Personality, Type A Behavior, and Coronary Heart Disease: The Role of Emotional Expression

Howard S. Friedman and Stephanie Booth-Kewley
University of California, Riverside

The nature of the relation between personality factors and coronary heart disease (CHD, the nation's greatest killer) is one of the most important if controversial issues in the field of psychology and health. Although there is still a great deal of conceptual confusion, progress is being made in refining the key components of a predisposition to heart disease. In this article we examine the construct of a coronary-prone personality in the context of the relations among personality, emotional expression, and disease. Special consideration is given to mode of measurement of the Type A behavior pattern—Structured Interview (SI) versus Jenkins Activity Survey (JAS)—and to components and non-Type A correlates of the general coronary-prone construct. Fifty middle-aged men who had had a myocardial infarction were compared with 50 healthy controls in terms of relevant aspects of their psychological functioning. Results indicate that the SI is better than the JAS as a predictor of coronary heart disease (CHD) because of its attention to emotional expressive style. Traditional emphasis on hurry sickness in coronary proneness are deemed wholly inadequate. Furthermore, the results indicate that depression, anxiety, or both may relate to CHD independently of and in addition to Type A behavior. Other aspects of personality and social support are also discussed in the context of improving the construct of coronary proneness.

The search for a coronary-prone personality—a style of coping and behaving that leads to coronary artery damage—has followed a tortuous path. Most attention has been directed at the Type A behavior pattern (TABP), a syndrome of behavior and emotional expression that seems predictive of clinically apparent coronary heart disease (CHD; Cooper, Detre, & Weiss, 1981; Dembroski, Weiss, Shields, Haynes, & Feinleib, 1978). However, there are differing definitions of the key characteristics of a Type A person, and not enough is known about how the Type A style compares to other personality factors in its relation to heart disease.

Type A behavior is not synonymous with coronary-prone behavior; coronary-prone behavior leads to CHD by definition, but the effect of Type A behavior on health is an empirical matter. The nature of the link between the TABP and CHD remains unclear. A nonquantitative but careful review of the epidemiologic foundations of the TABP—CHD relation (Siegel, 1984) indicated that there is reasonable strength of association, reasonable consistency of association in different populations, and a temporally correct association (i.e., TABP preceding CHD); however, there are some contradictory findings on each of these points. A nonquantitative review with a focus on recent prospective studies (Matthews & Haynes, 1986) concluded that Type A behavior (especially when interview assessed) is associated with risk for CHD in initially healthy men but noted that the definition of Type A behavior is broad and complex. In a quantitative review, Booth-Kewley and Friedman (1987) analyzed the relevant published research that can be brought to bear on validity issues and concluded that Type A behavior as assessed by the Structured Interview (SI) is indeed related to CHD, with an average effect size of approximately .20 (as measured by the correlation coefficient r). In addition, Booth-Kewley and Friedman found that other aspects of personality (such as depression) also seem reliably related to heart disease.

As described by its discoverers, the TABP refers to the behavior of an individual who is involved in an aggressive and incessant struggle to achieve more and more in less and less time; the idea of hurry sickness (e.g., M. Friedman & Rosenman, 1974). However, the Type A person has been defined in a wide variety of ways, ranging from workaholism and aggression to a particular expressive and emotional style. Diagnosis of the pattern often depends on unspecified behaviors of both the interviewer and the interviewee (Scherwitz, Graham, Grandits, Buehler, & Billings, 1986). Long lists of expressive characteristics of a coronary-prone person such as loud, explosive speech have been suggested (reviewed by H. S. Friedman, Harris, & Hall, 1984; see also Matthews, 1982), but there has been little research on which expressive characteristics are important and why.

The two primary methods of assessing Type A behavior are the SI and the Jenkins Activity Survey (JAS; Jenkins, Zyzanski, & Rosenman, 1979). The SI format allows the interviewer to challenge the subject and to measure expressive style (nonverbal and emotional) as well as verbal responses. As the inventors of the construct have said, "the assessment of the behavior pattern..."
actually is determined far more by the stylistics in which the interviewee responds than by the content of his responses" (M. Friedman, Brown, & Rosenman, 1969, p. 829). The JAS, on the other hand, is a paper-and-pencil, self-report questionnaire with three standard subscales (Speed and Impatience, Job Involvement, and Hard-Driving Competitiveness). Because of its convenience, it is heavily used in research. Overall, the SI appears to assess speech characteristics, general responsiveness to provocation, and possibly a desire to exert social control, whereas the JAS seems to measure a rapid and competitive living style but neglects affect (Matthews, 1982). Booth-Kewley and Friedman's (1987) quantitative review as well as other articles (e.g., Matthews, 1982) have found the JAS a weaker predictor of CHD than is the SI (with an effect size generally under \( r = .10 \)). In understanding coronary-prone behavior, it is useful to have multiple measures in order to assess convergent and discriminant validity. But if one measure predicts CHD whereas another reliable, conceptually similar measure does not, then the construct itself must be called into question and possibly redefined. Why is the SI a better predictor than the JAS? What are the conceptual underpinnings of the Type A pattern? Relatedly, what other aspects of personality are relevant to coronary proneness?

