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CANADIAN THESES ON MICROFICHE | *THÈSES CANADIENNES SUR MICROFICHE*

NAME OF AUTHOR/*NOM DE L'AUTEUR* Jeffrey Wayne Hyde

TITLE OF THESIS/*TITRE DE LA THÈSE* Type A behavior, hostility and race in hospitalized patients with and without coronary heart disease.

UNIVERSITY/*UNIVERSITÉ* University of Windsor, Windsor, Ontario

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NAME OF SUPERVISOR/*NOM DU DIRECTEUR DE THÈSE* Dr. G. Ron Frisch

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TYPE A BEHAVIOR, HOSTILITY AND RACE IN HOSPITALIZED PATIENTS WITH AND WITHOUT CORONARY HEART DISEASE

by

Jeffrey Wayne Hyde

M.A., Oakland University, 1976

A Dissertation
Submitted to the Faculty of Graduate Studies
through the Department of Psychology
in Partial Fulfillment of the
Requirements for the Degree
of Doctor of Philosophy at the
University of Windsor

Windsor, Ontario, Canada

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ABSTRACT

The primary purpose of this study was to determine whether a group of coronary heart disease patients could be distinguished from a hospitalized control group on the basis of their responses to the Jenkins Activity Survey and a modified Cook Medley Hostility Scale. Of further interest was whether the race of the subjects would have a significant effect on their responses to these two psychological instruments. One hundred and twenty-two hospitalized patients were surveyed and assigned to one of four groups based on their race and health status. The four groups were divided as follows: White heart disease, 45 patients; White control, 38 patients; Black heart disease, 22 patients; and Black control, 17 patients. The coronary heart disease patients were recovering from a recent, documented myocardial infarction. The control group patients were recovering from surgery and medical procedures and had no history of heart problems. The omnibus MANOVA indicated that the independent variable of heart disease did not have a significant effect on the JAS and Ho test scores. Specifically, the heart disease patients did not score significantly different on the JAS and Ho scales. Race did have a significant main effect on the mean scores of the JAS and Ho. The subsequent step-down analysis showed that the Black patients scored significantly higher than the White patients on the Hostility scale. However, after the dependent variables were adjusted for the effects of age, socioeconomic status, smoking history, and family history of myocardial infarction through the use of MANCOVA, the subsequent results indicated that the race of the patient did not have a significant effect on their scores on the JAS and Ho. This research illustrates the importance of analyzing

the demographic variables in studies that examine the association between coronary heart disease and psychological variables.

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CHAPTER I

INTRODUCTION

Coronary heart disease (CHD) has been called America's number one killer. It is the leading cause of death among black as well as white Americans. The American Heart Association estimates that Americans will suffer as many as 1.5 million heart attacks this year alone; 550,000 of these will result in death. The prevalence of CHD is very similar for white and black men and is somewhat higher for black women than for white women (Gillum, 1982; Gillum & Lui, 1984). Fifteen percent of the Americans who survive a first heart attack die of a second attack within two years. Major risk factors for coronary heart disease include elevated plasma cholesterol, high blood pressure, excessive cigarette smoking, and inadequate physical activity (Friedman, 1969).

The above classical risks factors account for only about half of the CHD incidence in white middle-aged American men, according to Keys (1972). These same factors have not been adequately evaluated for the black population (Gillum & Grant, 1982). Keys suggests that there must be other variables that contribute to the incidence of CHD. The recognition of certain characteristic personality and lifestyle patterns of many CHD patients led to the investigation of the role of behavior in the etiology of CHD. In the last 25 years the relationship between CHD and this cluster of behaviors, now termed "Type A behavior pattern" has been an important area of research.

The present study investigates the feasibility of combining two self-report measures--the Jenkins Activity Survey (JAS) and the Cook-Medley Hostility Scale (Ho)--in an attempt to improve the measurement of behaviors that have correlated with CHD. The second purpose of this study is to examine the association of the Type A behavior pattern and CHD in a sample of black men recovering from a recent myocardial infarction. The sections below will provide further rationale for this study. The first section will review the development of the Type A behavior pattern from its earliest observations to its present status as a recognized risk factor for coronary heart disease. The second section examines the strengths and weaknesses of two frequently used methods of assessing the Type A behavior pattern and reviews some important issues in the assessment of the Type A behavior pattern. The section entitled, The Emotional Correlates of Type A, reviews 25 years of research into psychological variables that correlate with CHD and with the Type A behavior pattern. The last section is a summary and a list of hypotheses for the present study.

