

PERSONALITY DIMENSIONS AND MEASURES POTENTIALLY RELEVANT TO HEALTH: A FOCUS ON HOSTILITY^{1,2,3}

Howard S. Friedman, Ph.D., Joan S. Tucker, Ph.D., and
Steven P. Reise, Ph.D.
University of California, Riverside

ABSTRACT

Although it is clear that chronic, negative socioemotional patterns are associated with poor health and premature death, various overlapping concepts and measures are currently used, making research planning difficult and limiting attempts at theoretical development. This article reviews current issues and reports a study of 36 theoretically interesting and commonly-used personality scales that were administered to 454 undergraduates. The scales included the Cook–Medley scale, Buss–Durkee Hostility Inventory, the Spielberger scales, Eysenck Personality Questionnaire, hardiness/alienation scales, NEO Personality Inventory, locus of control, Life Orientation Test, Jenkins Activity Survey, and the Beck Depression Inventory. While research and theory refine the best concepts and measures, studies predicting health from chronic negative patterns may want to include at least four measures: (a) aggressive overt hostility, (b) alienated bitterness, (c) introversion, and (d) anxiety/depression. A measure of conscientiousness is also useful.

(Ann Behav Med 1995, 17(3):245–253)

INTRODUCTION

It is now clear that negative socioemotional patterns are associated with illness. There is substantial evidence that individuals who become ill or die prematurely are more likely to be hostile, anxious, depressed, and cynical than they are to be calm, content, trusting, friendly, and altruistic (1–9). However, it is not yet known precisely why such associations exist or why they sometimes fail to appear. There is thus a substantial amount of current research interest in the definition and the measurement of negative socioemotional patterns, such as chronic hostility and pessimism. A recent conceptual review of personal dispositions and illness informally derived four categories from the existing literature (hostility and Type A, depression, neuroticism, and optimism and self-esteem), but notes the unsys-

tematic and unintegrated nature of these research foci. There is therefore a call for further development of valid measures of the major domains of hostility that can be used in large-scale prospective studies (10). For research on these questions to progress in a systematic manner, a clearer understanding is needed about basic dimensions of negative patterns and about reliable ways to measure them. In this article, we review basic concepts and examine the interrelations of a number of key measures.

Since the causal pathways are ambiguous, it is unknown whether we should be focusing on emotional temperament, cynical traits, personality-by-situation interactions, unhealthy habits, emotional coping strategies, or combinations thereof. Therefore, until more is discovered about the causal links, we will use the term “negative socioemotional patterns.”

In the search for psychosocial contributors to disease etiology or disease progression, hostility has emerged as an especially promising construct. In both longitudinal and cross-sectional studies, hostility has been isolated as a risk factor for coronary heart disease as well as other diseases (11–16), although some studies have not found the expected association (17,18). Many controversies exist over definition and measurement. For example, it has been argued that cynicism differs from antagonism which in turn differs from anger (19,20) and that some commonly-used hostility and neuroticism scales share variance (21–24).

Particular attention has focused on the Cook–Medley (Ho) scale and the Buss–Durkee Hostility Inventory. The Cook–Medley is derived from the MMPI and so allows researchers to return to old MMPI archival data, but it has come under criticism. As with the more general hostility construct, there is some dispute about whether the Cook–Medley predominantly measures cynicism, anger, aggressiveness, or neuroticism, as well as about health-related mechanisms or pathways (25). For example, Smith and Frohm (26) correlated the Cook–Medley scale with measures of hostility, anxiety, depression, social desirability, Type A, locus of control, Machiavellianism, hardiness, anger, and trustful/cynical outlook. They concluded that the Cook–Medley is related to anger, suspiciousness, resentment, and cynicism [see also Costa et al. (27); Pope et al. (28)]. But Blumenthal et al. (29) suggest that the Cook–Medley scale measures anger/hostility, neuroticism, social maladjustment, and inability to cope effectively. A related and often-used measure, the Buss–Durkee, is a comprehensive scale that attempts to assess different aspects of hostility (from resentment to suspiciousness to verbal hostility and assault). It is, however, sometimes avoided because it is lengthy. Some earlier efforts have concluded that hostility as measured by the Buss–Durkee is comprised of two aspects: (a) an affective component of hostility tapping into feelings of suspicion, anger, and/or resentment; and (b) a behavioral component of hostility reflecting a tendency to overtly express this trait through aggressive behavior (30,31) [see also

¹ Preparation of this manuscript was supported in part by intramural research funds of the University of California, Riverside, and by National Institute on Aging Grant #AG08825.

² Dr. Tucker is now at Brandeis University.

³ We would like to thank Marci Lobel and Arthur Stone for comments on an earlier draft.

Reprint Address: H. S. Friedman, Ph.D., Department of Psychology, University of California, Riverside, CA 92521.