**Emotional Expressiveness**

Type A behaviors such as fast talking, explosive speech, clenched fists, and hurrying are generally seen as indicative of an underlying emotional state that is unhealthy. Hence, complete understanding of the phenomenon depends on identification of the relevant underlying psychological and affective states. An active, hard-working, ambitious businessperson may epitomize the idea of hurry sickness. However, such a vigorous person does not necessarily share the emotional reactions of impatience, hostility, and tenseness that are also usually considered characteristic of the coronary-prone person. Furthermore, there are no separate classifications or theoretical analyses for people of differing expressive styles who are not Type A; instead, all such people who are quiet, inactive, and not emotionally expressive are simply classified as Type B.

An attempt to refine the Type A/Type B classification was made by H. S. Friedman, Hall, and Harris (1985), who hypothesized that some individuals labeled Type A are not actually coronary prone but are misidentified because of gross behavioral similarities between true Type As (who are coronary prone) and healthy individuals who are confident, dominant, vigorous, and active in their expressive style. For example, loud speech, rapid speech, and short response latencies could be regarded as cues of alertness and vigor rather than hurry sickness. Similarly, they hypothesized that some individuals labeled Type B are prone to CHD; they may have repressed hostility and ambition but are mislabeled because they are quiet, slow to speak, and unaggressive on the surface (see also H. S. Friedman et al., 1984; Hall, Friedman, & Harris, 1986).

In particular, further distinctions could be made on the basis of the Affective Communication Test (ACT), an extensively validated self-report scale of positive nonverbal expressiveness (H. S. Friedman, Prince, Riggio, & DiMatteo, 1980). High-ACT people are animated, popular, exhibitionistic, and easily noticed by others, but they seem emotionally healthy. On theoretical grounds, among Type A people, only those who score low on the ACT should be unhealthy; the high-ACT Type As are active, healthy charismatics. Among Type B people, the reverse should be the case: low-ACT Type Bs should be the true (i.e., healthy) ones. High-ACT Type Bs, who appear slow, quiet, and reserved in social interaction but report (on the ACT) that they are expressive, are assumed to be experiencing an unhealthy conflict between the way they see themselves and the way others see them.

This model was tested on 60 men at high risk for CHD (H. S. Friedman et al., 1985). Type A classification was made by using extremes of the JAS, and nonverbal expressiveness was assessed by using the ACT. Archival health data and videotapes of the men in interpersonal interaction were obtained. The results of the study showed that as predicted, the high-ACT As and the low-ACT Bs (i.e., the theoretically healthy groups) were perceived by observers (raters) as healthier, more alert, and less tense than were the low-ACT As and high-ACT Bs (the theoretically unhealthy groups). The theoretically unhealthy groups also were found to exhibit a greater number of repressed nonverbal cues such as crossed legs and body-focused gestures. These cues might be detected in the SI but, of course, were missed by the JAS. Finally, the two theoretically unhealthy groups were found to have a greater degree of peripheral artery disease.

This approach of refining the Type A construct through the use of concepts from research on emotional expression is a step toward solving the problem that large numbers of people who will not develop heart disease are being classified as coronary prone (Matthews, 1982). However, H. S. Friedman et al. (1985) used a sample of men who had not yet developed heart disease (although they were at high risk based on other factors). It would be useful to see whether this approach can be applied to a sample of men with CHD. More important, Friedman et al. (1985) used the JAS but did not include the SI. It is important to find out whether the SI does indeed measure the expressive dimension that the JAS evidently misses. If so, we would gain a better understanding and more refined diagnosis of coronary proneness. We will address both of these points.

**Coping and Hardiness**

Attention to emotions and emotional expression, though greatly needed, is not sufficient by itself. Where do the tense or competitive feelings—that is, the hypothesized dysfunctional emotional reactions—of coronary-prone people come from? Some conceptualizations of the Type A pattern suggest that a major aspect of the TABP lies in the inappropriate coping skills exhibited by Type A persons; that is, Type A behaviors represent the individual's excessive desire to assert and maintain control over stressful aspects of the environment (Glass, 1977, 1981). This promising view has not been fully tested. However, it has been shown that although the driven, overstressed business executive was the stereotypic image behind research on Type A behavior, many hard-working executives cope well and have good health. These individuals have an active personality variously termed hardy or coherent (Antonovsky, 1979; Kobasa, 1979; Kobasa, Maddi, & Kahn, 1982). Certain well-functioning
subgroups of people, though classified as Type A, may not be prone to illness (cf. Hansson, Hogan, Johnson, & Schroeder, 1983). In short, it is likely that personality characteristics such as internal locus of control and lack of self-alienation (ingredients of hardiness) have protective effects on health for some people. Hence we included in this study the hardiness scales validated by Kobasa and her colleagues.