Development of the Type A Behavior Pattern

An historical review of the Type A behavior pattern will reveal how early observations of CHD patients were followed by more systematic observations that led to the completion of two prospective studies that established the Type A behavior pattern as a predictive risk factor for CHD. The association between the Type A behavior pattern and the extent of coronary artery disease is examined in a review of 12 angiography studies. Three studies address the question of whether the Type A behavior pattern is predictive of the risk for a recurrent coronary event. Also reviewed is a major study that investigates the alteration of the Type A behavior pattern in postmyocardial infarction patients and

the effect this has on the future risk for reinfarction.

Early observations. Early on, professionals working with coronary patients were struck by the similarity of personality traits that these patients exhibited. In 1897, Sir William Osler (cited in Friedman, 1969, p. 86) wrote about the typical demeanor of the coronary patient based on his informal observations: "It is not the delicate, neurotic person who is prone to angina but the robust, vigorous in mind and body, the keen and ambitious man of 45 to 55 years of age, with military bearing, iron grey hair, and florid complexion." Osler believed that the high pressure at which men lived and their habit of overworking were more responsible for arterial degeneration than excesses in eating or drinking. Dunbar's observations in 1943 are consistent with Osler's observations. After undertaking a 12 year study of 1,600 hospital patients with specific illnesses and constructing a personality profile for each illness, she found the coronary heart disease patients to be a relatively homogeneous group that manifested a clearcut constellation of personality traits. They had a distinguished appearance, appeared self-sufficient, dominated social situations, were hard driving, goal directed and preoccupied with their work, and presented a surface calm which seemed to conceal underlying aggression and resentment. This is in agreement with Arlow's (1945) observation that the CHD patient keeps driving himself/herself to success despite feelings of insecurity that are often concealed. After studying three patients suffering from coronary artery disease, the Menningers (1936) concluded that such patients exhibited strong, often repressed aggressive tendencies. Furthermore, Kemple (1945) suggested that coronary-prone individuals manifested a persistent pattern of aggressiveness and drive to dominate which distinguished them from patients in other groups. He felt that

coronary-prone individuals tend to keep their strong aggressive impulses under control but managed to justify a great deal of outwardly expressed hostility.

It was two cardiologists, Friedman and Rosenman (1959) that first designated the term "Type A behavior pattern" to the characteristic action-emotion complex exhibited by their younger coronary patients. The authors described behavior pattern A as: (a) persistent drive to achieve self-selected but usually poorly defined goals; (b) an intense eagerness to compete; (c) sustained desire for recognition and advancement; (d) continuous involvement in numerous, diverse activities that are constantly subject to deadlines; (e) inclination to accelerate the completion of many physical and mental activities; and (f) mental and physical alertness. In 1969, Friedman added two personality constructs: hostility and aggressive tendencies. "Without question, hostility is frequently present (and sometimes not too deeply buried) and undoubtedly, aggressive tendencies almost always are present" (p. 85).

The converse pattern, defined as Type B behavior pattern, was initially thought to consist of the absence of the behaviors associated with the Type A behavior pattern. Subsequent research has shown that the Type B individual is more introverted, relaxed, deferential, and patient in comparison to his/her Type A counterparts (Glass, 1977; Matthews, 1982).

A review of the Type A research prior to 1960 concluded that when individuals of either sex were selected on the basis of their behavior pattern, the group composed of those who exhibited the fully developed Type A behavior pattern were already suffering from coronary artery disease four to seven times more frequently than the group who exhibited the converse behavior pattern, fully developed Type B. These studies do

not prove that the Type A individual without CHD would develop heart disease in the future more frequently than individuals with the fully developed Type B behavior pattern (Friedman, 1969). This future relative proneness is demonstrated in the Western Collaborative Group Study and the Framingham Heart Study.

Two prospective studies. The Western Collaborative Group Study and the Framingham Heart Study established Type A behavior as a predictive risk factor in the development of CHD.

Initiated in 1960, the Western Collaborative Group Study was the first prospective study of the interaction between the Type A behavior pattern and coronary heart disease, and is considered to be a landmark in the development of the theory. This eight and a half year study of 3,524 men, aged 39 to 59 years old and apparently free of CHD, was designed to compare the predictive abilities of different parameters, including Type A behavior pattern, in the future incidence of coronary heart disease. The authors hypothesized that if behavior pattern A does have a causative relationship with coronary heart disease, then a higher incidence of new CHD should occur over the course of the study in men exhibiting this behavioral complex (Rosenman, Friedman, Straus, Wurm, Jenkins, & Messinger, 1964). The assessment of behavior type and assignment to each group was made based on a 30 minute taped interview, known as the Structured Interview, developed by the authors (Rosenman et al., 1964).