© 1995 by The Society of Behavioral Medicine.

Bushman et al. (32)]. The present study includes both the Cook–Medley and the Buss–Durkee, and we retain a conceptual focus on suspicious resentment as compared to overt aggressiveness.

Anger and anger expression or suppression have also been singled out for special attention by many researchers (33). Does it matter if the anger is held in or let out, or is it simply the anger in either form that is related to illness? The Spielberger measures of state and trait anger and anxiety and anger expression are often used in this context, and so were also included in the present study.

Sometimes overlooked by hostility researchers are the considerable number of attempts to relate a person's general world view to health, which are often theoretically-based (34). For example, the Life Orientation Test (LOT), which measures optimism, sometimes predicts healthy outcomes (35,36) [but see Friedman et al. (37)]. It has been argued, however, that the LOT is highly related to neuroticism (38). More generally, the concept of "hardiness" taps into a person's general resources and appraisal processes relevant to resisting stress—commitment, control, and challenge (39), measured by alienation scales, the locus of control scale, and a security scale (40). In general, there is evidence that effective coping is related to good health (41), although the hardiness scale itself may be too broad (42). However, alienation is little studied. So we included these scales as well as the complementary measures of anxiety and depression that have been theorized to be relevant to health. These measures also serve as a check on the discriminant validity of the hostility measures.

Finally, in evaluating basic dimensions of negative patterns, it is worthwhile to understand their relations to the basic dimensions of personality. Substantial progress has occurred recently in understanding the Big Five dimensions (43), and this information should be utilized in the health arena (44). We therefore include the comprehensive NEO Personality Inventory (NEO-PI) (22). We also include the Eysenck Personality Questionnaire (EPQ) (45) with its Big Three dimensions. Eysenck sees a direct biological link—he posits that the sensitivity of the nervous system is a causal element in both personality and health (46).

Clearly, more attention should be given to problems of definition and measurement. Some of this must come from empirical efforts: What is each hostility-related instrument measuring, and how can the measures be used together so as to be more useful in their application? To address these matters, we employed correlational and factor analytic techniques to begin to paint a clearer picture of the negative reaction profiles.

METHOD

Subjects

Subjects were 461 male and female undergraduate students recruited from introductory psychology classes. The data from seven subjects were eliminated from the analysis due to missing data; the final N was 454. Our LISREL analyses used only S s with complete data, $N = 427$. Although many of the scales were originally validated on college students, the results that emerge here may not necessarily be generalizable to populations strikingly different in relevant ways (such as an institutionalized elderly population).

Procedure

Subjects anonymously completed a battery of personality tests in groups of up to 15 individuals. All are reliable, com-

monly-used, self-report measures that have been employed to assess the role of negative socioemotional patterns in physical health. The instruments administered were: Cook–Medley Hostility Scale with subscales of hostility, paranoia, and cynicism (47); the Buss–Durkee Hostility Inventory, with subscales of physical assault, indirect hostility, irritability, negativism, resentment, suspicion, and verbal hostility (30); Beck Depression Inventory (48); the shortened Taylor Manifest Anxiety Scale (49); Spielberger State–Trait Anger Expression Scale, with subscales of Anger–In, Out, and Control (50); the Spielberger State–Trait Anxiety Inventory (51); Eysenck Personality Questionnaire (45), with subscales of psychoticism, neuroticism, extraversion, and lie; Life Orientation Test (LOT) of optimism (35); Form T of the Jenkins Activity Survey (JAS) (52); Rotter Locus of Control Scale (53); and the alienation from self, alienation from work, security, and powerlessness subscales from Maddi et al.'s Alienation Test/Hardiness (54,40). The NEO Personality Inventory was included as a measure of the Big Five factors (five scales for normal populations) (22).

The order of the questionnaires was randomized across subjects. All were completed in one testing session. A break occurred after 45 minutes in order to relieve possible fatigue. Subjects were given as much time as necessary to complete the questionnaires, with most finishing within 1½ hours. The number of subjects exceeded the number of scales by a factor of more than 10 to 1. Two different kinds of factor analyses were conducted.

Promax Factor Analysis Results: First, a principal components factor analysis with a Promax (oblique) rotation was performed. An oblique rotation was used due to theoretical expectation of interrelations among negative patterns. Using a scree test and the criterion of eigenvalues exceeding 1.0, five factors were retained, which accounted for 89% of the variance. Maximum absolute correlations were used to set the prior communality estimates. The factors and loadings are shown in Table 1. Loadings with absolute value lower than .30 are not shown. The full correlation matrix is shown in the appendix.

