ASSOCIATIONS BETWEEN MAJOR DOMAINS OF PERSONALITY AND HEALTH BEHAVIOR

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Associations between Major Domains of Personality and Health Behavior

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Summary

The fitness and health of military personnel is important for operational readiness and effectiveness. This point is the basis for program's such as the Navy's Health and Physical Readiness Program. The effectiveness of those programs depends on an adequate understanding of the antecedents and consequences of the behaviors the programs attempt to modify. The present study examined personality as an antecedent of differences in health behaviors.

A sample of U.S. Navy recruits (n = 103) and a sample of U.S. Marine Corps personnel (n = 76) completed standardized questionnaires to describe their personality and their habitual health behavior patterns. The personality measures included scales for neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness, based on a growing consensus among personality researchers that these dimensions comprehensively cover the major personality domains. The health behavior measures included scales for wellness behaviors, accident prevention, substance-use risk taking, and traffic risk taking developed in prior Naval Health Research Center studies. Correlation and regression analyses were performed separately in each sample to estimate the relationships between personality and health behaviors. The results were pooled to produce overall estimates of the magnitude of associations and their statistical significance.

The most important personality correlates of health behaviors were conscientiousness and agreeableness. In the multiple regression analyses, conscientiousness was related to engaging in more frequent wellness behaviors and accident control behaviors and less frequent traffic risk taking behaviors. Agreeableness was related to less traffic risk taking and substance use risk taking. In addition, openness to experience was the strongest single predictor of substance use risk taking and was related to higher risk taking. Extraversion was related to more frequent wellness behaviors. In combination, the personality variables accounted for 9% to 25% of the variance in the health behavior variables.

Personality variables merit more attention than they have received in health behavior research. Knowledge of the personality composition of the target population for a program such as the Navy's Health and Physical Readiness Program can be used in two ways to enhance the impact of these programs. One way is by identifying general behavioral trends that must be overcome for a program to be effective. A second way is by providing a basis for selecting the

most suitable types of intervention programs for the target population. For example, simply providing information about the need for good health behaviors and the appropriate methods for incorporating those behaviors into one's life style may be sufficient when dealing with people who are high on conscientiousness. For people who are low on conscientiousness, programs which rely more on involvement with peers may be appropriate, particularly among those who are agreeable and presumably more responsive to that type of pressure. While these points are speculative at present, they illustrate how consideration of personality factors might lead to more effective, efficient health behavior modification programs.

Introduction

Past attempts to understand health behavior have focused mainly on single health practices, even though health behaviors occur in distinct clusters (Harris & Guten, 1979; Langlie, 1979; Vickers, Conway & Hervig, 1990; Williams & Wechsler, 1972). Given that overall patterns of health behaviors predict morbidity and mortality better than single health behaviors (Belloc, 1973; Belloc & Breslow, 1972; Brock, Haefner & Noble, 1988; Metzner, Carman & House, 1983), an understanding of the psychosocial antecedents of these patterns could lead to better models to explain the development of disease and better guidelines for interventions to minimize health problems. The present paper describes the results of two studies that examine personality as a potential determinant of aggregated health behavior patterns.

Personality constructs logically merit consideration when attempting to predict individual differences in health behavior patterns. Personality constructs typically describe dimensions of individual differences that can affect a range of behaviors across many situations. Although any given behavior may be influenced by motives specific to that behavior or by constraints of the situation in which the behavior is observed, aggregate behavior patterns, including health behavior patterns, can be predicted best by correspondingly broad personality constructs (Funder, 1991). Previous health behavior research has emphasized the study of relationships between specific health behaviors and correspondingly specific psychological predictors, such as those suggested by the Health Beliefs Model, the dominant model of health behavior at present (HBM; see Janz & Becker, 1984, for a review). There is a need for consideration of personality and health behavior with comparable aggregation on both sides of the equation as a complementary approach to predicting and understanding health behavior patterns.

Recent developments in the measurement of personality and health behaviors make this a propitious time to explore the relationships between these two behavior domains. Current personality measurement research suggests that the general domains of personality can be adequately assessed using just five dimensions (Costa & McCrae, 1985; Digman, 1990; John, 1990). In Costa and McCrae's (1985) terms, the "Big Five" dimensions are neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. A correspondingly general framework for health behaviors is provided by representing these behaviors in terms of

four broad domains (Vickers et al., 1990). These domains include behaviors oriented toward wellness promotion (e.g., exercise, good diet), accident prevention (e.g., knowing first aid, fixing hazards around the home), substance-related risk taking (e.g., alcohol consumption, smoking), and traffic risk taking (e.g., speeding, taking risks as a pedestrian). By combining these two measurement models, a comprehensive assessment of the associations between broad domains of personality and aggregated health behavior now is possible.