Out of the initial 3,524 men, manifest CHD was observed in 113 subjects at the time of initial assessment and these subjects were eliminated from the prospective aspect of the study. However, 70.9% of these 113 were assessed as having behavior pattern A. Of the remaining 3,411 men without manifest CHD, 1,771 or 52.0% were classified as

coronary prone (Type A) and the remaining 1,640 or 48.0% as non coronary prone or Type B. Annual resurveys were done for eight and one half years. Manifest CHD occurred in 257 subjects during the follow-up period. One hundred and seventy-eight of these subjects were previously classified as Type A. During the first two years, there were 25 deaths due to coronary heart disease. Twenty-two of these deaths (88%) had occurred in subjects with behavior pattern A. Friedman, Rosenman, Straus, Wurm, and Kositchek (1968) concluded that based on the autopsy data, six times more Type A than Type B subjects had died of coronary heart disease. Taking all the deaths from coronary heart disease, illness and accidents into consideration, the autopsy results showed that the Type A subjects exhibited approximately twice as much basic atherosclerosis as that of their Type B subjects. From this data it was determined that the annual rate of CHD was 13.2 per 1,000 for Type A persons, as compared with 5.19 per 1,000 for Type B persons. The authors reported that the incidence of CHD was significantly associated with the presence of Type A behavior pattern as well as parental CHD history, reported diabetes, schooling, smoking habits, blood pressure, and serum levels of cholesterol, triglyceride and betalipoproteins. The Type A behavior pattern's significant association with CHD could not be explained by the association of the behavior pattern with any other single predictive risk factor or with any combination of them (Rosenman, Brand, Jenkins, Friedman, Straus, & Wurm, 1975). It works independent of, as well as intensifying the effects of other risk factors and appears to double the effects of other risk factors (Suinn, 1982).

In the Framingham Heart Study, 1,822 individuals were administered a 300 question inventory that measured 23 psychosocial scales, including a measure of Type A (Haynes, Feinleib, Levine, Scotch, & Kannel, 1978).

The 1,674 subjects that were found to be initially free of CHD were followed for eight years in a prospective manner. After controlling for all other risk factors, Type A men were found to be over twice as likely to develop angina and myocardial infarction (Haynes, Feinleib, & Kannel, 1980).

Brand, Rosenman, Sholtz, and Friedman (1976) compared the Western Collaborative Group Study and the Framingham Study and found the predicted risk factors to be highly correlated between the two studies. The authors also estimated that if the excessive risk associated with the Type A behavior pattern was removed there would be a corresponding 31% reduction of coronary heart disease incidence in the Western Collaborative Group Study. Further analysis confirmed the hypothesis that the Type A behavior pattern elevated other traditional risk factors.

The relationship between the Type A behavior pattern and coronary artery disease. At least 15 studies have now been completed relating Type A to the extent of atherosclerosis in the coronary arteries as determined by angiography. The design for most of these studies has been similar. The samples consisted exclusively of patients undergoing coronary angiography for the evaluation of angina and possible coronary artery bypass surgery. Most patients were admitted to the hospital for not more than two days and were administered the Type A behavior pattern instrument at some time before the coronary angiography was completed. The first of these studies showed a positive relationship between the Type A behavior pattern and coronary artery disease (Blumenthal, Williams, Kong, Schanberg, & Thompson, 1978; Frank, Heller, Kornfield, Sporn, & Weiss, 1978; Zyzanski, Jenkins, Ryan, Flessas, & Everist, 1976). Since then there have been a series of studies that reported mostly negative findings. Bass and Wade (1982) interviewed 99 patients

who had undergone coronary arteriography for the investigation of chest pain. The 26 men with normal and minimally diseased arteries had significantly higher mean Type A scores as measured by the Bortner Type A questionnaire than the 41 men with important coronary occlusions. All patients except one were caucasians. The authors report that social class had a large influence on the Bortner Type A score in men. The workers with non-manual jobs had significantly higher Bortner scores than the men with manual jobs. The association was strongest in men with mild and severe CHD and weakest in those with normal coronary arteries. Dimsdale, Hackett, Hutter, Block, and Catanzano (1978) studied the relation between Type A behavior pattern (as measured by the JAS) and the extent of coronary artery disease. The authors administered the JAS to 109 patients, 99 men and 10 women, who were waiting to undergo coronary angiography. The authors failed to find a significant relation between the Type A behavior pattern and the extent of coronary artery disease. Dimsdale, Hackett, Hutter, Block, Catanzano, and White (1979) studied a second cohort of 105 patients using the same methods as outlined above, with the additional use of the semi-structured interview. Their findings were the same: neither the JAS nor the semi-structured interview were significantly associated with the extent of vessel disease. The authors suggest that the differences in their findings from those of similar studies be attributed to subtle differences in the population sample studied. In summarizing the negative results of the angiography studies (Bass & Wade, 1982; Dimsdale et al., 1978, 1979; Kornitzer, Magotteau, Degre, Kittel, Struyven, & Van Thiel, 1982; Krantz, Sanmarco, Selvester, & Matthews, 1979; Krantz, Schaeffer, & Davis, 1981; Scherwitz, McKelvain, & Laman, 1983; Silver, Jenkins, Ryan, & Melidossian, 1980; Williams, Haney, Lee,

Kang, Blumenthal, & Whalen, 1980; Young, Barboniak, Anderson, & Hoffman, 1980), Pickering (1985) noted two striking points. First, the majority of patients did have coronary artery disease in all of the studies, and the majority of the subjects were classified as Type A. This is not surprising considering the amount of screening done by the referring cardiologist before a patient is referred for an invasive test, such as a coronary angiography. Pickering suggests that the failure to show a correlation between the Type A behavior pattern and the existence or extent of coronary artery disease is not necessary because such a correlation does not exist, but rather because of a type II error--failure to recognize population differences which actually exist.