Factor 1 is a Neuroticism factor—the traits loading highly on this factor traditionally fall under this heading. It is comprised of both major Neuroticism scales (NEO and EPQ), the Taylor and Spielberger Anxiety scales, depression (Beck), and a lack of optimism (LOT). Note that the Spielberger Anger–In scale (the tendency to inhibit the expression of anger) and the Buss–Durkee Resentment and Irritability scales load on this factor, thus showing where so-called hostility scales may overlap with neuroticism. In fact, the following LISREL analyses (shown below) reveal that most of these scales have an element of neuroticism.

Factor 2 may be labeled Aggressive Overt Hostility. It is largely comprised of scales measuring the outward expression of hostility. Loading most substantially on this factor are the Buss–Durkee scales of Assault, Indirect Hostility, and Verbal Hostility. Also comprising this overt hostility are the Spielberger Anger scales of Angry Temper, Anger–Out, and a lack of Anger Control. This factor represents a readiness to explode, often manifested in an aggressive attack on others.

Factor 3 appears to comprise an Alienated, Suspicious Hostility, very distinct from Factor 2. Loading on this Alienated Hostility factor are the two Alienation scales and Powerlessness, the Cook–Medley Paranoia and Cynicism scales, EPQ Psychoticism, Buss–Durkee Suspiciousness and Negativity, as well as a lack of Agreeableness. This factor represents a bitterness which

TABLE 1
Factor Analysis Using Promax Rotation

	I	II	III	IV	V
NEO Personality Inventory					
Neuroticism	.88				
Extroversion				.85	
Openness				.47	
Agreeableness		-.37	-.40	.40	
Conscientiousness					.64
Cook-Medley Hostility					
Cynicism			.49		.36
Paranoia			.46		
Hostility			.32		
Eysenck Personality Questionnaire					
Neuroticism	.87				
Psychoticism			.62		
Extroversion				.75	
Lie		-.60			
Buss-Durkee Hostility Inventory					
Irritability	.47	.57			
Physical Assault		.59	.31		
Resentment	.52				
Indirect Hostility		.64			
Verbal Hostility		.74			
Suspiciousness			.38		
Negativism			.36		
Hardiness					
Security	.33				
External Locus of Control	.30		.35		
Powerlessness			.79		
Alienation from Work			.73		
Alienation from Self			.74		
Spielberger Trait Anger					
Angry Temperament		.70			
Angry Reaction		.31			
Spielberger Anger Expression					
Anger-In	.56				
Anger-Out		.79			
Anger Control		-.67			
Spielberger State Anger					
Spielberger Trait Anxiety	.89				
Spielberger State Anxiety	.73				
Beck Depression Inventory	.58				
Jenkins Activity Survey					.47
Life Orientation Test	-.56				
Taylor Manifest Anxiety	.81				

Notes: Loadings with absolute value < .30 are not shown. Promax rotations allowing greater interfactor correlation showed the same basic pattern, but with Cook-Medley and with NEO Agreeableness (inversely) loading even higher on Factor III. Spielberger State Anger does not load substantially on any factor.

is manifested in a suspicion and pulling away from others. (This is consistent with the findings of Musante et al. (23), who focused on anger.)

Factor 4 is Introversion, having the two extraversion scales loading substantially on it. Introverts avoid over-stimulation and prefer to be alone (cf. Barefoot et al. (1) re Social Avoidance). Since disease-proneness is often associated with a lack of social relations, it is conceptually important to demonstrate that introversion is distinct.

Factor 5 is mainly comprised of the NEO scale of Conscientiousness. Conscientiousness does not seem directly relevant to negative reaction patterns. However, Conscientiousness has proven repeatedly to be a robust dimension of personality, predictive of many health-related outcomes (37,55-57) and so should not be lightly dismissed. In fact, conscientiousness or social dependability is the only dimension ever shown to predict longevity across the life span (37); conscientiousness may be relevant to many health behaviors such as taking prophylactic

actions, and it may impact patterns of social relations. The Jenkins Activity Survey also loaded on Conscientiousness, consistent with the idea that Type A people are job-involved. The lack of relation of the JAS to the hostility factors is consistent with its relative lack of relations to coronary disease, compared to a structured interview. Note that the purpose of the factor analysis was not to construct new measures, but rather to help understand our existing measures. Cross validation was not an issue and it would be inappropriate to construct new measures based solely on the current results.

LISREL Orthogonal Analysis Results: An oblique factor rotation (above) can muddy interpretation and does not directly address the utility of using a Big Five personality dimension approach. To represent the Big Five model, we used the NEO items to create six parcels of items for each of the Big Five dimensions (30 parcels total). Using LISREL (Version 8), we fixed each of the parcels to load on one and only one factor of a five-factor solution. (This defined the Big Five structure.) The solution was constrained to be orthogonal. The other variables (scales) were left free to load on any of the five factors. The results are shown in Table 2. The scale loadings can be interpreted as the extent to which the scale is explained in terms of the Big Five.

