

CORONARY-PRONE BEHAVIOR, LOCUS OF CONTROL, AND ANXIETY¹

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Summary.—216 college students were administered the Taylor Manifest Anxiety Scale, the Bortner Type A/B Scale for coronary-prone behavior, and the Rotter internal-external Locus of Control Inventory. The results indicated that the mean anxiety score for the Type A-external group was significantly higher than those of the other three groups. This finding supports the bio-behavioral theory that high-risk coronary-prone individuals are more likely to possess a Type A, high external control, and high anxiety score profile. A mathematical analysis of responses to the items on the Bortner scale produced three interpretable factors, aggression, speed, and impatience, all of which have some clinical validity in other studies.

During the past 15 years considerable evidence and argument has been made for the association between the Type A behavior pattern and the incidence of coronary heart disease (Friedman & Rosenman, 1974). This pattern is characterized by extreme and various combinations of the following: competitiveness, self-imposed deadlines, desire for recognition, achievement, haste, impatience, time urgency, inability to relax, tenseness of facial muscles, accentuation of normal speech, and restlessness. On the other hand, a Type B behavior pattern is characterized by a low or moderate amount of only a few of the above traits. The initial evidence relating this pattern to coronary heart disease was done by Rosenman (1970, 1975) in which he followed 3,154 men over an 8.5-yr. period. Type A individuals exhibited 2.3 times the rate of coronary diseases as did Type Bs. Classification of individuals as Type A or B was originally based on a structured stress interview (Friedman & Rosenman, 1974; Bortner, Rosenman, & Friedman, 1967). Other approaches have used self-report inventories such as the Jenkins Activity Survey and the Bortner Short Rating Scale (Bortner, Rosenman, & Friedman, 1967; Bortner, 1969; Jenkins, 1967). The Jenkins activities predict the onset of coronary disease in a number of studies (Jenkins, 1967, 1976). Only one such study has been done for Bortner's scale (Bortner, 1969). Therefore, one purpose of this study was to investigate the structure of that scale as well as its relationship to a biobehavioral theory for the development of coronary disease in Type A individuals.

A biobehavioral theory for coronary disease in Type A individuals was

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developed by Glass (1977a, 1977b). Essentially this theory proposes that the maintenance of control over many aspects of the environment is of utmost importance to extreme Type A individuals, hence the frantic pace by which they live. The behavioral difference between Type A and B personalities is even more distinguishable when As are in situations of uncontrollable environmental stressors. In these situations, Glass (1977b) points out, As exert greater efforts to establish control even on related or transfer tasks and situations. However, this hyper-responsiveness in As often proves to be ineffective in the long run, at which point As may give-up and show behavior characteristics of "learned-helplessness" (Seligman, 1975). Since Bs are less likely to react to assert control like As, they are less likely to perceive lack of control over uncontrollable life events or stressors and less often develop learned-helplessness. Although it has never been demonstrated, it seems likely that a Type A individual, also possessing an external locus of control, would possess an even greater susceptibility to learned helplessness. Thus, Type As with external control presumably believe that other factors such as fate, chance, luck, or other people largely control their lives in almost all situations—controllable or not.

Recently, Jenkins (1976) has shown that there is considerable evidence associating coronary disease with anxiety. For example, anxiety has been shown to be related to cardiovascular disorders such as myocardial infarction, atherosclerosis, and to angina pectoris. This evidence indicates that anxiety could be appropriately incorporated into Glass's (1977a, 1977b) biobehavioral theory, since it would appear that perceived lack of control represents a condition of helplessness which should increase anxiety for Type As. Thus, we hypothesize that extreme Type A individuals possessing an external locus of control would tend to have higher anxiety test scores. On the other hand, extreme Type B individuals possessing an internal locus of control would have lower anxiety test scores. According to our extended biobehavioral theory, Type A-internals and Type B-externals should have moderate anxiety test scores.

METHOD

The subjects were 216 male and female undergraduates at the University of California, Davis. They were volunteers recruited from four residence halls during one of their regular meetings.