Type A behavior pattern and the risk of reinfarction. Type A scores (as measured by the Jenkins Activity Survey) have been found to be associated with the increased risk of reinfarction among persons already having coronary heart disease (Jenkins, Zyzanski, Rosenman, & Cleveland, 1971; Jenkins, Zyzanski, & Rosenman, 1976). In the 1976 study, Type A scores significantly discriminated between the 220 men of the Western Collaborative Group Study that survived a single coronary event and the 67 men that experienced a recurrent event. The Type A score was found to be relatively unaffected by whether its measure was made before or after the initial coronary event. Even after the variables of age, diastolic blood pressure, cholesterol, and number of cigarettes were controlled statistically in a stepwise discriminant function analysis, the Type A scores significantly discriminated recurrent from single event cases.

The association between Type A score and the risk of reinfarction failed to be replicated in two large studies. In the Aspirin Myocardial Infarction Study, Shekelle, Gale, and Norusis (1985)

administered the Jenkins Activity Survey to 2,314 people who were recovering from a myocardial infarction. This sampling included a subgroup of 244 women and another subgroup of 671 men who were employed full-time in white collar jobs. All subjects were followed for at least three years. The Type A score was not significantly associated with the risk of recurrent major coronary events as defined by definite non-fatal myocardial infarction and coronary death. Furthermore, the Type A score was not significantly associated to the risk for recurrent coronary events for any of the subgroups. In fact, the highest risk for a recurrent coronary event appeared to be observed among persons with the lowest scores. These results fail to support the results reported by Jenkins et al. (1976).

A similar study looking at the association between the Type A behavior pattern (as measured by the JAS) and the risk of recurrent coronary events was completed by the Multicenter Post-Infarction Research Group (Case, Heller, Case, & Moss, 1985). Within two weeks after an acute myocardial infarction, 516 patients completed the Jenkins Activity Survey. The subjects were followed for one to three years (average, 22 months). There were 101 deaths during the follow-up period. The mean Type A score of those patients who died did not differ significantly from the scores of those who survived. In fact, the mortality was lower among patients with a higher Type A score.

These two studies raise the question of whether the Type A behavior pattern (as measured by the JAS) is associated with the risk for recurrent coronary events. A related question is, if the Type A behavior pattern is associated with the risk for a recurrent coronary event, does the reduction of the Type A behavior pattern reduce the risk of a recurrent cardiac event? The Recurrent Coronary Prevention Project

(Friedman, Thoresen, Gill, Powell, Ulmer, Thompson, Price, Rabin, Breall, Dixon, Levy, & Bourg, 1984) attempted to answer that question. Initiated in 1977, the Recurrent Coronary Prevention Project was designed to determine whether the Type A behavior pattern could be altered or reduced in postmyocardial infarction patients, and if so, would these patients be less likely to develop recurrent coronary problems. Eight hundred and sixty-two postmyocardial patients voluntarily participated in this study. These patients were randomly enrolled into a control group of 270 patients to receive cardiologic counseling or an experimental group of 592 patients who received both the cardiologic and the Type A behavior counseling. The Type A behavior pattern was measured by a videotaped structured interview (VSI) and the use of a self report questionnaire. The video taped structured interview is similar to the structured interview, and the authors observed 83.6% agreement between the two measures. The authors also had the patients' spouse and work colleagues complete the questionnaires on a yearly basis. Thus, the authors monitored the change in the Type A behavior pattern with three types of questionnaires and the VSI. At the end of three years, a reduction in Type A behavior was observed in 43.8% of the 592 patients who participated in the experimental group. The control group exhibited a reduction of the Type A behavior pattern in 25.2% of the 270 participants. The three year cumulative cardiac recurrence rate for the experimental group was seven point two percent, compared to the 13% observed in the control group. It was also significant that regardless of which group a participant was enrolled in, if their Type A behavior showed a reduction after the first year they were significantly less likely to experience a recurrent cardiac event in the following two years.