As before, Factor 1 is the Neuroticism factor. Factor 2, the Agreeableness factor, is clearly central to the matter under study, but in an uncertain way. Disagreeable people are especially high on the aggressive, overt hostility described above, engaging in interpersonal conflict. But they are also high on other negative scales. This is good to the extent that Agreeableness captures many aspects that may previously have been incompletely defined or measured; on the other hand, Agreeableness may be too broad to use as a single dimension in studies of hostility and health.

Factor 3 was here defined by the NEO Openness measures, but, as usual, this turned out to be a vague construct. Interestingly, this factor seems to capture alienation and powerlessness, which is consistent with a lack of values and anti-intellectualism (two characteristics of lack of Openness—closed-mindedness). This finding supports the theorizing about alienation as potentially important to consider and again hints at a negative pattern that is often overlooked. Also, it is interesting to note that Cook-Medley is not simply captured by any single dimension.

Factor 4 is a distinct extraversion factor, and Factor 5, Conscientiousness, again shows as distinct from the negative patterns. NEO-defined Conscientiousness is not very relevant to negative socioemotional patterns, except perhaps to the extent that conscientious people may be more determined or achievement-striving. However, to the extent that conscientiousness includes impulse control and harm-avoidance, it is certainly relevant to health.

DISCUSSION

If the long, broad view is not taken in the search for psychosocial factors in illness, then shallow concepts and weak scales are likely to lead to inconsistencies that could have been avoided. It is too simplistic for health studies to throw in a few questionnaire items in an attempt to measure anger. Theoretically, shallow constructs and quick-and-dirty measures may provide useful hints in the short term, but will ultimately bog down in a morass of inconsistent findings and conceptual quicksand. The interrelations of measures and their ties to deeper psychological theorizing should be continually evaluated.

The first basic factor that we believe is important to study is a classic neuroticism—anxiety, depression, and some resentment and pessimism. We might hypothesize that these people likely have poor coping responses and poor health habits (such as lack of exercise). They may be hypochondriacal. They may often have the physiological correlates of depression. It is interesting that the LOT loads on this factor, confirming Smith et al. (38). It may be that optimism sometimes predicts health because optimists cooperate more with treatment and/or experience less depression-related psychophysiological distress; or it may be that neurotics simply feel and report worse health (58). Optimism seems unlikely to be directly related to the psychophysiological mechanisms currently being studied under the rubric of hostility. Also, consistent with Marshall et al. (34), many of the measures are associated with at least two basic dimensions, particularly including neuroticism.

The second factor worthy of continued attention is an overt hostility. These people have an angry temper that is easily noticed. They tend to be aggressive and disliked by others, perhaps cruel. Their hostility should be readily seen in an interview. This dimension is probably what has classically been detected in the Type A interview. Such people should often show the physiological correlates of anger. We might hypothesize that these people are the most physiologically hyperreactive, and it would be interesting to see if they are especially likely to be hypertensive (59). It is unclear as to whether these people likely have unhealthy habits.

The third factor captures a cynical, powerless, alienated hostility. These people may also be suspicious and jealous. Perhaps they seek power or accomplishment to overcome their powerlessness and alienation. They may be cold rather than angry. They may be prone to substance abuse. As above, these people may be disliked by others, but this factor is different. Perhaps some contradictory findings of previous research are due to a failure to distinguish the overt angry hostility from the cynical alienated hostility. In some ways, this third factor is the most interesting. It reminds us that people respond in a social context and that coping with stress is a dynamic process (25,41). Advice to “cheer up” or “don’t worry” offered by physicians and friends is worthless to such alienated people; but sophisticated interventions are imaginable (3).

A fourth factor is a classic introversion. Introverts may be quiet and unsociable, but perhaps content. On the other hand, if they are especially sensitive people, they may be more susceptible to environmental stressors. It is likely important to distinguish introversion from a cynical, repressed hostility. An important unanswered question is how the health correlates of social integration and social support arise. Perhaps introverted, isolated people who are content can maintain their health; perhaps not. That is, it is unclear whether it is patterns of social support *per se* that are health-promoting, or whether socially-integrated people are those who bring healthy reaction patterns to their dealings with others.