Self-esteem might also be thought to be a psychological construct relevant to physical health, although there is little evidence that it is directly associated with CHD. Scherwitz, Berenson, and Leventhal (1977) found that Type A individuals who used many self-references in the SI had the highest levels of systolic blood pressure. They suggested that self-references measure self-involvement, which may link Type A behavior and CHD. Similarly, Matthews (1982), Strube (1985), and others have suggested that Type A people are particularly concerned with self-esteem enhancement or protection. Hence, in this research, we assessed and analyzed self-esteem in concert with other relevant measures of personality functioning.

**Hostility, Social Support, and Life Stress**

Evidence suggests that likely elements of coronary proneness are hostility or repressed hostility, anger, and aggression (Chesney & Rosenman, 1985). Reanalyses of data from a major prospective study of heart disease revealed competitive drive to be associated with the development of CHD; the item in the competitive-drive factor that contributed most to this relation was potential for hostility (Matthews, Glass, Rosenman, & Bortner, 1977). This finding is interesting given that such a relation has long been suspected (e.g., Gildea, 1949; Kemple, 1945). Williams and his colleagues (1980) showed that both the TABP and the Cook-Medley Hostility Scale (Cook & Medley, 1954) were independently related to coronary atherosclerosis, and other researchers (Barefoot, Dahlstrom, & Williams, 1983) also found that the Cook-Medley scale predicted clinical coronary disease in a 25-year follow-up of medical students. In a quantitative review, Booth-Kewley and Friedman (1987) found anger/hostility a reliable predictor of CHD, with an average effect size of about .14. It thus appears that the relation between anger/hostility/aggression and heart disease warrants special attention (Shekelle, Gale, Ostfeld, & Paul, 1982; Williams, Barefoot, & Shekelle, 1985). In this research, we used the Cook-Medley Hostility Scale.

In the more general area of psychology and health, numerous studies have indicated that individuals who have more social support are in better health than are those with less (Cohen & Wills, 1985). Although of great theoretical interest, it is not yet clear whether lack of support is related to aspects of personality or why it may be related to cardiovascular disease (U.S. Department of Health & Human Services, 1985). Furthermore, most studies of social support and illness use distress symptoms rather than measures of chronic illness as the illness criteria. To determine whether individuals with CHD have less social support than healthy individuals do, we included the brief measure of social support developed by Williams and his colleagues (Barefoot et al., 1983; Williams et al., 1980). Somatic illness has been frequently found to be associated with life stress. Although this study was not designed to focus in depth on life stress, we also included the brief measure of life stress developed by Williams and colleagues (Williams et al., 1980; R. Williams, personal communication, August 10, 1984) to determine whether stress might be relevant to the relation between emotional expression and illness.

**Depression and Anxiety**

To place the Type A pattern in an appropriate theoretical context, more attention must also be paid to psychological characteristics other than Type A that may be relevant to coronary proneness. A substantial number of studies, both prospective and cross-sectional, have demonstrated significant associations between depression and CHD (e.g., Bakker & Levenson, 1967; Thomas, Ross, & Duszynski, 1975; Zyzanski, Jenkins, Ryan, Flessas, & Everist, 1976). Other studies have found significant relations between anxiety and CHD (e.g., Bruni, Chandler, & Wolf, 1969; Medalie, et al., 1973). It may be that coronary proneness results from a general chronic disturbance in personal functioning rather than from hurry sickness (Booth-Kewley & Friedman, 1987; H. S. Friedman et al., 1985). Yet such characteristics as depression and anxiety are often overlooked in studies of the coronary-prone pattern; even worse, the concept of a Type A style is sometimes inappropriately stretched to try to include them, resulting in definitional confusion. In this research, we included the Depression and Anxiety scales of the Hopkins Symptom Checklist (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974).

**Issues of Inference**

**Disease Endpoints**

Coronary-prone behavior is often discussed in terms of its relation to “heart disease,” but this phrase refers to a collection of disease endpoints. When atherosclerosis becomes advanced in the coronary arteries of the heart, insufficient oxygen is supplied to the heart muscle, which contributes to angina pectoris (chest pain), coronary insufficiency, and myocardial infarction (heart attack). Arteries to the brain and other organs can also become blocked in this same general process (cf. Cottier et al., 1983; Stevens, Turner, Rhodewalt, & Talbot, 1984). However, other physiological factors may contribute to the precise form the disease will take, and some diagnoses, such as that of angina, depend heavily on patients’ self-reports; so the precise disease endpoint (myocardial infarction, angina, occlusion, etc.) should always be specified. We have used physician-diagnosed myocardial infarction, which is a relatively important and reliably defined event.