In response to the above findings (and other studies described later in this chapter), the National Heart, Lung and Blood Institute assembled a panel to review the Type A behavior pattern research. Their final report in 1981 begins with the following statement:

> The Review panel accepts the available body of scientific evidence as demonstrating that type A behavior - as defined by the Structured Interview used in the Western Collaborative Group Study, the Jenkins Activity Survey, and the Framingham type A behavior scale - is associated with an increased risk of clinically apparent CHD in employed, middle aged U.S. citizens. This risk is greater than that imposed by age, elevated values of systolic blood pressure and serum cholesterol, and smoking and appears to be of the same order of magnitude as the relative risk associated with the latter three of the other factors (Cooper, Detre, Weiss, Bristow, Carleton, Dustan, Elliot, Feinleib, Jesse, Klocke, Schwartz, Shields, & Stallones, 1981, p. 1200).

It is not known whether the Type A behavior pattern is a risk factor for CHD in the black population because there have not been any prospective or retrospective studies that examined that specific question. The present study will investigate the association between the Type A behavior pattern and CHD in a sample of black men with coronary heart disease.

The Assessment of the Type A Behavior Pattern

Research of the Type A behavior pattern has served as a basis for devising some useful, but far from perfect techniques for identifying coronary-prone individuals. The assessment instruments attempt to ascertain the presence of the behaviors characteristic of the "Type A" person, and the intensity of these behaviors. Two popular assessment strategies are examined, followed by a review of some suggestions for future research in Type A behavior pattern assessment.

Structured Interview. The Structured Interview (SI), designed by Rosenman and Friedman in 1964, was the first well-validated procedure for assessing the Type A behavior pattern. The interview takes about

20 to 30 minutes to administer and consists of approximately 28 questions. The trained interviewer observes and investigates the following factors: (a) general appearance and demeanor; (b) motor activities; (c) degree of drive and ambition; (d) degree of past and present competitive, aggressive, and hostile feelings; and (e) the degree of urgency. The scoring depends on the person's expressive gestures and motor behaviors, as well as the content of the answers (Friedman, 1969; Jenkins, 1966).

The Structured Interview assesses competitive, aggressive, and hostile feelings by asking questions that identify these attitudes. For example, individuals are asked about their reaction to working with a slow partner or competing with a friend or family member. A characteristic way of detecting the individual's time urgency is to ask a question in a slow, halting manner. Often the Type A individual will interrupt and finish the question or give the answer before the interviewer can finish (Friedman, 1969). The value of these speech stylistics for the assessment of Type A has been confirmed by Schucker and Jacobs (1977).

As a result of the interview, the individuals are classified into one of five categories: A-1 or fully developed Type A; A-2 or incompletely developed Type A; B-3 or less developed Type B; B-4 or fully developed Type B; and X or equally developed Type A and B characteristics. Less than three percent of the population is considered to be Type X, while it is estimated that 50-75% of the white males in the United States are Type A-1 or A-2 (Cooper et al., 1981; Matthews, 1982). There is no reported literature on the estimated prevalance of the Type A behavior pattern in black males.

Despite the subjective nature of these judgements by the

interviewer, the interrater reliability in classifying subjects ranges from 0.64 to 0.85 (Caffrey, 1968; Howland & Seigman, 1982; Jenkins, Rosenman, & Friedman, 1968; Matthews, Glass, Rosenman, & Bortner, 1977). The stability of the rating over a period of 12 to 30 months was found to be 0.82 (Jenkins et al., 1968). Subjects classified as Type A by the Structured Interview who are caucasian, male, and employable report that they behave in ways that are consistent with the Type A construct (Matthews, 1982).

An exciting new direction that strengthened the SI comes from Dembroski and MacDougall (1983) who developed a component scoring system that yields separate estimates of (1) the four speech stylistics that are used in arriving at a global Type A rating, (2) clinical ratings for verbal competitiveness, anger-in and hostility, and (3) five content-derived factor scores reflecting the person's self-reported tendency to engage in behavior considered to be Type A. This system was developed consequent to promising results shown by Matthews et al. (1977) who used a component analysis of the Structured Interview. Matthews' earlier work suggested that only a small subset of Type A characteristics were prospectively able to discriminate the coronary cases from the non-coronary cases in the Western Collaborative Group Study. The key attributes that distinguished coronary cases from non-cases in the Matthews et al. (1977) study were anger, irritation, hostility, competitiveness, and vigorous voice stylistics. In 1985, Dembroski, MacDougall and their associates at the Duke University medical center used this component scoring system to reexamine the SI and its relationship to the severity of coronary artery disease as determined by coronary angiography. The multivariate analysis showed no relationship between the global Type A rating and the extent of the disease. Only

the attributes of anger-in and potential for hostility were significantly and positively associated with the severity of coronary artery disease. This association was interactive in that only patients that were both high in potential for hostility and anger-in showed the association for the severity of the disease. These findings are in accord with other studies implicating the role of hostility in coronary heart disease (Barefoot, Dahlstrom, & Williams, 1983; Shekelle, Gale, Otsfeld, & Paul, 1983; Williams et al., 1980).