Prior research provides some evidence that personality and health behavior are related at the proposed level of analysis. Neuroticism, which includes the disposition to experience relatively strong negative emotions and vulnerability to stress, has been associated with both the presence of harmful health practices and the absence of positive health behaviors (Brook, Whiteman, Gordon & Cohen, 1986; Coan, 1973; Mechanic & Cleary, 1980; Spielberger & Jacobs, 1982; Tappan & Weybrew, 1982). Extraversion, the tendency to be outgoing and sociable and to experience positive emotions, has been linked to negative behaviors involving substance use (Coan, 1973; Labouvie & McGee, 1986; Schwarz, Burkhart & Green, 1978; Smith, 1970; Spielberger & Jacobs, 1982; Tappan & Weybrew, 1982) and to positive behaviors in the form of exercise compliance (Blumenthal, Sanders, Wallace, Williams & Needles, 1982). "Good spirits," analogous to the positive emotion aspect of extraversion, has been linked with preventive health behaviors (Mechanic & Cleary, 1980).

Associations between health behaviors and the other three major personality domains have been less extensively studied, but some evidence that potentially important associations exist is available. Conscientiousness, a tendency to be goal-oriented, methodical, and reliable, has not been studied as such in connection with health behavior. However, conscientiousness is conceptually similar to responsibility and need for achievement, both of which are related to low rates of substance use (Brook et al., 1986; Labouvie & McGee, 1986). Furthermore, hardiness, which involves a sense of commitment that could characterize the conscientious individual, has been related to an overall index of positive health behaviors (Wiebe & McCallum, 1986). Agreeableness, the tendency to be tolerant and accepting rather than cynical and hostile, may be related to poorer exercise habits, self-care, and more frequent substance use given evidence associating these behaviors with hostility (Leicker & Hailey, 1988). Finally, an association

between openness to experience and more frequent substance use is suggested by the association between substance use and sensation seeking (Brook et al., 1986).

Despite prior evidence that personality is a potentially important predictor of health behaviors, no previous study has combined comprehensive measurement models for both domains. Indeed, the typical study has examined the relationships between at most one or two of the major domains of personality and one or two indicators of health behavior. As a result, the overall pattern of associations between personality and health behavior patterns at the level of major domains within these two behavioral categories is not known. A related problem is that the overall predictive precision that can be achieved by using the five major personality dimensions in combination to predict health behavior patterns has not been established. The studies reported in this paper addressed these limitations of prior research by relating the five-factor model of personality to the four-dimensional model of health behaviors.

Study 1

Method

Sample. The sample consisted of male U. S. Navy enlisted personnel (n = 103) who were undergoing military basic training. The participants completed the requisite questionnaires voluntarily as part of a study of risk factors for infectious disease in basic training. The subjects ranged in age from 17 to 32, with a mean age of 19.3 (SD = 2.7). The primary ethnic groups were Caucasian (76%), Black (14%), and Hispanic (6%). Ninety-six percent of the sample had high school diplomas; an additional 1% had Graduate Equivalence Diplomas.

Instruments. NEO-PI. The NEO Personality Inventory (NEO-PI; Costa & McCrae, 1985) is a 181-item personality questionnaire answered on a 5-point scale from "strongly disagree" to "strongly agree." This inventory measures five broad dimensions of personality: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. In addition, the NEO-PI measures six facets within each of the domains of neuroticism, extraversion, and openness to experience. Facet subscales were not available for the agreeableness and conscientiousness domains at the time of this study. The NEO-PI scales and subscales have adequate internal consistency, test-retest reliability, and validity (Costa & McCrae, 1985; 1988).

Health Behavior Check List. The Health Behavior Check List (Vickers et al., 1990) consists of 40 items, 26 of which are used to assess four factor-analytically defined health behavior dimensions, with 14 additional filler items (see Vickers et al., 1990 for instrument content). Subjects indicate how well each item describes his or her typical behavior, using a five-point Likert scale, ranging from (1) Disagree Strongly to (5) Agree Strongly.

