variable	LOC	ES	SE	GSE	LOC	ES	SE	GSE
Agreeableness					.31	.32	.21	.33
Conscientiousness					.25	.21	.29	.32
Extraversion					.24	.17	.28	.29
Openness					.44	.32	.18	.53
Happiness (ABS)					.63	.51	.46	.73
Happiness (UF)					.55	.48	.51	.69
Life satisfaction	.27	.35	.56	.38	.00	.10	.19	.03
Stress	−.39	−.64	−.53	−.45	−.12	−.04	−.23	−.13
Strain	−.34	−.65	−.60	−.48	−.03	−.12	−.08	−.01

Note. Study 2a, $N = 251$. Study 2b, $N = 702$. Correlations greater than .08 are significant at the .05 level. Correlations greater than .10 are significant at the .01 level. LOC = locus of control; ES = emotional stability; SE = self-esteem; GSE = generalized self-efficacy; ABS = Affect Balance Scale; UF = the Underwood, Froming, and Moore (1980) measure of happiness.

Table 6
Relationship Among Measures of the Four Traits and Other Variables (Study 3)

	Study 3a				Study 3b				Study 3c			
Variable	LOC	ES	SE	GSE	LOC	ES	SE	GSE	LOC	ES	SE	GSE
Agreeableness	.02	.30	.20	.11	.04	.39	.33	.20	.25	.15	.08	.05
Conscientiousness	.45	.28	.42	.49	.28	.17	.36	.46	.31	.03	.15	.12
Extraversion	.19	.24	.46	.53	.23	.37	.44	.35	.24	.12	.33	.29
Openness	.13	.06	.20	.23	.04	.18	.15	.03	.06	.05	.35	.49
Happiness (UF)					.19	.57	.62	.49				
Life satisfaction					.24	.48	.57	.48				

Note. In Study 3a ($N = 270$), correlations greater than .15 are significant at the .05 level, and correlations greater than .18 are significant at the .01 level. In Study 3b ($N = 124$), correlations greater than .18 are significant at the .05 level, and correlations greater than .23 are significant at the .01 level. In Study 3c ($N = 72$), correlations greater than .23 are significant at the .05 level, and correlations greater than .31 are significant at the .01 level. LOC = locus of control; ES = emotional stability; SE = self-esteem; GSE = generalized self-efficacy; UF = the Underwood, Froming, and Moore (1980) measure of happiness.

trolled for the general factor (i.e., $R^2 = .02–.03$), though generalized self-efficacy did explain more incremental variance in Openness ($R^2 = .06$).

Subjective Well-Being

We expected the four traits to be positively and moderately to strongly related to different measures of subjective well-being. The correlations presented in Tables 5–7 support this expectation. A perusal of the weighted average correlations in Table 8 shows that the four measures were moderately related to measures of job and life satisfaction and strongly related to measures of happiness. Here again, there were relatively small differences in relations between the measures of each of the four traits and subjective well-being, a result that is confirmed by the regression analyses in Tables 9–11. To facilitate interpretation of the regression analysis results, we averaged the findings in these tables. The average variance explained by the general factor was 46% for happiness, 23% for life satisfaction, and 21% for job satisfaction. The variance explained in these concepts by locus of control, beyond the other three measures, was .01, .01, and .00, respectively. Neuroticism contributed .02, .00, and .00 incremental variance, respectively. Self-esteem contributed .01, .02, and .01, respectively, and generalized self-efficacy contributed .04, .01, and .00, respectively. Thus, the variance specific to the four measures provides little incremental validity beyond the general factor.

Stress and Strain

As can be observed in Tables 5, 7, and 8, measures of the four traits were negatively and moderately related to stress and strain. As with respect to the previous variables in the nomological network, there were relatively small differences in the relationships between the four measures and stress and strain (see Table 8). Summarizing the results of the regression analysis in Tables 9–11, we note that the average R^2 values show that the general factor explained 18% of the variance in stress and 22% of the variance in strain. Self-esteem, self-efficacy, and locus of control contributed very little beyond the other three measures to these variances ($R^2 = .00–.03$). Neuroticism contributed relatively more of the variance of stress ($R^2 = .05$) and strain ($R^2 = .06$) beyond the contribution of the general factor.