MacDougall, Dembroski, and Hackett (1985) attempted to replicate the above findings by re-analysis of the data from the Dimsdale et al. (1979) study which had failed to find an association between the global Type A rating as determined by the Structured Interview and severity of coronary artery disease. The authors found that both the potential for hostility and anger-in showed significant associations with the severity of coronary heart disease. Unlike the previous Duke study, however, these two components were not interactive. Both studies are in accord with a growing body of research that indicate that the hostility component of the Type A behavior pattern can be significantly associated with the coronary artery disease even when the global Type A rating only shows a weak or insignificant relationship to the severity of the disease.

Matthews and Glass (1981) state that the SI lacks specificity for the prediction of coronary heart disease--large numbers of people who will not develop coronary heart disease are being classified as Type A. Bass (1984) contends that the scoring and interpretation of the interview is essentially subjective. This shortcoming is often reduced by using audio or video tapes of the SI and having more than one expert score the interview. Howland and Seigman (1982) note that there are no

objective guidelines published, which means that the only way to become an interviewer is to train under Friedman, Rosenman, or one of their trainers. Howland and Seigman report that this training can be inconvenient, expensive, and time consuming; sometimes taking up to one month (Jenkins, Rosenman, & Friedman, 1967). Matthews (1983) indicates that the classification of a person as Type A by the SI is based on a simple preponderance of Type A characteristics. One person would be classified as Type A because he/she spoke in a loud manner and frequently interrupted the interviewer, while another Type A person may be classified as Type A by the SI for different reasons. Further research with the SI needs to assess the effects of the interviewer's age, sex, socioeconomic status, education level, race, and culture on similar variables of the interviewer. In addition, there is no research indicating what effect the behavior pattern of the interviewer has on the interviewee.

Jenkins Activity Survey. Jenkins et al. (1967) developed a self-administered, machine scored, paper and pencil questionnaire called the Jenkins Activity Survey (JAS). The JAS was constructed to be a quicker, less expensive, more uniform, better calibrated procedure for assessing coronary-prone behavior pattern in large groups of subjects (Jenkins et al., 1967). The 1965 edition of the JAS was completed by 2,960 men from the Western Collaborative Group Study. Using the SI of Friedman and Rosenman as the criteria of coronary-prone behavior pattern Zyzanski and Jenkins (1970) formulated an optimal scoring system for the JAS that had over 70% agreement with the SI. In developing the JAS the authors recognized that many Type A individuals may be lacking insight about their behavior pattern and many of them may deny possessing Type A traits that embarrass them. Conversely, many Type B persons may feel it

is socially desirable to endorse behavior that portray themselves as hard-driving and achievement oriented. For this reason the developers of the JAS empirically tested their self-report instrument to determine if the JAS had the ability to discriminate between subjects previously judged to be Type A and those judged Type B by the SI. Only those test items that were found to be valid discriminators were retained (Jenkins, 1978).

To answer the question of whether the multi-faceted behavior pattern as described by Friedman and Rosenman was really a single syndrome or a loose aggregation of traits or subsyndromes, Zyzanski and Jenkins (1970) performed a series of factor analyses on the items of the JAS. Three major factors were found: Speed and impatience, Job involvement, and Hard-driving. The three factors are uncorrelated with each other and have been demonstrated to be reliable and stable over time, but none of the three subscales related significantly to coronary heart disease (Jenkins, Rosenman, & Zyzanski, 1974). However, JAS scores are correlated with socioeconomic status ($r = .29$) (Shekelle, Schoenberger, & Stamler, 1976) and with education (caucasian only, Waldron, Zyzanski, Shekelle, Jenkins, & Tannenbaum, 1977).

Kenigsberg, Zyzanski, Jenkins, Wardell, and Licciardello (1974) compared a sample of 48 hospitalized CHD patients with a sample of 42 patients hospitalized for surgery or traumatic injury. The subjects were administered the Jenkins Activity Survey (JAS) shortly before discharge from the hospital. The authors concluded that the JAS is capable of distinguishing between a non-coronary group and a group of recently developed CHD patients. The CHD cases exhibited more Type A behavior as measured by the JAS. Of particular note is that 23% of the total sample were women, and the hospital was in an urban setting.

The JAS Type A scale was found to be predictive of new cases of coronary heart disease (Jenkins et al., 1974) and in 1976, Zyzanski et al. showed a relationship between the JAS Type A scale and the degree of basic coronary atherosclerosis.