The Health Behavior Check List measures four replicable factors: (1) Wellness Behaviors, consisting of items such as "I exercise to stay healthy," "I limit my intake of food like coffee, sugar, fats, etc.," and "I take vitamins"; (2) Accident Control, consisting of items such as "I fix broken things around my home right away," "I have a first aid kit in my home," and "I learn first aid techniques"; (3) Traffic Risk-Taking, consisting of items such as "I speed while driving," "I cross busy streets in the middle of the block," and "I carefully obey traffic rules so I won't have accidents"; and (4) Substance Risk-Taking, which consists of the items, "I do not drink," "I drive after drinking," and "I do not smoke or use smokeless tobacco." The procedures used to develop the Health Behavior Check List are described in Vickers et al. (1990).

Vickers et al. (1990) reported modest intercorrelations among the four health behavior dimensions measured by the check list, with correlations averaged across four samples ranging from .10 to .48 (absolute). Coefficient alpha internal consistencies of .65 or greater (averaged across four samples) were obtained for all scales except for the brief Substance Risk-Taking scale, which had an average alpha of .55.

For the present study, individual differences on each of the four health behavior dimensions were represented by the average of the responses to the scale items. For each scale, a high score indicated a stronger agreement with the items concerning the behavior in question.

Analysis Procedures. Pearson product-moment correlation coefficients were computed between the health behavior scale scores and the personality scale scores.

Results

All five personality dimensions were significantly related to at least one health behavior dimension (Table 1). The pattern of correlations was consistent with prior evidence regarding neuroticism and extraversion. Neurotic individuals reported less Wellness Behavior, less Accident Control behavior, and more Traffic Risk-Taking behavior. In contrast, extraverts

engaged in more Wellness Behavior and Accident Control behavior with a weaker, marginally significant ($p < .076$), tendency toward more Substance Risk-Taking behavior.

Table 1
Correlations of NEO Personality Scales with Health Behavior Dimensions

	Health Behavior Dimension			
Personality Dimension	Wellness Behaviors	Accident Control	Traffic Risk-Taking	Substance Risk-Taking
Neuroticism	-.39**	-.27**	.24**	.07
Extraversion	.41**	.33**	.12	.14
Openness	.04	.10	.07	.24**
Agreeableness	.22*	.18*	-.26**	.05
Conscientiousness	.45**	.54**	-.24**	-.07

* $p < .05$; ** $p < .01$

The potential significance of personality dimensions that have previously received little attention in health behavior research was clearly indicated. More conscientious individuals reported more Wellness Behaviors, more Accident Control behaviors, and fewer Traffic Risk-Taking behaviors than their less conscientious counterparts. The magnitude of these correlations was substantial, accounting for as much as 29% of the variance in the health behavior scales. Agreeableness also proved to be an important correlate of health behavior, as agreeable individuals reported more Wellness Behavior, more Accident Control behavior, and less Traffic Risk-Taking behavior. Openness to experience was associated with greater Substance Risk-Taking and was the only statistically significant personality predictor of this aspect of health behavior.[1]

Discussion

The Study 1 findings extended the evidence that personality is a significant correlate of health behavior. The strength of the relationships between conscientiousness and the health behavior scales was particularly noteworthy, because these findings implied that health behavior models would benefit substantially from including this construct as an explanatory variable. The other personality dimensions were less potent predictors of health behaviors, but they still could

be important for health behavior models if the Study 1 results were representative of personality-health behavior relationships. The fact that the neuroticism and extraversion results extended established trends in the literature gave reason to believe that the findings would replicate in other samples. A second study, therefore, was undertaken to directly replicate the results from the first study using measures of the same personality constructs and the same health behavior measures employed in the first study.

Study 2

Method

Sample. The sample consisted of 76 male U. S. Marine Corps personnel who volunteered to participate in a study of determinants of performance in cold weather training. The subjects ranged in age from 19 years to 40 years with a mean age of 23.4 (SD = 4.3). The primary ethnic groups were Caucasian (78%), Black (13%), and Hispanic (7%). The large majority of the men had high school degrees only, but a few had additional schooling (9%). A single individual reported only 11 years of schooling.