The current research should not be confused with attempts to uncover the basic dimensions of personality. We are focusing on reliable, commonly-used scales thought relevant to health-related negative patterns. Factor analyses cannot, of course, reveal anything about measures that are not included. However, it has been pointed out that theory and research in this area have not taken advantage of the impressive recent developments in the assessment of personality in general (44). In the current analyses, it does appear that comprehensive Big Five measures

TABLE 2
LISREL Orthogonal Analysis

	N	A	O	E	C
Cook-Medley Hostility					
Hostility	0.28	-0.39	-0.22		
Paranoia	0.48	-0.52	-0.33		
Cynicism	0.41	-0.52	-0.35		
Life Orientation Test	-0.60			0.25	
Taylor Manifest Anxiety	0.80				
Eysenck Personality Questionnaire					
Psychoticism		-0.44	-0.26		-0.22
Neuroticism	0.87				
Extroversion				0.89	
Buss-Durkee Hostility Inventory					
Physical Assault		-0.74			
Indirect Hostility	0.50	-0.55	0.32	0.24	
Irritability	0.67	-0.53			
Negativism		-0.55			
Resentment	0.63	-0.34	-0.25		
Suspicion	0.43	-0.44	-0.37		
Verbal Hostility		-0.86	0.35	0.28	
Hardiness					
Alienation from Self	0.27	-0.28	-0.46		
Alienation from Work	0.28	-0.25	-0.45		
Security	0.24				
Powerlessness	0.36	-0.22	-0.59		
Rotter Locus of Control	0.36		-0.25		
Spielberger Trait Anger	0.42	-0.67			
Spielberger State Anger	0.21				
Spielberger Anger Expression					
Anger-In	0.51				
Anger-Out	0.27	-0.72	0.33	0.22	
Anger Control	-0.37	0.49	-0.31		
Jenkins Activity Survey		-0.29			0.38
Spielberger State Anxiety	0.68		-0.20		
Spielberger Trait Anxiety	0.81				
Beck Depression Inventory	0.53		-0.30		

Note: Dimensions were formed from parcels of NEO items. NEO: N = Neuroticism, A = Agreeableness, O = Openness, E = Extraversion, C = Conscientiousness. Loadings with absolute values < .20 are not shown.

such as the Revised NEO-PI cover the territory. In this broader scheme, the NEO factors of Agreeableness (especially the facets of Trust/Suspicion and Compliance/Aggression) and Neuroticism (the facets of Anxiety, Hostility, and Depression) are most relevant to chronic negative socioemotional patterns (60), though perhaps in complex ways (61). It is clear that use of a general term like "hostility" is often inadequate. On the other hand, the Big Five dimensions may prove too broad, unless further subdivided. Interestingly, the Openness dimension seems quite relevant to previously-studied issues of alienation.

In understanding personality and health, the heavy focus on negative socioemotional reaction patterns derives from a belief that stress reactions (primarily sympathetic arousal) can disrupt the body's homeostatic processes. These ideas were developed a half century ago by psychosomatic theorists and are currently being resurrected with the help of a better understanding of psychophysiology. Outside the realm of negative affect/hyperreactivity, it may remain very important to assess the domains of Extraversion and of Conscientiousness, since these broad factors are very relevant to issues of warmth, gregariousness, harm-avoidance, achievement-striving, and self-discipline, which have also been shown of possible significance to health and longevity [see Friedman et al. (37,56); Marshall et al. (34)]. In addition, important attention is just now turning to

the health-behavior correlates of an unhealthy personality (62,63). As we have been noting in passing, a key unanswered question concerns the interrelations among personality, psychophysiological disruptions, and unhealthy behaviors.

There are always problems with self-report measures, revolving around issues of self-presentation and limits on self-knowledge. Hence, in this area, as in most areas of psychosocial prediction, self-report measures should be supplemented with behavioral measures such as structured interviews and observational biographies whenever possible. This is especially true since the role of repression is unclear (64,65). Personality reveals itself in social life. Still, properly designed and chosen self-report measures can show good reliability and validity as the individual settles into a typical life pattern. Given their ease of use and low cost, personality measures will likely continue to be used. But we should consistently re-think the most appropriate measures.

In sum, on the practical side, researchers beginning a study of the role of negative reaction patterns in health might want to address at least four constructs: (a) aggressive overt hostility (such as the Buss-Durkee Verbal Hostility scale or the Spielberger Angry Temper and Angry Expression scales); (b) cynical alienated bitterness (an alienation/powerlessness scale); (c) introversion (the NEO or an Eysenck measure); and (d) anxiety/

depression (a neuroticism scale). Conscientiousness should also be measured so that a more complete picture of likely personality predictors of health can be obtained. If a Big Five approach to hostility is taken, it would be valuable to focus significant attention on understanding the Agreeableness and Neuroticism dimensions, and perhaps Openness.

On the theoretical side, strong consideration should be given to the basis for the selection of measures in a study. Hostility is too vague a term unless it is carefully defined in a particular context. This field has progressed sufficiently that sophisticated concepts and measures should be employed. Psychologists know a lot about what it means to be neurotic, alienated, introverted, or aggressive, and this information should be used in achieving a full understanding of how negative reaction patterns may affect health.