A comparison of the Jenkins Activity Survey and the Structured Interview. Has the development of the Jenkins Activity Survey improved the ability of researchers in assessing the Type A behavior pattern? One way to answer this question is to compare the JAS and the SI. The JAS measures only that component of the SI which is common to both instruments because the scoring of the JAS uses the SI as its criteria and is based on a least squares correlation with the SI. Since the JAS was developed as a predictor of the SI it follows that the SI is a more valid instrument (Cooper et al., 1981). The SI captures more of the Type A behavior pattern than the JAS because it utilizes speech patterns, posture, and gestures. The SI is also able to correct for respondents who misrepresent or misperceive their own behavior (Bass, 1984; Blumenthal, Haney, Williams, & Barefoot, 1986; O'Looney, Harding, & Eiser, 1985).

Matthews (1982) suggests that the two assessment techniques measure different aspects of Type A behavior. This notion is supported by research indicating that the Jenkins Activity Survey and the Structured Interview generally measure the same content but that, with the Structured Interview, the interviewer tends to downplay the content and weigh more heavily the individual's speech characteristics (Scherwitz, Berton, & Leventhal, 1977). Chesney, Black, Chadwick, and Rosenman (1981) found that the JAS Type A scale and the SI were weakly correlated ($r = 0.255$). This led the authors to conclude that the individual classified as Type A by the JAS is not similar to the one

classified by the SI.

In comparison to the Structured Interview, the Jenkins Activity Survey Type A scale is a weaker predictor of coronary heart disease incidence (Bass, 1984; Cooper et al., 1981), of severity of coronary atherosclerosis (Blumenthal et al., 1978), and of challenged induced physiological arousal (MacDougall, Dembroski, & Musante, 1979). The self-administered multiple choice JAS does not capture the style of the response or the vigor of the voice or mannerism of the subject. This may be the missing ingredient that gives the Structured Interview its additional power (Jenkins, 1978).

Matthews (1982) concludes that "... it appears that Type A's classified by the Jenkins Activity Survey - both adults and students - report behavior that is consistent with the achievement-striving aspect of pattern A but not with the aggressive and hostile aspects included in the description of this pattern" (p. 302). Matthews further notes that not only does the JAS fail to assess hostility, it also may be less than adequate in assessing coronary-prone behavior in populations that are not upwardly mobile, white collar men. In agreement with Matthews are Jenkins et al. (1974) who state, "The Jenkins Activity Survey in its present form still misclassifies too many subjects to allow its use in the usual clinical setting for evaluating coronary risk among individuals or small groups" (p. 1,275).

Assessment issues in coronary-prone behavior. In Matthews' (1983) study it is suggested that the greatest impedence to understanding the Type A construct has been the lack of studies using two or more measures of Type A. She also suggested that it would be wise to use measures of Type A that are continuous rather than categorical. For example, the JAS yields a normal distribution of scores but is

frequently treated as a categorical variable in the data analysis. Matthews discusses three promising directions that take an assessment approach to understanding the Type A pattern and its association with coronary disease. The first direction is to develop standardized ways to measure cardiovascular and neuroendocrine reactivity to laboratory tasks and to determine their association with measures of Type A. These include research by Glass (1981), Manuck, Craft, and Gold (1978), and Manuck and Garland (1979). The second approach for refining the Type A construct comes from attempts to measure Type A-like behaviors in population samples different in cultural background from the original validation sample. Cohen, Syme, Jenkins, Kagan, and Zyzanski's (1979) work with the Japanese-Americans is an example of this approach. The third direction suggested by Matthews is to include other behavior risk factors that may interact with the Type A variable to produce its coronary disease effect. These factors may include the following: lack of social support caused by a hostile personality; anxiety; depression; bereavement; work overload; and anger (Cottingham, Matthews, Talbott, & Kuller, 1980; Haynes et al., 1980; Jenkins, 1971, 1976; Medalie & Goldbourt, 1976; Scherwitz et al., 1977). Cooper et al. (1981) suggest the following:

> Improvements in association between the JAS (or some other self-report measure) and the SI classification depend on a better understanding of what additional areas of the self-report can be brought in.... There are considerable problems with the Type A measurement, both in terms of the relationship between the SI and the JAS and in terms of the predictive validity of these measures for CHD. Improvement of measurement would be valuable. Thought should be given to the potential development of an orderly program of research that would lead to the eventual selection of a single, fairly brief scale, based on self-reporting, which is close to the Type A construct and maximally predictive of CHD and other illnesses. For example, can one use a short version of the JAS (the original twenty or so discriminations)? ... Will specific hostility scales add the crucial additional variance that

should be explained? (p. 1,205).