**Causal Direction**

Isolating precise causal links is difficult in most epidemiological and developmental research, and the area of personality and heart disease is no exception. Although personality could affect the etiology or course of disease, disease could change (“cause”) personality, or both disease and associated personality may be caused by underlying third variables (such as biological temperament). However, although there have been occasional failures to replicate (e.g., Shekelle et al., 1985), overall both prospective...
and concurrent studies show very reliable relations between personality and CHD (Booth-Kewley and Friedman, 1987; Siegel, 1984). Fortunately, the coronary-prone phenomenon itself is well enough established to allow researchers to use cross-sectional studies as well as prospective studies to focus in depth on such matters as the diagnosis, the physiological mediating mechanisms, and the personality associated with the phenomenon. Of course, because people cannot be randomly assigned to personality or to state of health, threats to internal validity remain.

Multiple Prediction

The idea of a coronary-prone personality was originally proposed because physical risk factors such as cigarette smoking did not seem sufficient to account fully for this slow-developing chronic disease and because many eminent clinicians had noticed certain distinctive traits among their heart disease patients (M. Friedman & Rosenman, 1974). The Type A pattern, in particular, was proposed because more traditional personality conceptions did not seem to capture the essence of the observed personality syndrome. However, aside from some initial validation work, little attention has been directed toward determining how the TAPB compares to other aspects of personality. For example, review has shown that SI Type A behavior, hostility, depression, and anxiety are all reliably correlated with CHD (Booth-Kewley & Friedman, 1987), but the various predictors are rarely measured in the same study. This important matter is therefore addressed here.

In sum, we report the results of a research project on the relations between personality patterns (including the TAPB) and coronary heart disease. In particular, 100 men were selected on the basis of their health status and were assessed on a variety of relevant personality and style measures. In addition to a focus on the validity of the coronary-prone construct itself, attention is addressed both to the different measures (SI vs. JAS) and the different components of the Type A pattern.

Method

Subjects

The groups of individuals studied were a heart disease sample of 50 men with diagnosed CHD and a control, a healthy sample of 50 men of comparable age, ethnic group, income, and education who did not have any evidence of CHD. The CHD sample was drawn from the Cardiac Rehabilitation Unit of St. Bernardine's Hospital in San Bernardino, California. These individuals had had a medically diagnosed myocardial infarction (heart attack) within the preceding 24 months but had no other serious chronic diseases such as diabetes or cancer. The control sample was recruited from community organizations in the same geographical area. The control individuals had never had a heart attack or shown any other signs of CHD (no angina or abnormal electrocardiograms) and also had no other serious chronic diseases. Individuals in both groups were male, between the ages of 40 and 69, not physically handicapped, and had normal speaking abilities. Each was paid $20 for his participation.

Procedure

Each individual was given the SI according to the procedure taught by Rosenman and Chesney (Rosenman, 1978). The interviews were audiotaped with the subjects' permission. The SI consists of approximately 25 questions about the subject's behaviors and characteristic ways of responding to situations such as being stuck in traffic. The interviewee is deliberately challenged by the interviewer in the SI in order to elicit Type A responses. Behavior pattern classification is based on both response content and speech characteristics of the interviewee, such as speech rate, speech volume, and response latency.

The 100 audiotapes of the SI were later edited to remove references to the subjects' health status and were then rated independently by two judges, who assigned each subject a rating of either Type A, Type X, or Type B. These ratings were initially in 80% agreement (r = .72; k = .66). The interviews for which there was disagreement were rerated until 100% agreement was achieved.

Each subject was also administered a biographical information form and the following selected personality measures:

1. Form C of the JAS, a widely used paper-and-pencil measure of Type A behavior, contains questions based on those used in the SI. The JAS yields four scores: an overall Type A score, a Hard Driving score, a Job Involvement score, and a Speed and Impatience score.

2. The ACT, a 13-item measure of nonverbal emotional expressiveness, was developed and validated by H. S. Friedman et al. (1980).

3. The Anxiety and Depression scales of the Hopkins Symptom Checklist (Derogatis et al., 1974) measure symptoms associated with anxiety and depression. We predicted that anxiety and depression would be associated with the presence of CHD.

4. The Cook-Medley Hostility Scale (Cook & Medley, 1954), which consists of 50 items taken from the Minnesota Multiphasic Personality Inventory, measures the extent to which the subject views other people as dishonest, inconsiderate, immoral, and unintelligent and believes that they should "suffer for their sins". This scale has been found to relate significantly to coronary atherosclerosis (Williams et al., 1980) and to CHD incidence and total mortality (Barefoot et al., 1983). We predicted that hostility would be associated with the presence of CHD.

5. The Rosenberg Self-Esteem Scale (Rosenberg, 1965) is a widely used 10-item measure of self-esteem. We expected that high self-esteem would be associated with the absence of CHD.

6. The five scales used by Kobasa, Maddi, and their colleagues to assess hardiness (Kobasa et al., 1982) were also selected. According to Kobasa et al. (1982), hardiness is made up of commitment, control, and challenge. The set of scales used to measure hardiness consists of the Alienation From Work and the Alienation From Self scales of the Alienation Test (Maddi, Kobasa, & Hoover, 1979), which are used to measure commitment; the Powerlessness Scale (Maddi et al., 1979) and the Rotter Locus of Control Scale (Rotter, 1966), which are used to measure control; and the Security scale of the California Life Goals Evaluation Schedule (Hahn, 1966), which is used to measure challenge. Hardiness has been found to buffer or attenuate the stress-illness relation (Kobasa, 1979; Kobasa et al., 1982). We expected that hardiness would be associated with the absence of CHD.