REFERENCES

- (1) Barefoot JC, Dodge KA, Peterson BL, Dahlstrom WG, Williams Jr. RB: The Cook-Medley Hostility scale: Item content and ability to predict survival. *Psychosomatic Medicine*. 1989, 51:46-57.
- (2) Friedman HS (ed): *Personality and Disease*. New York: Wiley & Sons, 1990.
- (3) Friedman HS: *The Self-Healing Personality: Why Some People Achieve Health and Others Succumb to Illness*. New York: Henry Holt, 1991.
- (4) Friedman HS (ed): *Hostility, Coping, and Health*. Washington, DC: APA, 1992.
- (5) Matthews KA: Coronary heart disease and Type A behaviors: Update on and alternative to the Booth-Kewley and Friedman (1987) quantitative review. *Psychological Bulletin*. 1988, 104:373-380.
- (6) Peterson C, Seligman M: Explanatory style and illness. *Journal of Personality*. 1987, 55:237-265.
- (7) Shekelle RB, Gale M, Ostfeld AM, Paul O: Hostility, risk of coronary heart disease, and mortality. *Psychosomatic Medicine*. 1983, 45:109-114.
- (8) Smith TW: Hostility and health: Current status of a psychosomatic hypothesis. *Health Psychology*. 1992, 11:139-150.
- (9) Smith TW, Christensen AJ: Hostility, health, and social contexts. In Friedman HS (ed), *Hostility, Coping, and Health*. Washington, DC: APA, 1992.
- (10) Adler N, Matthews K: Health psychology: Why do some people get sick and some stay well? *Annual Review of Psychology*. 1994, 45:229-259.
- (11) Barefoot JD, Dahlstrom WG, Williams Jr. RB: Hostility, CHD incidence, and total mortality: A 25-year follow-up study of 255 physicians. *Psychosomatic Medicine*. 1983, 45:59-63.
- (12) Booth-Kewley S, Friedman HS: Psychological predictors of heart disease: A quantitative review. *Psychological Bulletin*. 1987, 101:343-362.
- (13) Friedman HS, Booth-Kewley S: The "disease-prone personality": A meta-analytic view of the construct. *American Psychologist*. 1987, 42:539-555.
- (14) Koskenvuo M, Kaprio J, Rose RJ, et al: Hostility as a risk factor for mortality and ischemic heart disease in men. *Psychosomatic Medicine*. 1988, 50:330-340.
- (15) Matthews KA: Psychological perspectives on the Type A behavior pattern. *Psychological Bulletin*. 1982, 91:293-323.
- (16) Williams Jr. RB, Barefoot JC: Coronary-prone behavior: The emerging role of the hostility complex. In Houston BK, Snyder C (eds), *Type A Behavior Pattern: Research, Theory and Intervention*. New York: Wiley, 1988.
- (17) Hearn M, Murray D, Luepker R: Hostility, coronary heart disease, and total mortality. *Journal of Behavioral Medicine*. 1989, 12:105-121.
- (18) McCranie EW, Watkins LO, Brandsma JM, Sisson BD: Hostility, CHD incidence, and total mortality: Lack of association in a 25-year follow-up study of 478 physicians. *Journal of Behavioral Medicine*. 1986, 9:119-125.
- (19) Barefoot JC: Developments in the measurement of hostility. In Friedman HS (ed), *Hostility, Coping, and Health*. Washington, DC: APA Press, 1992, 13-32.
- (20) Diamond EL: The role of anger and hostility in essential hypertension and coronary heart disease. *Psychological Bulletin*. 1982, 92:410-433.
- (21) Carmody TP, Crossen JR, Wiens AN: Hostility as a health risk factor: Relationships with neuroticism, Type A behavior, attentional focus, and interpersonal style. *Journal of Clinical Psychology*. 1989, 45(5):754-762.
- (22) Costa PT, McCrae RR: *The NEO Personality Inventory Manual*. Odessa, FL: Psychological Assessment Resources, 1985.
- (23) Musante L, MacDougall J, Dembroski T, Costa Jr. P: Potential for hostility and dimensions of anger. *Health Psychology*. 1989, 8:343-354.
- (24) Smith TW, Sanders JD, Alexander JF: What does the Cook and Medley hostility scale measure? Affect, behavior, and attributions in the marital context. *Journal of Personality and Social Psychology*. 1990, 58(4):699-708.
- (25) Houston BK, Vavak CR: Cynical hostility: Developmental factors, psychosocial correlates, and health behaviors. *Health Psychology*. 1991, 10:9-17.
- (26) Smith TW, Frohm KD: What's so unhealthy about hostility? Construct validity and psychosocial correlates of the Cook and Medley Ho scale. *Health Psychology*. 1985, 4:503-520.
- (27) Costa Jr. PT, Zonderman AB, McCrae RR, Williams Jr. RB: Cynicism and paranoid alienation in the Cook and Medley Ho Scale. *Psychosomatic Medicine*. 1986, 48:283-285.
- (28) Pope MK, Smith TW, Rhodewalt F: Cognitive, behavioral, and affective correlates of the Cook and Medley Hostility Scale. *Journal of Personality Assessment*. 1990, 54:501-514.
- (29) Blumenthal JA, Barefoot J, Burg MM, Williams Jr. RB: Psychological correlates of hostility among patients undergoing coronary angiography. *British Journal of Medical Psychology*. 1987, 60:349-355.
- (30) Buss AH, Durkee A: An inventory for assessing different kinds of hostility. *Journal of Consulting Psychology*. 1957, 21:343-349.
- (31) Bendig AW: A factor analysis of scales of emotionality and hostility. *Journal of Clinical Psychology*. 1961, 17:189-192.
- (32) Bushman B, Cooper H, Lemke K: Meta-analysis of factor analyses: An illustration using the Buss-Durkee Hostility Inventory. *Personality and Social Psychology Bulletin*. 1991, 17:344-349.
- (33) Siegel JM: Anger and cardiovascular health. In Friedman HS (ed), *Hostility, Coping, and Health*. Washington, DC: American Psychological Association, 1992.
- (34) Marshall GN, Wortman CB, Vickers RR, Kusulas JW, Hervig LK: The five-factor model of personality as a framework for personality-health research. *Journal of Personality and Social Psychology*. 1994, 67:278-286.
- (35) Scheier MF, Carver CS: Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology*. 1985, 4:219-247.
- (36) Scheier MF, Matthews KA, Owens J, et al: Dispositional optimism and recovery from coronary artery bypass surgery. *Journal of Personality and Social Psychology*. 1989, 57:1024-1040.
- (37) Friedman HS, Tucker JS, Tomlinson-Keasey C, et al: Does childhood personality predict longevity? *Journal of Personality and Social Psychology*. 1993, 65:176-185.
- (38) Smith TW, Pope MK, Rhodewalt F, Poulton J: Optimism, neuroticism, coping, and symptom reports: An alternative interpretation of the Life Orientation Test. *Journal of Personality and Social Psychology*. 1989, 56:640-648.