The subjects were administered (1) Bortner's (1969) scale, as a measure of Type A or B coronary prone behavior; (2) Rotter's (1954) Locus of Control Scale, as a measure of internal or external control; and (3) Bendig's short version of the Taylor Manifest Anxiety Scale (Bendig, 1956). Bortner's scale has 14 items of comparative descriptive phrases separated by a 3-in. line. One descriptive phrase is indicative of Type A coronary prone behavior. The subject's mark on each 3-in. line was given a score from 1 to 12 depending upon

of the test. Principal components (factors) were extracted from the correlation matrix and those with eigenvalues (sum of squared factor loadings) greater than 1.00 were rotated by the varimax procedure. Table 2 presents the factor structure of the Bortner scale showing only items loading $\pm .40$ or more. The factors have been tentatively identified as aggression, impatience, speed, and school work. Although this latter "factor" consisted of only one item with a large loading, it is nevertheless consistent with the "job involvement" factor for non-college populations on Jenkins' scale (Jenkins, 1971).

TABLE 2
FACTOR STRUCTURE OF BORTNER TYPE A/B SHORT RATING SCALE

Factor Name	Loading	Item
Aggression	.57	Competitive
	.65	Ambitious
	.65	Hard driving
Impatience	.44	Impatient listener
	.53	Feeling rushed
	.52	Impatient waiting
	.40	Empathic speaker
Speed	.42	Late appointments
	.51	Going "all out"
	.50	Fast eating, talking
	.44	Hard driving
School work	.75	School work vs outside interests

DISCUSSION

The importance of the higher mean anxiety scores of the Type A-external group suggests, according to our extension of Glass's (1977a, 1977b) bio-behavioral theory, that these individuals may be more prone to coronary heart disease. Although we do not have physiological data fully to substantiate our hypothesis in these college students, our behavioral data substantiate this part of the theory. The results are very interesting because they substantiate for young adults what the theory and research has indicated for middle-aged adults. Also our behavioral data substantiate very tentatively the part of the bio-behavioral theory that Type B-internal subjects tend to have the lowest anxiety test scores, and the Type A-internal and Type B-external subjects would have moderate or middle-most anxiety scores. Unfortunately these latter results were not statistically reliable. It is possible that either the theory is insufficient in these regards, or that the procedures for measuring Type A/B, internal-external locus of control, or anxiety may be inadequate for testing the theory.

Although both the locus of control inventory and the anxiety test have been around for many years and considerable analysis and research has been

its proximity to the Type A adjective in quarter-inch intervals. Thus the total possible score was 168 (14 items \times 12 points). Rotter's Locus of Control Scale consists of 23 forced-choice items. An internal statement is paired with an external statement. Scores may range from zero (internal) to 23 (external). Bendig's short form of the Manifest Anxiety Scale consists of the best 20 items from the original 50. The subjects responded to each item on a 1 to 5 scale, with five indicating greater anxiety. Thus, possible scores ranged from 20 to 100.

RESULTS

In order to test the hypotheses regarding extreme Type A and Type B individuals, subjects in the upper and lower one-third on the Bortner scale (Type A & B), and on the Locus of Control Scale (external and internal) were selected to form a 2×2 analysis of variance with their anxiety score as the measure to be analyzed. Table 1 presents the means and standard deviations on the anxiety test for the four groups.

TABLE 1
MEANS AND STANDARD DEVIATIONS ON ANXIETY TEST FOR
TYPE A/B AND INTERNAL-EXTERNAL GROUPS

Group	N	M	SD
Type A—External	25	51.68	11.64
Type A—Internal	28	39.61	8.85
Type B—External	32	42.53	9.59
Type B—Internal	23	35.61	8.23

The statistical results showed a significant main effect for both Type A/B ($F_{1/107} = 12.87, p < .05$) and internal-external ($F_{1/107} = 25.62, p < .05$) on anxiety test scores. No significant interaction was obtained ($F_{1/107} = 1.89, p > .05$). Scheffé's multiple comparison test was used to determine which of the four means was significantly different from the others. This analysis indicated that only the Type A-external group differed significantly from the other three groups. Thus our hypothesis has been confirmed that extreme Type A individuals who possess an external locus of control would have higher anxiety test scores. However, our hypothesis was not confirmed that extreme Type B individuals who possess an internal locus of control would have lower anxiety test scores. Indeed, this latter group did have the lowest mean but it was not significantly lower than that of the Type A-internal and Type B-external groups. According to the theory, these latter two groups should have moderate anxiety scores and they do.