7. A brief social support scale developed by Williams and colleagues (Williams et al., 1980) measures perceived quantity and quality of social support. This scale was selected to provide comparability to previous related research and because it is not primarily a measure of social activity (because CHD may reduce activity level). Sample items of the scale are "I have as much contact as I like with someone I feel close to, someone I can trust and confide in"; "I talk socially on the telephone a good bit"; "I have someone who takes pride in my accomplishments"; and "I am not lonely very often." Social support was expected to be associated with the absence of CHD.

8. A brief life stress scale developed by Williams and his colleagues (Williams et al., 1980; R. Williams, personal communication, August 10, 1984) measures the amount of perceived stress in the subject's life. A sample item is "In the past month, I have often felt unable to control
the important issues in my life.” This scale was expected to be associated with the presence of CHD.

Analysis

In the analyses, a higher number was used to indicate disease (i.e., membership in the CHD group), whereas a lower number indicated health. A higher number also indicated a Type A classification. In the SI diagnosis, the men were classified as Type X if they appeared to have some but not a clear preponderance of Type A characteristics. For conceptual clarity and simplicity, these men were classed with the Type A subjects in the results reported here. (Analyses with Type X men classed separately showed similar results.) Overall, 48 of the men were SI Type A, 14 were Type X, and 38 were Type B. This distribution is well within the expected bounds in a sample in which half of the individuals have heart disease.

Analyses assessing the comparability of the heart disease and control groups revealed that the heart disease group had a mean age of 57 (range of 40–68), and 37 had at least some college education. The matched controls had a mean age of 53 (range of 40–69), and 39 had at least some college education. The CHD group had a slightly lower average income level, as might be expected with people who have had a heart attack.

To view all zero-order relations, we computed correlation coefficients between the personality variables and health status. For easier viewing of key interaction effects on health, we performed analyses of variance (ANOVAs) with JAS and ACT as the independent variables (dummy coded) and with SI and ACT as the independent variables (cf. Lunney, 1970; Rosenthal & Rosnow, 1984). To view the JAS x ACT interaction effect in relation to the SI diagnosis, we performed an ANOVA using SI as the dependent measure. Bifurcation of JAS scores into two categories (Type A and B) may sacrifice some statistical power but makes the JAS measure comparable to the categorical SI classification. Furthermore, because of ongoing conceptual and reliability difficulties regarding Type A behavior, these statistical analyses should be viewed as useful tools in uncovering patterns; precise estimation of effects must await future refinements.

To ascertain multifactor prediction and maximum discriminability, we performed multiple regression analyses in which health status was regressed on the personality variables. This last analysis is equivalent to discriminant analysis because there are only two groups. The analyses were based on a sample of 100, with the following exceptions. For hostility, the sample size was 98; for JAS Speed and Impatience, it was 99; for JAS Job Involvement, it was 96; and for JAS Hard Driving, it was 97. (A few subjects omitted responses to one or more items on these scales.)

Results

Type A and Health

As predicted, the SI measure of Type A successfully distinguished between the healthy and unhealthy men, r(98) = .25, p < .05. The size of this relation is comparable to the average value of the relation between SI Type A and CHD (about r = .20) found in the review by Booth-Kewley and Friedman (1987). This finding adds to the validity of the SI-measured TABP. However, the JAS measure of the TABP was not significantly related to health, r(98) = .01, nor was any of the JAS subscales: Hard Driving, r(95) = .15; Job Involvement, r(94) = -.01; Speed and Impatience, r(97) = .07 (these three values are also close to those found by Booth-Kewley and Friedman). These results thus provide further evidence that the SI taps a relevant aspect of coronary proneness that the paper-and-pencil JAS is missing. Furthermore, if heart disease “caused” Type A behavior by leading heart attack victims to see themselves as being too impatient and so forth, then we would expect to see a clear relation between heart disease and the (self-report) JAS scores; this was not the case.

Hostility, Social Support, and Life Stress

Contrary to prediction, scores on the Cook–Medley Hostility Scale were not significantly related to health status, r(96) = .04. This correlation is smaller than that found in two previous studies but is close to that found by Dembroski, MacDougal, Williams, Haney, and Blumenthal (1985) as related to coronary occlusion. However, given the size of the previously found relations (r = .12 in Williams et al., 1980, and r = .17 in Barefoot et al., 1983), this difference might reasonably be explained as due to random sampling fluctuations. A test of the significance of the difference between the average correlations obtained by Williams et al. and Barefoot et al. (r = .14) and the correlation of .04 found in this study revealed the difference to be nonsignificant (z = −0.99, p = .32).

We predicted that social support would be associated with the absence of CHD. This prediction was confirmed, r(98) = -.19, p = .06. Social support is considered further in the Multifactor Prediction section. However, perceived life stress was not significantly related to health status, r(98) = .11.