- (39) Kobasa SC, Maddi SR, Kahn S: Hardiness and health: A prospective study. *Journal of Personality and Social Psychology*. 1982, 42:168-177.
- (40) Hahn ME: *California Life Goals Evaluation Schedule*. Palo Alto, CA: Western Psychological Services, 1966.
- (41) Lazarus RS: Stress, coping, and illness. In Friedman HS (ed), *Personality and Disease*. New York: Wiley & Sons, 1990.
- (42) Funk SC, Houston BK: A critical analysis of the hardiness scale's validity and utility. *Journal of Personality and Social Psychology*. 1987, 53:572-578.
- (43) McCrae RR, John OP: An introduction to the five-factor model and its applications. *Journal of Personality*. 1992, 60(2):175-215.
- (44) Smith TW, Williams PG: Personality and health: Advantages and limitations of the five-factor model. *Journal of Personality*. 1992, 60:395-423.
- (45) Eysenck HJ, Eysenck SBG: *Manual for the Eysenck Personality Questionnaire*. San Diego, CA: Educational and Industrial Testing Service, 1975.
- (46) Eysenck HJ: Biological dimensions of personality. In Pervin LA (ed), *Handbook of Personality: Theory and Research*. New York: Guilford, 1990.
- (47) Cook WW, Medley DM: Proposed hostility and pharisaic-virtue scores for the MMPI. *Journal of Applied Psychology*. 1954, 38:414-418.
- (48) Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J: An inventory for measuring depression. *Archives of General Psychiatry*. 1961, 4:53-63.
- (49) Bendig AW: The development of a short form of the manifest anxiety scale. *Journal of Consulting Psychology*. 1956, 20:384.
- (50) Spielberger CD: *State-Trait Anger Expression Inventory Professional Manual*. Odessa, FL: Psychological Assessment Resources, 1988.
- (51) Spielberger CD: *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press, 1983.
- (52) Jenkins CD, Zyzanski SJ, Rosenman RH: Prediction of clinical coronary heart disease by a test for the coronary-prone behavior pattern. *New England Journal of Medicine*. 1974, 23:1271-1275.
- (53) Rotter JB, Seeman M, Liverant S: Internal versus external locus of control of reinforcement: A major variable in behavior theory. In Washburne NF (ed), *Decisions, Values, and Groups*. New York: Pergamon, 1962.
- (54) Maddi SR, Kobasa SC, Hoover M: An alienation test. *Journal of Humanistic Psychology*. 1979, 19:73-76.
- (55) Block J, Block JH, Keyes S: Longitudinally foretelling drug usage in adolescence. *Child Development*. 1988, 59:336-355.
- (56) Friedman HS, Tucker J, Schwartz JE, et al: Childhood conscientiousness and longevity: Health behaviors and cause of death. *Journal of Personality and Social Psychology*. 1995, 68:696-703.
- (57) John OP: The "big five" factor taxonomy. In Pervin L (ed), *Handbook of Personality*. New York: Guilford, 1990.
- (58) Costa PT: Is neuroticism a risk factor for CAD? Is Type A a measure of neuroticism? In Schmidt T, Dembroski T, Blumchen G (eds), *Biological and Psychological Factors in Cardiovascular Disease*. New York: Springer-Verlag, 1986.
- (59) Chesney MA, Rosenman R (eds): *Anger and Hostility in Cardiovascular and Behavioral Disorders*. Washington, DC: Hemisphere, 1985.
- (60) Costa Jr. PT, McCrae RR: Trait psychology comes of age. In Sonderegger TB (ed), *Nebraska Symposium on Motivation*. Lincoln, NE: Nebraska Press, 1991, 39:169-204.
- (61) Watson D, Clark LA: On traits and temperament: General and specific factors of emotional experience and their relation to the five-factor model. *Journal of Personality*. 1992, 60:441-476.
- (62) Scherwitz LW, Perkins LL, Chesney MA, et al: Hostility and health behaviors in young adults: The CARDIA Study. Coronary Artery Risk Development in Young Adults Study. *American Journal of Epidemiology*. 1992, 136(2):136-145.
- (63) Siegler IC, Peterson BL, Barefoot JC, Williams RB: Hostility during late adolescence predicts coronary risk factors at mid-life. *American Journal of Epidemiology*. 1992, 136(2):146-154.
- (64) Denollet J: Negative affectivity and repressive coping. *Psychosomatic Medicine*. 1991, 53:538-556.
- (65) Pennebaker JW: *Opening Up: The Healing Power of Confiding in Others*. New York: Morrow, 1990.