Instruments. NEO-FFI. The NEO-FFI is a 60-item personality questionnaire answered on a 5-point scale from "strongly disagree" to "strongly agree." This inventory measures five broad dimensions of personality: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness using subsets of the items employed in the full NEO-PI. The scales of the NEO-FFI were developed to maximize the correlation between these abbreviated scales and the full NEO scales with the constraint that only 12 items be retained to represent each dimension. This inventory has been used previously in military populations and has acceptable reliability (Marshall, Wortman, Vickers, Kusulas, & Hervig, 1991). Validity information is provided by Costa and McCrae (1989). The NEO-FFI was chosen for this study, even though it meant that the prior results pertaining to facets of the general dimensions could not be replicated. This choice was dictated by the time available for testing.

Health Behavior Check List. A subset of the items from the Health Behavior Check List described for Study 1 was used in this study. Only those items required for the computation of the four health behavior scales (Vickers et al., 1990) were included, as time constraints prevented use of the full questionnaire.

Analysis Procedures. Pearson product-moment correlations were computed between the health behavior scale scores and the personality scale scores. The difference between each correlation obtained in Study 2 and the corresponding correlation obtained in Study 1 was tested for statistical significance using a test for the difference between independent correlations based on Fisher's r-to-z transformation (Hays, 1963). The weighted average of the correlations then was computed to combine the results of the two studies into a single estimate of the true population value for each correlation[2]. The methods of adding t-tests and adding z-scores (Rosenthal, 1978) were used to estimate combined probabilities for each correlation based on the two studies. The method of adding z-scores consistently produced less extreme significance estimates, so the reported significance levels were based on this test.

Stepwise multiple regression analyses were conducted to determine the combined predictive value of the personality dimensions and to determine which personality variables predicted health behaviors independent of the other dimensions. The specific procedures employed in these regressions are described in the presentation of results.

Results

The pattern of the earlier findings replicated, although the size of each correlation varied across the two studies (Table 2). Given the present sample sizes, the observed variability can be attributed to sampling error. For these sample sizes, two correlations would have had to differ by .30 or more in the two samples to produce a statistically significant difference (Hays, 1963). The largest observed difference between the Study 1 and Study 2 correlations was .26 for Openness with Accident Control. Thus, none of the pairs of correlations differed enough to be statistically significant, even when the statistical test did not allow for the fact that 20 separate comparisons were made.

Eight of 20 correlations were statistically significant ($p < .05$, one-tailed) in Study 2, and each of these 8 replicated a Study 1 finding. Four additional correlations between .10 and .21 (absolute) were too small to be statistically significant in Study 2, but produced pooled correlation estimates between .19 and .29 (absolute) that were significant when combined with the results from Study 1. Thus, 12 of 20 associations were statistically significant ($p < .033$) when the combined probability estimate was computed.

Table 2

Personality and Health Behavior Correlations:
Study 2 Estimates and Pooled Estimates

Personality Dimension	Health Behavior Dimension: Wellness Behaviors	Accident Control	Traffic Risk-Taking	Substance Risk-Taking
Study 2				
Neuroticism	-.15	-.12	.11	-.04
Extraversion	.24*	.22*	-.08	-.06
Openness	.02	-.16	-.06	.28**
Agreeableness	.14	.21*	-.40**	-.11
Conscientiousness	.31**	.44**	-.32**	.00
Combined Results				
Neuroticism	-.29**	-.21*	.19*	.02
Extraversion	.34**	.28**	.04	.06
Openness	.03	-.01	.02	.26**
Agreeableness	.19*	.19*	-.32**	-.07
Conscientiousness	.39**	.50**	-.27**	-.04

Note. See analysis procedures for details of significance levels and procedures for combining results from two samples.

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

Multiple Regression Equations. The multivariate relationships between each health behavior and the set of personality dimensions was examined by stepwise multiple regressions. Each health behavior variable was considered separately as a dependent variable and the five major personality dimensions were used as predictors. Parallel analyses were conducted in the data sets from Study 1 and Study 2. The first predictor entered into each regression equation was the personality variable with the largest average bivariate correlation to the dependent health behavior variable (see Table 2). The partial correlations for the remaining personality variables then were examined to identify any which were .10 or greater in absolute magnitude and had the