Emotional Expressiveness

As described earlier, H. S. Friedman et al. (1985, 1984) have proposed a conceptual scheme designed to clarify the expressiveness aspect of the coronary-prone personality. In this scheme, individuals are divided into four groups as a function of being Type A or Type B and high or low on expressiveness as measured by the ACT. We first divided subjects into the four groups on the basis of their JAS scores (divided at the median) and their ACT scores, as was done in H. S. Friedman et al. (1985). Although we also performed correlational and regression analyses, the four-group scheme is most easily viewed in terms of a 2 x 2 ANOVA. The use of ANOVA on dichotomous dependent variables is known to be robust so long as the distributions are not heavily skewed (e.g., see Lunney, 1970).

A 2 x 2 (JAS x ACT) ANOVA on health status revealed the predicted interaction, F(1, 96) = 6.03, p < .05. High-ACT Type As (healthy charismatics) and low-ACT Type Bs (truly relaxed Bs) were healthier (i.e., less likely to have had a heart attack) than were those men in the other two groups. The means are shown in Table 1. Furthermore, low-ACT, low-JAS men (true Bs) were significantly more likely to be free of CHD than were low-ACT (true) Type As, t(96) = 2.12, p < .05, and high-ACT As (charismatics) were more likely to be free of CHD than were the true As, t(96) = 1.91, p < .10. This study thus replicates H. S. Friedman et al. (1985), but this time using actual victims of heart attacks.

To ascertain whether emotional expressiveness (as measured by the ACT) does indeed distinguish JAS Type A from SI Type A classification, we performed two additional analyses. First, an analogous 2 x 2 ANOVA (ACT x SI) was done on health status; that is, the SI was substituted for the JAS. The SI and the ACT
were not related to each other, \( r(98) = .04, \text{ns} \); also, ACT by itself is not related to health status, \( r(98) = -.09, \text{ns} \). The interaction was nonsignificant, \( F(1, 96) = 0.26 \). (The means are shown in Table 1.) This finding, or lack of a finding, suggests that the SI classification already takes emotional expressiveness into account.

Second, a 2 x 2 (JAS x ACT) ANOVA was performed with the SI classification as the dependent measure. A JAS x ACT interaction was found on SI classification, \( F(1, 96) = 3.75, p < .05 \). With a low score indicating a more Type B rating on the SI, this interaction shows that the low-ACT, low-JAS men (true Type Bs) were most likely to be rated Type B on the SI (\( M = 0.42 \)); the low-ACT, high-JAS men (unhealthy Type As) were most Type A (\( M = 0.76 \)); and the other two groups were in between (\( M_s = 0.63 \) and 0.67). Newman-Keuls post hoc comparisons confirmed that the "true" Type Bs were significantly more SI Type B than were the "true" Type As (\( p < .05 \)). Together with the fact that SI Type A predicts coronary health status in this study and JAS Type A does not, these analyses indicate that the diagnosis of Type A behavior likely gains a good part of its predictive validity from its ability to take emotional expressiveness into account.

To learn more about the personalities of the men in these four groups, we looked at their scores on other measures. As might be expected, the healthy charismatics (high ACT, JAS Type A) were highest on hardiness: They were least alienated from self and work, least powerless, and highest on internal locus of control. The true Type Bs (low ACT, low JAS) were least anxious, least depressed, and highest in SI-rated Type B. The high-ACT, low-JAS group (i.e., the JAS Type B people who reported being expressive) was singled out in previous research (H. S. Friedman et al., 1985) as being especially intriguing. These people may look and sound quiet, but their high scores on the ACT may look and sound quiet, but their high scores on the ACT may look and sound quiet, but their high scores on the ACT may look and sound quiet, but their high scores on the ACT may look and sound quiet, but their high scores on the ACT were significantly more likely to be judged SI Type A than were the true Bs, \( t(96) = 2.51, p < .05 \); however, the true Type As were not readily distinguishable on the other personality variables, which is consistent with the idea that the Type A construct is not captured by traditional personality measures.

### Depression and Anxiety

Regarding the Hopkins inventory, both the Anxiety scale (items like "nervousness or shakiness inside") and the Depression scale (items like "feeling no interest in things"; "feeling blue"; "poor appetite") were significantly correlated with health status: for Anxiety, \( r(98) = .30, p < .01 \); for Depression, \( r(98) = .23, p < .05 \). In addition, Anxiety and Depression are highly correlated with each other, \( r(98) = .68 \), and with the Powerlessness Scale (\( r_s \) of .42 and .45, respectively), suggesting that they are tapping a general depression syndrome. However, Anxiety, Depression, and Powerlessness are all correlated at \( .20 \) or less with SI Type A, indicating that they assess an aspect of personality different from Type A. (This is also true within the heart attack and control groups.) This matter is considered further later.\(^1\)

### Hardiness and Self-Esteem

Contrary to prediction, self-esteem was not correlated with health status, \( r(98) = -.08 \). It was also not correlated with the SI, \( r(98) = -.12 \), or the JAS, \( r(98) = -.04 \). In future research, it may be desirable to distinguish self-esteem from a need for self-esteem enhancement.