Discussion

Individually and as a set, results presented in this study reveal that measures of the four traits were related to the criteria in the

Table 7
Relationship Among Measures of the Four Traits and Other Variables (Study 4)

	Study 4a				Study 4b			
Variable	LOC	ES	SE	GSE	LOC	ES	SE	GSE
Agreeableness	.14	.30	.24	.19				
Conscientiousness	.32	.44	.51	.58	.34	.31	.47	.45
Extraversion	.29	.43	.42	.48	.32	.22	.37	.42
Openness	.06	.06	.00	.14				
Job satisfaction	.20	.41	.39	.40	.24	.36	.36	.38
Life satisfaction	.36	.38	.44	.37				
Stress	−.13	−.35	−.17	−.19				
Strain	−.24	−.55	−.35	−.31				

Note. Study 4a, $N = 440$. Study 4b, $N = 277$. Correlations greater than .13 are significant at the .01 level. LOC = locus of control; ES = emotional stability; SE = self-esteem; GSE = generalized self-efficacy.

Table 8
Weighted Average of Relationship Among Measures of the Four Traits and Other Variables Across Studies

Variable	*N*	Locus of control	Emotional stability	Self-esteem	Generalized self-efficacy
Agreeableness	1,608	.19	.31	.22	.23
Conscientiousness	1,885	.31	.28	.39	.43
Extraversion	1,885	.26	.26	.36	.39
Openness	1,608	.24	.18	.14	.33
Job satisfaction	717	.22	.39	.38	.39
Life satisfaction	1,517	.17	.25	.35	.22
Happiness	826	.52	.52	.51	.68
Stress	1,393	.17	.25	.27	.21
Strain	1,393	.15	.35	.26	.19

Note. N = sample size combined across all studies.

nomological network. When we compare the validity contributed by individual trait measures beyond the general factor composed of their shared variance, we find that each individual trait measure had relatively little to contribute. Across the criteria, the average incremental variance contributed by an individual trait measure in Studies 2, 3, and 4 was, respectively, 11%, 14%, and 10% of the variance contributed by the four trait measures as a whole. Thus, it seems that although measures of the four traits together share variance with other personality measures (i.e., the Big Five traits) and psychological states in the nomological network, each trait measure separately contributes little beyond the contribution of their common core. One clear exception was the relationship of

Table 9
Incremental Validity of Individual Traits With General Factor Controlled for: Study 2

	Study 2a				Study 2b			
Variable	LOC	ES	SE	GSE	LOC	ES	SE	GSE
Agreeableness								
Common factor					.13**	.13**	.13**	.13**
Trait					.00	.00	.01**	.00
Conscientiousness								
Common factor					.10**	.10**	.10**	.10**
Trait					.00	.01**	.00	.00
Extraversion								
Common factor					.09**	.09**	.09**	.09**
Trait					.00	.02**	.01**	.00
Openness								
Common factor					.21**	.21**	.21**	.21**
Trait					.01**	.01**	.07**	.07**
Happiness (ABS)								
Common factor					.51**	.51**	.51**	.51**
Trait					.01**	.02**	.02**	.04**
Happiness (UF)								
Common factor					.47**	.47**	.47**	.47**
Trait					.00	.02**	.00	.03**
Life satisfaction								
Common factor	.24**	.24**	.24**	.24**	.09**	.09**	.09**	.09**
Trait	.02†	.00	.07**	.00	.00	.01**	.01**	.00
Stress								
Common factor	.39**	.39**	.39**	.39**	.08**	.08**	.08**	.08**
Trait	.00	.07**	.00	.04	.00	.01**	.01**	.00
Strain								
Common factor	.42**	.42**	.42**	.42**	.03**	.03**	.03**	.03**
Trait	.04**	.06**	.01†	.02**	.00	.04**	.02**	.00

Note. Study 2a, N = 251. Study 2b, N = 702. LOC = locus of control; ES = emotional stability; SE = self-esteem; GSE = generalized self-efficacy; Common factor = variance explained (R^2) by the common factor; Trait = incremental variance explained (R^2) by the individual trait; ABS = Affect Balance Scale; UF = Underwood, Froming, and Moore (1980) measure of happiness.
† $p < .10$. ** $p < .01$.