Table 3
Multiple Regression Equations for Health Behavior Dimensions

Dependent/Predictor(s)		Study 1	Study 2	Combined Results
Wellness Behavior/				
Conscientiousness	b=	.524	.291	
	beta=	.371	.279	
	t=	3.955	2.299	4.675
	p=	.0001	.0124	.0001
Extraversion	b=	.545	.126	
	beta=	.246	.119	
	t=	2.621	.981	2.792
	p=	.0101	.1651	.0027
	Shrunken R^2=	.259	.085	.189
Accident Control/				
Conscientiousness	b=	.836	.585	
	beta=	.538	.462	
	t=	6.419	4.624	8.090
	p=	.0001	.0001	.0001
	Shrunken R^2=	.283	.202	.251
Traffic Risk-Taking/				
Agreeableness	b=	-.423	-.434	
	beta=	-.189	-.360	
	t=	-1.823	-3.228	3.378
	p=	.0357	.0010	.0004
Conscientiousness	b=	-.251	-.280	
	beta=	-.161	-.217	
	t=	-1.555	-1.946	-2.426
	p=	.0616	.0280	.0077
	Shrunken R^2=	.066	.181	.112
Substance Risk-Taking/				
Openness	b=	-1.196	-.768	
	beta=	-.265	-.376	
	t=	-2.695	-3.333	-4.182
	p=	.0042	.0007	.0001
Agreeableness	b=	.437	.263	
	beta=	.135	.154	
	t=	1.371	1.370	1.944
	p=	.0868	.0877	.0259
	Shrunken R^2=	.075	.137	.088

same sign in both samples. If any predictors met these two criteria and had a combined significance estimate of $p < .05$ or better using the method of adding ts, the one with the largest weighted average partial correlation was entered into the regression equation. The partial correlations for the remaining three predictors then were examined by the same criteria to determine whether a third predictor should be added to the equation.

The regression analyses underscored the importance of conscientiousness and agreeableness as predictors of health behaviors (Table 3). Conscientiousness was a predictor in three of four equations; agreeableness was a predictor in two of four equations.
Extraversion and openness to experience each figured in one of four equations, and neuroticism was conspicuously absent from these equations.

The proportion of variance explained by each equation has been estimated in Table 3 using Wherry's (1984) shrinkage formula rather than cross-validation, because information from both samples was used to select the predictors in the equations. Weighting these shrunken R^2 estimates by sample size, the proportion of variance explained was .189 for Wellness Behavior, .251 for Accident Control, .112 for Traffic Risk-Taking, and .088 for Substance Risk-Taking.

General Discussion

The most important finding of the present studies was the demonstration that major personality dimensions which have received little attention in connection with health behavior are important predictors of these behaviors. In the regression analyses, conscientiousness was a reliable predictor of three health behavior dimensions, and agreeableness was a predictor of two health behavior dimensions. Openness to experience only predicted a single health behavior dimension, but it was the strongest single correlate of that dimension, Substance Risk-Taking.

Neuroticism and extraversion, the two elements of the Big Five that have been most widely studied in the past, played little part in the regression equations even though previously reported correlations between these variables and health behavior patterns generally replicated. Extraversion entered the regression equations only as a secondary predictor of Wellness Behavior, and neuroticism did not figure in any of the regression equations. The prior findings for neuroticism and extraversion, although replicable, apparently are largely the result of correlations

between neuroticism and extraversion and other personality dimensions such as conscientiousness which are more directly related to health behaviors.

The magnitude of the replicable bivariate correlations (absolute r's between .19 and .50) compared favorably to results obtained with Health Belief Model (HBM) variables. A meta-analysis of the pertinent studies cited in Janz and Becker's (1984) review of the HBM[3] produced the following average unweighted correlation coefficients for the model's four main elements: perceived susceptibility to the illness, r = .08; perceived severity of the illness, r = .16; perceived efficacy of the behavior for preventing the illness, r = .33; and perceived barriers to performing the behavior, r = -.35. Thus, personality measures predict health behaviors as well as or better than the variables comprising the leading explanatory model for health behavior.

Caution is appropriate in comparing the present findings to prior HBM research. The present work employed aggregated self-report health behavior criteria, while most HBM research focuses on reports or observations of individual behaviors. Aggregate behaviors are appropriate criteria for studying personality correlates (Epstein, 1983), but this fact points to important methodological and conceptual differences between the HBM and personality. If personality is not strongly related to health beliefs, an integrated model which takes into account the influence of both sources of variation in health behavior might provide a much more potent predictive/explanatory model than either alone. In this sense, personality constructs and HBM constructs may represent two complementary models for predicting and understanding health behaviors, one based on general behavioral predispositions, and the other on specific health motivations.