The hardiness composite was not significantly related to health status, \( r(98) = -.14, p < .10 \), although the relation was in the expected direction. In addition, none of the three hardiness components was significantly associated with health status: Correlations were .04 for challenge, -.13 for control, and -.12 for commitment. However, the healthy charismatics (high ACT, high JAS) were significantly more internal on the Locus of Control Scale than were the other subjects, \( r(98) = 2.28, p < .05 \), although locus of control is only weakly related to health overall (\( p < .10 \)). This finding, which replicates that of H. S. Friedman et al. (1985), suggests that locus of control (and possibly the more general construct of hardiness) may be most valuable when it is considered in combination with other aspects of personality. It may well be that an internal locus of control is conducive to health only among active, motivated, and successful people.

### Multifactor Prediction

We have shown that Depression/Anxiety is associated with health status, that SI Type A is also so associated, but that SI Type A is not closely related to Anxiety/Depression. To find the best combination of predictors of health status, we performed multiple regression analyses with hostility, social support, anx-

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1 There is one item on the Anxiety scale ("heart racing or pounding") that could be seen as confounded with CHD. With this item excluded, the recomputed correlation between Anxiety and CHD is .29 (previously .30).
Table 2
Inter correlations of Major Predictor Variables

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<td>1. SI</td>
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<td>2. JAS</td>
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<td>3. ACT</td>
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<td>4. Depression</td>
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<td>5. Anxiety</td>
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<td>6. Hostility</td>
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<td>8. Security</td>
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<td>10. Powerlessness</td>
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<td>.62</td>
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<td>11. Alienation from self</td>
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<td>.02</td>
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<td>.41</td>
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Note. N = 100 except for hostility, where N = 98. Correlations greater than .20 and .26 are significant at the .05 and .01 levels, respectively. SI = Structured Interview. JAS = Jenkins Activity Survey. ACT = Affective Communication Test.

Discussion

With greater attention to construct validity, researchers have recently been closing in on the important elements of a coronary-prone personality. This study advances our understanding of the role of emotional states in this phenomenon. In general, SI-assessed Type A behavior and a depression/anxiety cluster were found to be associated with the presence of CHD, whereas social support and internal locus of control tended to be related to the absence of CHD. However, a much more specific understanding was also achieved. In particular, this research has improved our understanding of coronary-prone behavior in two main areas: emotional expressiveness and multiple prediction.

Emotional Expressiveness, JAS, and SI

The first major set of findings provided by the study concerns the questionnaire (JAS) versus interview-based (SI) assessments of Type A behavior. These two measures are widely used, but past research has found the SI to be a much better predictor of heart disease. Our results indicate, as previously suspected, that the SI and the JAS are indeed distinguishable on an emotional expressiveness dimension in predicting CHD.

In this study, the SI successfully distinguished between the healthy and unhealthy men, but the JAS did not. Although the JAS had an almost zero correlation with health status, it was found to interact significantly with the ACT (measuring a positive, spontaneous nonverbal expressiveness or charisma) in its effects on health. The low-ACT, JAS Type A men and the high-ACT, JAS Type B men were more likely to have CHD than were the high-ACT, JAS Type A and the low-ACT, JAS Type B. This finding, which replicates the results obtained by H. S. Friedman et al. (1985) on peripheral artery disease, indicates that scoring Type A on the JAS is not necessarily unhealthy, and scoring Type B on the JAS is not necessarily healthy. More important, this study also indicates why: The SI takes into account the healthy or unhealthy expressive cues that the JAS misses. This finding is consistent with the recent literature-review findings that nonverbal cues are related to SI Type A diagnosis and nonverbal behavior is related to CHD (Hall et al., 1986).

The healthy charismatic Type As (high ACT, high JAS) appear to have an internal locus of control and report little powerlessness, alienation from work, or alienation from self. These individuals are likely fast moving, in control, socially skilled, and healthy. The other healthy group was the true Type Bs (low ACT, low JAS). They were least depressed, least anxious, and
most likely to sound like the classic Type B man in the SI. They seem to be relaxed, easygoing, reserved, and healthy.

The true Type A individuals (low ACT, high JAS) are likely to be rated as Type A in the SI. They may be the easily recognized competitive, aggressive strivers. However, our results also indicate that scoring Type B on the JAS is not necessarily healthy. The high-ACT, low-JAS (Type B) men seem to be conflicted that scoring Type B on the JAS is not necessarily healthy. It may also be that these men experience strong emotions but have some difficulty in expressing them openly to others. Evidently, the conflicts or negative emotions of these coronary-prone men are detected by the SI but not by paper-and-pencil measures.