Table 10
Incremental Validity of Individual Traits With General Factor Controlled for: Study 3

	Study 3a				Study 3b				Study 3c			
Variable	LOC	ES	SE	GSE	LOC	ES	SE	GSE	LOC	ES	SE	GSE
Agreeableness												
Common factor	.05**	.05**	.05**	.05**	.12**	.12**	.12**	.12**	.00	.00	.00	.00
Trait	.01	.04**	.00	.02**	.02	.07**	.00	.07**	.09*	.04	.03	.01
Conscientiousness												
Common factor	.26**	.26**	.26**	.26**	.18**	.18**	.18**	.18**	.03	.03	.03	.03
Trait	.05**	.04**	.01**	.01*	.07**	.08**	.00	.03*	.07*	.04	.00	.00
Extraversion												
Common factor	.22**	.22**	.22**	.22**	.21**	.21**	.21**	.21**	.11**	.11**	.11**	.11**
Trait	.00	.05**	.00	.06**	.00	.00	.00	.02	.00	.02	.01	.00
Openness												
Common factor	.02**	.02**	.02**	.02**	.01	.01	.01	.01	.12**	.12**	.12**	.12**
Trait	.05**	.00	.02**	.04**	.01	.02	.01	.03	.03	.06*	.01	.14**
Depression												
Common factor					.38**	.38**	.38**	.38**				
Trait					.03**	.10**	.00	.03**				
Happiness (UF)												
Common factor					.40**	.40**	.40**	.40**				
Trait					.01	.02*	.02	.04**				
Life satisfaction												
Common factor					.35**	.35**	.35**	.35**				
Trait					.00	.00	.01	.02				

Note. Study 3a, $N = 270$. Study 3b, $N = 124$. Study 3c, $N = 72$. LOC = locus of control; ES = emotional stability; SE = self-esteem; GSE = generalized self-efficacy; Common factor = variance explained (R^2) by the common factor; Trait = incremental variance explained (R^2) by the individual trait; UF = Underwood, Froming, and Moore (1980) measure of happiness.
* $p < .05$. ** $p < .01$.

neuroticism to stress and strain; neuroticism appears to uniquely contribute to the prediction of stress and strain. This is not so surprising given that neuroticism is a central construct in most models of stress (Suls, 2001). In general, though, results presented in Study 4 indicate that the measures of each of the four traits individually contribute little beyond the contribution of the general factor in predicting criteria of interest in the nomological network of variables. As a result, the analysis of the nomological network suggests a lack of discriminant validity among the four traits.

General Discussion

There are no more widely studied personality traits in psychology than self-esteem, locus of control, and neuroticism. That there are more than 50,000 studies on these traits attests to their popularity and usefulness among psychologists. Yet, for the most part, researchers have considered these traits in isolation, with little attention to whether they might be alternative indicators or even measures of the same construct. It is our contention that the relationships among measures of these traits as well as a closely related trait (generalized self-efficacy) need to be considered.

The results of the present investigation provide several important insights into the nature of these traits. First, the meta-analytic findings reveal that the measures are strongly related. Across 75 studies, the average correlation among measures of these traits was .60. Though these results are suggestive, simple correlations among traits per se do not address the issue of whether a higher order factor can be extracted from the measures.

Second, in Study 2 we investigated the structural relations among measures of the traits. Results revealed that the measures cannot be entirely treated as independent and, furthermore, that a second-order latent factor explains the association among the measures. This suggests that the traits are indicators (measures) of a higher order construct. As a result, we next turned to the issue of the discriminant validity among the measures.