Reliable associations between personality and health behavior have important implications for personality concepts and for health behavior models. One implication is that health behaviors may be specific manifestations of general personality traits. For example, the behaviors and qualities that comprise conscientiousness (e.g., self-discipline, deliberation) may be manifested in a variety of ways, including behaviors like using dental floss and driving within the speed limit. To the extent that this is true, it is appropriate to shift much of health behavior research away from traditional conceptualizations of health behaviors as motivated specifically by health concerns, independent of other aspects of motivation and behavior (e.g., Harris & Guten, 1979; Kasl & Cobb, 1966). While this traditional view probably is appropriate for many behaviors

(e.g., inoculations, compliance with medical regimens), regarding health-related behaviors as elements of overall behavior patterns influenced by a variety of factors seems more appropriate for many behaviors. Behaviors which can be treated from this broader perspective are important, because they include factors such as diet, smoking, sexual practices, and other behavioral health problems facing society today. Adopting this broader perspective would be consistent with a growing tendency to study "lifestyles," a broader concept than "health behavior" as the term has been classically defined. The lifestyle concept encompasses behaviors affecting health with fewer assumptions regarding the factors motivating these behaviors. A connection between personality and lifestyle may be the basis for purported associations between personality and disease (e.g., Booth-Kewley & Friedman, 1987; Matthews & Haynes, 1986; Shekelle et al., 1981). If so, it is important to determine the conceptual status of health behaviors relative to personality. Work such as that of Eysenck's (1985) provides a starting point for a better understanding of the interplay of personality, health behaviors, and disease.

Turning to the interpretation of specific findings as a contribution to the proposed lifestyle approach, the fact that conscientiousness was the strongest personality predictor of health behaviors is quite reasonable in retrospect. Good health behavior frequently requires that immediate gratifications be foregone in the interest of obtaining longer term outcomes. The ability to focus on the future and develop and implement long-term plans for achieving personal goals is a key aspect of conscientious behavior (Costa, McCrae & Dye, 1991). Indeed, it might even be suggested that a long-term perspective on outcomes is the hallmark of the conscientious individual. This long-term perspective is implied in prior discussions of conscientiousness, and the present findings help emphasize this point as a basis for interpreting the construct of conscientiousness as well as providing a logical relationship between personality and health behavior.

The fact that agreeableness was related to risk-taking behaviors also merits comment. Disagreeable individuals are cynical, hostile, and intolerant of others. It seems logical that disagreeable individuals would be more likely to engage in risk-taking behaviors that have an element of confrontation and infringe on the rights of others, such as cutting off other cars in traffic, tailgating, and running yellow or red lights. In the case of substance risk taking, disagreeable individuals may simply be more willing to flout convention or resist the social

pressure that normally minimizes these behaviors; indeed, they may even derive satisfaction from doing so. Here again, this interpretation echoes recent independently developed conceptual elaborations of agreeableness (Costa et al., 1991). Although these interpretations are speculative given the actual item content of the measures involved, they are similar to the findings for conscientiousness in that they suggest possible refinements for our understanding of both the personality variable and the health behaviors in question.

Some strengths and limitations of the present studies are noteworthy. Strengths include replication in two samples, discriminant validity in the pattern of bivariate correlations, and the absence of confounding due to overlapping content of the predictor and dependent variables. Replication provides some evidence that the results are robust across populations, a conclusion supported by the qualitative similarities between our results and prior research. Discriminant validity was evident in the presence of different patterns of predictors for the different health behavior measures, thereby helping to rule out general response factors such as social desirability or acquiescence as the basis for the associations. The personality scales did not include items pertaining to health behaviors, so this potential confounding of predictor and criterion was not present. It should be noted, however, that the use of a common response scale for both measures is a potential source of methods covariance.

The strengths of the studies must be balanced against two important weaknesses. First, although we have referred to the personality variables as "predictors" of health behavior, this term applies in the statistical sense only, given the cross-sectional study design. Second, our samples consisted of young males, so caution is appropriate when generalizing to other populations. The fact that previously reported patterns of correlations between health behaviors and the personality dimensions of extraversion and neuroticism replicated in the present samples provides some reason to believe that the pattern of associations observed in these studies will replicate in other populations, but the extent of this replication remains to be determined. These limitations point to a need for future studies of personality and health behavior conducted longitudinally with representative samples of the U. S. population.