In short, the SI seems to allow trained observers to distinguish healthy from unhealthy people. This study as well as previous research (reviewed by Booth-Kewley & Friedman, 1987) indicates that the SI can predict CHD, but the JAS misses something. In addition, however, the SI diagnosis is not simply related to a charismatic emotional expressiveness (i.e., ACT); the SI seems able to detect both a healthy charismatic expressive and a more laid-back healthy style. So just what is it that the SI is detecting? There may be no easy answer to this question. Research on social perception has thus far been unable to reveal an isomorphic mapping between personality and expression or between expression and perception. Some of the reasons for this complexity may be that we have not yet isolated all the relevant expressive cues that provide information to observers, that people may differ in the cues by which they reveal their emotional health, or that perceivers do not make simple, additive judgments relying on only a few expressive cues but instead make complex inferences. Because these are all empirical questions, research along these lines should continue.

Multiple Factor Prediction of CHD

The second major set of findings of the study involves the association between Type A and CHD in relation to other personality factors. A key question emerging from past research is whether Type A behavior and other variables such as depression and anxiety are redundant or independent in their relations with CHD (Booth-Kewley & Friedman, 1987). The Type A pattern was originally proposed as a unique style of responding. However, conceptual confusion between Type A behavior and coronary-prone behavior has obscured relations between various aspects of personality and disease. The results of this study indicate that the Type A construct does seem to go beyond more traditional conceptions. We found that SI Type A and a depression/anxiety cluster are independently and significantly associated with CHD. However, it is not yet clear where anger and hostility fit into this equation.

In terms of cognitive processes, research approaches that attend to an individual's aspirations and frustrations may prove valuable. Perhaps an anger born of frustrated ambition turns into an unhealthy depression. Perhaps a mismatch between social skills and life stresses (when not buffered by appropriate coping and social support) is a root cause of coronary proneness (see also Scherwitz, Graham, & Ornish, 1985). It may also be that different types of emotional frustrations lead to CHD in different types of people.

Other Predictors

Social support tended to be associated with the absence of CHD. Because the social support measure used in this study does not seem primarily to assess the physical aspects of social ties, it is not likely that the CHD patients were merely physically less able to maintain social support. Although numerous studies have found associations between social support and "health" (usually some measure of mental health), few have found significant relations between social support and coronary heart disease. Our study was not designed to focus on social support. Future studies should more comprehensively investigate the relation between social support and CHD, but in the context of emotional reactions.

Hardiness was not significantly associated with health status in overall analyses, although the findings were in the expected direction. A larger sample might have found reliable relations. However, elements of hardiness did distinguish among certain theoretically interesting subgroups of men. To the extent that hardiness assesses the more cognitive coping processes (as opposed to the more directly observable emotional reactivity), it may have predictive power when examined in terms of the fit between the person and the environment. In other words, future research should examine the protective effects of a hardy personality in terms of the stresses put on that personality.

In contrast to previous findings, hostility as measured by the Cook-Medley scale was not found to be associated with CHD. As this difference could reasonably be explained as due to random sampling fluctuations, future research in this area should continue to measure hostility.

Inference

Because this study involved a cross-sectional design, one must be careful about some of the inferences regarding causal direction. For example, it may be that heart attack victims become anxious, depressed, Type A, and so on as a result of their illness. However, at this point there is so much evidence suggesting that psychological factors play some part in causing CHD that it seems valuable to pay close attention to carefully executed cross-sectional research that addresses unanswered questions about the coronary-prone construct. Of course, large-scale prospective studies and intervention studies are also still needed, despite the high cost of such research.

Future prospective work on personality and disease should include other disease outcomes in addition to CHD (H. S. Friedman & Booth-Kewley, 1987). Studies of these matters in samples of women are also sorely needed. Finally, mediating mechanisms involving the interaction of personality with life stresses and health risk factors (such as diet) should also be investigated.

Although the relations between psychological variables and CHD found in this and similar studies are modest in size, the standard risk factors for heart disease (including biological factors) typically involve similarly modest effects. Many people
smoke cigarettes or have high blood pressure or eat a fatty diet and never suffer heart disease, just as many Type A people never have a heart attack. Still, there is better evidence for the benefits of a proper psychological orientation in producing a long life free of heart attack than there is for the benefits of many popularly promoted health tips. If Type A people are twice as likely to have a heart attack as Type B people are (as found in the prospective Western Collaborative Group Study of initially disease-free people; Rosenman, Brand, Jenkins, Friedman, & Straus, 1975), and if other independent, psychological predictors can also be isolated, then the phenomenon of a coronary-prone personality is of major importance. Theoretically, it is important because it can lead to knowledge about the mechanisms linking psychology and health. Practically, it is important because of the prevalence of CHD, which accounts for almost one third of all premature deaths in the United States.

It is ironic that many in the health care community are now concluding that the role of psychological factors in causing physical illness is largely folklore (Angell, 1985). Especially in the case of coronary-prone behavior, the evidence for the role of psychological disturbance in the etiology of disease is quite strong. By taking a broad approach to the construct of coronary proneness, including the emotional aspects, definite progress can be made. It would be foolish to abandon the search now.

References


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