In order to investigate the factor structure of the Bortner scale, Pearson product-moment correlations were calculated among the 14 twelve-point items

done with them, the Bortner scale was developed in 1969 and less analysis and research has been done with it. Yet the results of our factor analysis of scores on this scale are consistent with previous factor analyses of other Type A/B classification systems. The three factors, aggression, impatience, and speed—are qualitatively similar to those found in previous studies (Jenkins, 1967; Friedman & Rosenman, 1960; Matthews, Glass, & Rosenman, 1977)—where they have been validated on physiological data with non-college populations. Now we show the same factors, at least, with a college population. The next step appears to be one of a prospective or retrospective study relating the Bortner scale, together with locus of control and anxiety, with proneness to coronary disease.

With our extension of the biobehavioral theory and its evidence relating Type A-external-high anxiety to coronary disease, the important question remains how might one correct or prevent the seeming pathogenic behavior of coronary-disease prone subjects? Since many environmental and behavioral situations present uncontrollable stress to many individuals, the important consideration in the long run is how to cope with or deal with these situations. Since coping or adaptation style can be learned early in life, what are some of the better educational procedures now available for this situation? Several methods have been suggested as showing promising results.³ These are Transcendental Meditation, relaxation training, running, and, management of anxiety and stress. Suinn and Bloan³ used training for management of anxiety and noted significant changes in Type A behaviors (as measured on the Jenkins scale) and lower anxiety scores. Studies such as this suggest an expanded role of health education or preventive medicine and more research on both the identification and education phases in the area of behavioral treatment of precursor states of coronary disease prone. If indeed, such advances could be made, they, in addition to traditional medical treatments, might help reduce one of the major killers in the U.S.

REFERENCES

- BENDIG, A. W. The development of a short form of the manifest anxiety scale. *Journal of Consulting Psychology*, 1956, 5, 384.
- BORTNER, R. W. A short rating scale as a potential measure of pattern A behavior. *Journal of Chronic Disease*, 1969, 22, 87-91.
- BORTNER, R. W., ROSENMAN, R. H., & FRIEDMAN, M. Familial similarity in pattern A behavior: father and sons. *Journal of Chronic Disease*, 1967, 23, 39-43.
- FRIEDMAN, M., & ROSENMAN, R. H. Association of specific overt behavior patterns with blood and cardiovascular findings. *Journal of Clinical Investigation*, 1960, 39, 758-764.
- FRIEDMAN, M., & ROSENMAN, R. J. *Type A behavior and your heart*. New York: Knopf, 1974.

³R. M. Suinn, & L. J. Bloom, Anxiety management training for Type As. (Personal correspondence, 1978)

- GLASS, D. C. Behavioral patterns, stress, and coronary disease. *American Scientist*, 1977, 65, 177-187. (a)
- GLASS, D. C. *Stress, behavioral patterns, and coronary disease*. Hillsdale, NJ: Lawrence Erlbaum Assoc., 1977. (b)
- JENKINS, C. D. Development of an objective test for the determination of the coronary prone behavior pattern. *Journal of Chronic Disease*, 1967, 20, 371-379.
- JENKINS, C. D. Progress towards validation of a computer scored test for the type A coronary prone behavior pattern. *Psychosomatic Medicine*, 1971, 33, 244-256.
- JENKINS, C. D. Recent evidence supporting psychological and social risk factors for coronary disease. *New England Journal of Medicine*, 1976, 294, 987-994.
- MATTHEWS, K. A., GLASS, D. D., & ROSENMAN, R. H. Competitive drive, pattern A and coronary heart disease: a further analysis of some data from the Western Collaborative Group Study. *Journal of Chronic Disease*, 1977, 30, 389-398.
- ROSENMAN, R. H. Coronary heart disease in the Western collaborative group study: a follow-up experience of four years. *Journal of Chronic Disease*, 1970, 23, 173-190.
- ROSENMAN, R. H. Coronary heart disease in the Western collaborative group study: a follow-up experience of two years. *Journal of the American Medical Association*, 1975, 233, 872-877.
- ROTTER, J. B. *Social learning and clinical psychology*. New York: Prentice-Hall, 1954.
- SELIGMAN, M. E. P. *Helplessness*. San Francisco: Freeman, 1975.

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