APPENDIX
Intercorrelations of Personality Measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	1.00	-.25	-.14	-.27	-.32	.46	.57	.29	.79	.20	-.21	-.22	.69	.17	.66	.49	.23	
2		1.00	.41	.32	.33	-.14	-.31	-.02	-.22	-.13	.73	-.06	-.14	.03	-.30	.07	.20	
3			1.00	.41	.17	-.17	-.26	-.16	-.14	-.14	.23	-.02	-.16	-.11	-.30	-.04	.09	
4				1.00	.28	-.49	-.53	-.29	-.24	-.40	.15	.19	-.41	-.45	-.43	-.27	-.40	
5					1.00	-.10	-.23	-.07	-.18	-.34	.13	.30	-.20	-.14	-.27	-.18	-.07	
6						1.00	.69	.47	.44	.33	-.08	-.21	.49	.36	.61	.31	.35	
7							1.00	.42	.54	.43	-.25	-.20	.58	.38	.71	.39	.32	
8								1.00	.26	.24	-.04	-.16	.31	.26	.39	.26	.34	
9									1.00	.20	-.18	-.17	.64	.13	.63	.39	.17	
10										1.00	-.06	-.29	.26	.31	.31	.22	.30	
11											1.00	-.09	-.13	.07	-.24	.08	.15	
12												1.00	-.37	-.31	-.21	-.41	-.36	
13													1.00	.40	.64	.61	.47	
14														1.00	.32	.40	.53	
15															1.00	.40	.29	
16																1.00	.51	
17																	1.00	
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		
27																		
28																		
29																		
30																		
31																		
32																		
33																		
34																		
35																		
36																		

Note: 1 = NEO Neuroticism; 2 = NEO Extraversion; 3 = NEO Openness; 4 = NEO Agreeableness; 5 = NEO Conscientiousness; 6 = Cook-Medley Cynicism; 7 = Cook-Medley Paranoia; 8 = Cook-Medley Hostility; 9 = EPQ Neuroticism; 10 = EPQ Psychoticism; 11 = EPQ Extraversion; 12 = EPQ Lie; 13 = Buss-Durkee Irritability; 14 = Buss-Durkee Physical Assault; 15 = Buss-Durkee Resentment; 16 = Buss-Durkee Indirect Hostility; 17 = Buss-Durkee Verbal Hostility; 18 = Buss-Durkee Suspicion; 19 = Buss-Durkee Negativism; 20 = Security; 21 = External Locus of Control; 22 = Powerlessness; 23 = Alienation from Work; 24 = Alienation from Self; 25 = Spielberger Angry Temperament; 26 = Spielberger Angry Reaction; 27 = Spielberger Anger-In; 28 = Spielberger Anger-Out; 29 = Spielberger Anger Control; 30 = Spielberger State Anger; 31 = Spielberger Trait Anxiety; 32 = Spielberger State Anxiety; 33 = Beck Depression Inventory; 34 = Jenkins Activity Survey; 35 = Life Orientation Test; 36 = Taylor Manifest Anxiety.