Third, like Lucas et al. (1996) in their study of the construct validity of well-being measures, we used an MTMM approach to investigate the discriminant validity of the traits. In the MTMM approach, according to D. T. Campbell and Fiske (1959), the first requirement is that the convergent validity estimates (correlations among different measures of the same trait or between different sources) exceed the heteromethod–heterotrait correlations. This was generally the case in the present study, though there were numerous exceptions (and more than in the Lucas et al. study). The second requirement is that the convergent validity estimates exceed the monomethod–heterotrait triangle. On this dimension, the results did not support discriminant validity. In almost all cases, the correlations among the four trait measures within source were higher than the correlations among different sources of the same trait. We should note that the monomethod–heterotrait correlations are generally lower than the correlations among different measures of the same trait, but this comparison is flawed, as the latter estimates are potentially affected by same-source effects. Finally, the third Campbell and Fiske criterion, as discussed by Lucas et al., is that "the same pattern of correlations should emerge in all

Table 11
Incremental Validity of Individual Traits With General Factor Controlled for: Study 4

	Study 4a				Study 4b			
Variable	LOC	ES	SE	GSE	LOC	ES	SE	GSE
Agreeableness								
Common factor	.08**	.08**	.08**	.08**				
Trait	.00	.02**	.00	.00				
Conscientiousness								
Common factor	.36**	.36**	.36**	.36**	.27**	.27**	.27**	.27**
Trait	.00**	.00	.00	.01**	.02**	.01	.00	.00
Extraversion								
Common factor	.27**	.27**	.27*	.27**	.19**	.19**	.19**	.19**
Trait	.00**	.00	.01*	.00	.03**	.02**	.00	.00
Openness								
Common factor	.01	.01	.01	.01				
Trait	.00	.00	.03**	.02**				
Job satisfaction								
Common factor	.21**	.21**	.21**	.21**	.20**	.20**	.20**	.20**
Trait	.00	.01	.00	.00	.00	.00	.01	.00
Life satisfaction								
Common factor	.24**	.24**	.24**	.24**				
Trait	.02**	.00	.00	.02				
Stress								
Common factor	.07**	.07**	.07**	.07**				
Trait	.00	.05**	.02**	.01*				
Strain								
Common factor	.21**	.21**	.21**	.21**				
Trait	.00	.09**	.02**	.05**				

Notes. Study 4a, $N = 440$. Study 4b, $N = 277$. SE = self-esteem; LOC = locus of control; ES = emotional stability; GSE = generalized self-efficacy; Common factor = variance explained (R^2) by the common factor; Trait = incremental variance explained (R^2) by the individual trait.
* $p < .05$. ** $p < .01$.

heterotrait triangles in both the monomethod and heteromethod blocks" (p. 621). On this dimension, the results were equivocal. For Study 3a, the results were quite consistent, with the following pattern of correlations generally emerging from highest to lowest: generalized self-efficacy–self-esteem, self-esteem–emotional stability, emotional stability–generalized self-efficacy, generalized self-efficacy–locus of control, self-esteem–locus of control, and emotional stability–locus of control. In Study 3a, there was only one exception to this pattern in the six heterotrait triangles. For Studies 3b and 3c, however, the pattern was much less consistent. Indeed, there was no single pattern that was the same in any of the six heterotrait triangles in Study 3b or any of the six triangles in Study 3c. Thus, overall, there was, at best, equivocal support for the discriminant validity of the four personality measures.

We also evaluated discriminant validity of the traits by correlating measures of the four traits with measures of other relevant traits (the five-factor model) as well as various attitudes. Results revealed that measures of the four traits were consistently related to the Big Five traits as well as to the attitudes. However, the discriminant validity of the traits was, again, open to question. The core measures displayed roughly similar correlations with the Big Five and the attitudes, yet the pattern of which trait measure was most consistently related to the variables in the nomological network was not particularly consistent. No trait was the strongest correlate of even a majority of the variables included in the nomological net. Furthermore, the regression analysis revealed that it was rare for one measure to explain incremental variance in the network variables when we controlled for the influence of the common factor. Thus, across the studies, the discriminant validity of the four traits was suspect.