The present studies demonstrated replicable associations between general personality and health behavior dimensions. The findings point to possible expansions and refinements of the conceptual frameworks guiding health behavior research and perhaps personality research as well.

The change in perspective on health behaviors suggested by the findings could have significant implications for applied health behavior research. Given the stability of personality in adulthood, and our limited knowledge of the determinants of personality change, any causal sequence from personality to health behaviors would represent a significant barrier to changing these behaviors. With further study, however, these barriers might be overcome by designing health behavior modification programs in which participants were assigned to behavior modification programs matched to their personality predispositions.

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Footnotes

[1]The possibility that specific facets of neuroticism, extraversion, and openness to experience were better predictors of health behavior than their corresponding "parent" personality dimensions was examined. Correlations were computed between the health behavior scales and the facet scales and compared to the correlations between these scales and the corresponding higher-order dimension. Whenever a personality facet-health behavior correlation was greater than the correlation of that health behavior dimension with the facet's parent dimension, a t-test was performed to test the significance of the difference between the correlations (Cohen & Cohen, 1983). Significant differences were obtained for Wellness Behavior with Openness to Fantasy (r = -.19 versus r = .04, t = 2.20, p < .05) and for Traffic Risk-Taking with Impulsiveness (r = .45 versus r = .24, t= 2.52, p < .007), Excitement-Seeking (r = .27 versus r = .14, t = 2.09, p < .05), and Openness to Feelings (r = .30 versus r = .07, t = 2.55, p < .05). However, 4 significant findings in 72 tests (18 facet scales for each of 4 health behavior measures) can readily occur by chance (p > .78). If these findings could be replicated, however, they would indicate that pursuing personality-health behavior associations at the facet level would provide stronger prediction of health behaviors and a more sharply focused understanding of their personality correlates. However, because it was not possible to replicate the findings in the present studies, a decision was made to restrict the present paper to presentation of those findings that could be replicated. The facet correlations for Study 1 are available from the authors on request.

[2]Two different procedures were used, one employing the raw correlation coefficients (Hunter, Schmidt & Jackson, 1982) and one using Fisher's r-to-z transformation (Hays, 1963). The maximum difference between the values produced by these two approaches was .02 (absolute). The values reported in this paper are those derived by the Hunter et al. (1982) procedure and may slightly underestimate the true strengths of association. The alternative method of using r-to-z transformations was not adopted, even though it is recommended on the basis of smaller bias (e.g., Silver & Dunlap, 1987), because it was judged desirable to have conservative estimates of the population values in this work which is somewhat exploratory in character.

[3]The studies utilized in this analysis were Aho (1979a, 1979b); Beck (1981); Becker,Kaback, Rosenstock, & Ruth (1975); Cummings, Jette, Brock, & Haefner (1979); Hallal (1982); King (1982); Langlie (1977); Larson, Olsen, Cole, & Shortell (1979); Rundall and Wheeler (1979a, 1979b); and Tirrell and Hart (1980). Two studies listed in Table 1 of Janz and Becker's (1984) review under the heading of "Preventive Health Behaviors" were excluded from the meta-analysis. Beck (1981) was excluded, because the manner in which the results were presented did not allow us to determine effect sizes for the individual components of the HBM. Weinberger, Greene, Mamlin, & Jerin (1981) was excluded, because in this study the HBM variables were evaluated in relation to possible behavioral outcomes such as being arrested by the police for drunk driving, rather than in relation to possible health outcomes, which is the usual approach.

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13. ABSTRACT *(Maximum 200 words)*

Two studies are reported which capitalized on recent developments in the measurement of personality and health behaviors to examine personality-health behavior relationships comprehensively by determining associations between five major personality dimensions and four major health behavior dimensions. Prior associations between health behaviors and neurotic and extraverted personality tendencies generally replicated. However, conscientiousness and agreeableness, two previously neglected domains of personality, were the most important personality predictors of health behaviors. Multiple regression analyses showed that the personality measures cumulatively accounted for 8.8% to 25.1% of the variance in each of the health behavior aggregates. Personality can be a reliable predictor of health behavior aggregates, and its importance in this regard has been underestimated by failure to consider appropriate health behavior criteria and by omission of important personality dimensions.

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