Despite these results, it is not our contention that researchers should abandon study of self-esteem, neuroticism, locus of control, or generalized self-efficacy as isolated traits. Our results suggest that there is some variance unique to each of these traits. Although a second-order factor explained much of the variance among the measures, it did not explain all of the variance. Our results also show that the individual trait measures correlate quite similarly with other variables (the Big Five and well-being). The psychological importance of the variance unique to the traits, beyond the shared variance explained by the general factor, therefore needs to be documented empirically in the context of external validation criteria. Specifically, as demonstrated by Sanders et al. (1995) on another concept, in such an endeavor, one must determine whether the unique aspects of the measures share variance with relevant criteria, controlling for the general factor, in this case the core factor. It is possible that these uniquenesses are psychologically meaningless, as might be due to a crud factor (Meehl, 1990, pp. 208–211) or ambient noise (Lykken, 1968, pp. 153–154). In the case of the traits studied here, the relation of the uniqueness to the criteria was quite small in magnitude.

This brings us to another important matter to be discussed—what is the nature of this higher order latent trait that explains the

associations among the four individual traits? We believe that these individual traits may be indicators of neuroticism, although broader than usually conceptualized. Eysenck (1990), for example, considered self-esteem to be one of the lower order indicators of neuroticism, and D. Watson and Clark's (1984) conceptualization of negative affectivity, which the authors have subsequently argued is neuroticism (D. Watson, 2000), also includes self-esteem as one of its indicators. Although we are not aware of researchers who have argued that generalized self-efficacy and locus of control are indicators of neuroticism, researchers have discussed the relationships among the traits (Morrison, 1997). Furthermore, Hunter, Gerbing, and Boster (1982), in a study of Machiavellianism, concluded that self-esteem and locus of control "act like proxies for a second-order factor" (p. 1302) and Hojat (1982) found that self-esteem, locus of control, and neuroticism had their highest loadings on a common factor.

One might argue that the three traits cannot be subsumed under the neuroticism construct. For example, the results in Table 8 show that locus of control, self-esteem, and generalized self-efficacy correlate somewhat more strongly with the other Big Five traits than does neuroticism. Thus, it might be that self-esteem, locus of control, and generalized self-efficacy are more heterogeneous traits that have elements of several Big Five traits. On the other hand, the magnitude of the correlations is not large (on average, neuroticism correlates .25 with the Big Five traits, compared with .29 for the three traits) and is much smaller than the correlations of the three traits with neuroticism (.48 across the studies). Thus, it appears more likely that the four measures represent a general neuroticism factor than a factor that is a composite of several Big Five traits.

Response bias might be argued to support the importance of the common factor. Specifically, in Studies 3a, 3b, and 3c, the heterotrait–monosource correlations were stronger than the monotrait–heterosource correlations. Though this fact might support the argument that the four traits are indistinct, it also might support the argument of a response bias or methods factor. To be sure, it appears that there are source effects in the results (see Tables 2–4). However, with the exception of locus of control, even when the traits were measured with independent sources, the same traits measured with different sources did not correlate much more highly with one another than the different traits did with each other. In addition, the confirmatory factor analysis of the MTMM suggested that method effects could not explain the lack of discriminant validity among the traits. Thus, though source variance clearly exists in the data, it does not appear to explain the lack of discriminant validity among the traits.

Another caveat must be issued here. Of the four traits, evidence regarding locus of control was the weakest. It was the trait whose measures correlated most weakly with the other core traits. To some extent, this is due to measurement problems with the trait. Reliability problems have plagued locus of control measures (see Lefcourt, 1991). Furthermore, though there were exceptions, locus of control tended to have weaker correlations with the external criteria, compared with the other three traits. Thus, that locus of control showed weaker levels of convergent and discriminant validity may speak more to the problems involving the locus of control construct than the existence of a higher order construct. Nevertheless, given these lower correlations, future research on the relationship of locus of control to the higher order factor is warranted.

What are the implications of our results for personality researchers? First, researchers who study these traits should consider the possibility that the uniqueness of measures of these traits is overwhelmed by their commonality. If measures of the traits are roughly equivalent measures of the same general construct, then personality researchers could avoid the jangle fallacy (Kelley, 1927) by recognizing the common core. This would allow the scattered literatures on these specific traits to achieve a greater degree of unity and integration than has been possible in the past. For example, one literature has focused on the role of locus of control as an important resource in childhood coping with divorce (Sandler, Kim-Bae, & MacKinnon, 2000), whereas another literature has focused on the role of self-esteem as a resource of childhood coping with divorce (Clark & Clifford, 1996). These literatures operate independently (neither of the studies cited above mention the other trait). However, if the traits do indicate a common construct, the results of one line of inquiry could build on the other (i.e., studies of the relationship of self-esteem and divorce would complement those involving locus of control).

A second general implication is that researchers who measure neuroticism should do so broadly. Typically, measures of neuroticism, perhaps owing to their psychopathological origins, assess dysphoria, hostility, stress, and anxiety. Most measures of neuroticism do not explicitly assess beliefs about one's capabilities or control over one's environment. For example, there are no items in the Neuroticism scales of the NEO–FFI (Costa & McCrae, 1992), the IPIP (Goldberg, 1996), or the Eysenck Personality Inventory (Eysenck & Eysenck, 1968) that explicitly reference control or capability. Thus, measures of neuroticism may need to be expanded to include aspects of subjective self-worth and competence. One area for future research is to study the broad trait of neuroticism in a hierarchical organization. Treating neuroticism as a hierarchical concept is not new (e.g., Costa & McCrae, 1992; Eysenck, 1990). However, we think there may be a simpler or intermediate structure, wherein there are two main indicators. One, as discussed above, may be labeled *trait anxiety* and is omnipresent in typical measures of neuroticism. The other, the one at study here, is the self-concept aspect and might be called *core self-evaluations* (Judge, Locke, et al., 1998) in the positive or *personal negativity* (Furr & Funder, 1998) in the negative.

If we needed to summarize the implications of this study in one sentence, we would probably say that the various literatures studying these four traits should be integrated. For example, in many literatures, there is a marked tendency to study self-esteem and, to a certain extent, locus of control and generalized self-efficacy as dependent variables, whereas neuroticism is usually studied as an independent variable. For instance, Courneya, Bobick, and Schinke (1999) noted a negative relationship between exercise and neuroticism, where neuroticism was viewed as a predictor of exercise behavior. Palmer (1995) and Brandon and Loftin (1991), on the other hand, noted positive relationships between self-esteem and internal locus of control, respectively, with exercise behavior, but in these studies, the measures were modeled as dependent variables. (Nagy, 1988, used participation in aerobic exercise to predict both self-esteem and locus of control but did not discuss the relationship among the traits.) However, self-esteem and locus

of control, like neuroticism, appear to exhibit considerable stability (Conley, 1984) and are heritable (Plomin, Chipuer, & Loehlin, 1990; Roy, Neale, & Kendler, 1995). If investigators believe that there are meaningful psychological differences among self-esteem, locus of control, emotional stability, and generalized self-efficacy, it behooves them to demonstrate the distinctiveness of the scales in the context of relevant psychological criteria or to build new scales that assess the unique qualities of these concepts. Thus, although there may be value in studying these traits separately and as dependent variables, we do believe that researchers need to recognize the similarities among these traits and give their common core consideration.

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Received May 24, 2001
Revision received March 27, 2002
Accepted March 28, 2002 ■

Call for Nominations

The Publications and Communications (P&C) Board has opened nominations for the editorships of ***Contemporary Psychology: APA Review of Books***, ***Developmental Psychology***, and ***Psychological Review*** for the years 2005–2010. Robert J. Sternberg, PhD, James L. Dannemiller, PhD, and Walter Mischel, PhD, respectively, are the incumbent editors.

Candidates should be members of APA and should be available to start receiving manuscripts in early 2004 to prepare for issues published in 2005. Please note that the P&C Board encourages participation by members of underrepresented groups in the publication process and would particularly welcome such nominees. Self-nominations are also encouraged.

Search chairs have been appointed as follows:

- ***Contemporary Psychology: APA Review of Books:*** Susan H. McDaniel, PhD, and Mike Pressley, PhD
- ***Developmental Psychology:*** Joseph J. Campos, PhD
- ***Psychological Review:*** Mark I. Appelbaum, PhD

To nominate candidates, prepare a statement of one page or less in support of each candidate. Address all nominations to the appropriate search committee at the following address:

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American Psychological Association
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The first review of nominations will begin November 15, 2002. The deadline for accepting nominations is November 25, 2002.