Therefore, the present study attempts to improve the predictive validity of a brief self-report measure of Type A (JAS) by adding a self-report hostility scale. The decision to use the weaker JAS rather than the SI is made in consideration of the Cooper et al. (1981) position that the improvement of this self-report measure would be of value to researchers studying the Type A behavior pattern and its association with CHD. The JAS Type A scores are treated as continuous variables rather than categorical variables. The present study also attempts to measure Type A behavior in population samples that are different from the original validation sample using multiple measures of risk factors, that is, the JAS Type A scale and a self-report measure of hostility. In choosing a self-report measure of hostility it is important to review the literature for relevant research linking CHD with the emotional components of the Type A behavior pattern. The following section reviews that literature.

Emotional Components of the Type A Behavior Pattern

Cleveland and Johnson (1962) compared the results of the Rorschach and Thematic Apperception Test on 25 young males recovering from recent myocardial infarction with similar data on 25 males awaiting serious surgery and 25 males hospitalized for benign skin disorders. The coronary group included two black males, the remainder being white. The authors attempted to control variables such as age, education, and socioeconomic status. The authors found that the coronary group exhibited a pattern of personality characteristics which included chronic restlessness, underlying passivity, and suppressed hostility that may have had a bearing on the propensity for coronary heart disease.

The Southeastern Connecticut Heart Study was a carefully controlled retrospective study designed to assess the potential etiologic contribution to CHD of a variety of social background, personality, and attitudinal variables related to stress. In this study, Wardwell and Bahnson (1973) utilized matched groups of MI patients, other hospitalized patients, and healthy community controls on the major variables. Their subjects consisted of 373 white males between the ages of 35 and 64 years. Only two variables, a Type A measure similar to the JAS and a measure of somaticizing, were significantly characteristic of the MI patients.

In a further analysis of the Western Collaborative Group Study data (Matthews, et al., 1977), five primary factors were found after factor analysis of the interview variables. These factors were called competitive drive, past achievements, impatience, non-job achievement, and speed. The incidence of CHD was found to be particularly associated with competitive drive and impatience. Analysis also revealed that three items on the factor "competitive drive" accounted for the significant relationship with CHD. These three items consisted of responses reflecting vigor, drive, and hostility. The authors stressed the importance of this finding:

> The isolation of competitive drive and impatience as conceptually distinct dimensions of pattern A has theoretical as well as predictive implications. A high drive level, coupled with impatience and hostility, is readily apparent in the characteristic tendency of type A's to seek ever expanding goals and achievements. Many type A's reveal the fact that they have tried to change, but have reverted to their hard-driving activities as they found themselves becoming increasingly anxious about work which still needed to be finished and goals that had not yet been attained. It is as if these A's must maintain a high drive and rapid pace in order to gain mastery over the environment. Impending lack of control is experienced as anxiety arousing and leads to task-relevant behaviors designed to assert control. It is precisely such characteristic behaviors which constitute the overt part of the type A behavior

pattern (p. 496).

This is consistent with other research by Glass (1977) that demonstrates that Type A behavior constitutes a style of responding to uncontrollable life stresses. He hypothesized that Type As are achievement oriented people who work at near-maximum capacity relative to Type Bs. Type As are more likely to suppress feelings of fatigue and become impatient with delay. In one experiment, Type As delivered more intense electric shock to a confederate than did comparably aroused Type Bs. Glass (1982) suggests, "An individual who shows pattern A behavior is competitive and hard driving, time urgent and impatient, hostile, and aggressive. By contrast, pattern B individuals display these characteristics to a much lesser degree" (p. 194).

Van Egeren (1979) used the Prisoner's Dilemma game to demonstrate that Type A individuals elicited more competitiveness and angry feelings from both A and B partners than did Type B individuals. It appears that Type A individuals elicit aggressive behaviors from others, which in turn might lead the Type A individual to become even more aggressive.

Chesney et al. (1981) found that Type A individuals, as classified by the Structured Interview, did not report more anxiety, depression, neurotic or somatic symptoms than did Type B subjects. The Type A individual did have significantly ($p = 0.001$) higher scores than Type B subjects on subscales of aggression, autonomy, exhibition, self-confidence, and dominance. These subscales were from the Adjective Checklist (Gough & Heilburn, 1965).

Ortega and Pipal (1984) found that Type As (as assessed by the JAS) sought greater challenges than Type Bs and had significantly faster heart rates during the performance of a challenging task. The authors propose that the behavior pattern may be associated with heart disease

through the cumulative deleterious effects of chronic and excessive challenge induced cardiovascular excitation.

It has been reported that neither the SI nor the JAS measure psychopathology or psychological distress (Bass, 1984; Chesney et al., 1981; Wadden, Anderton, Foster, & Love, 1983). This is consistent with the original description of the Type A construct which emphasized that the pattern is not a reflection of anxiety, stress or psychological disturbance (Jenkins, 1978). However, a recent study by Langeluddecke and Tennant (1986) examined the association between the JAS and the psychological measures of the Jackson Personality Inventory, Eysenck Personality Questionnaire, Locus of Personal Control, Spielberger State-Trait Anxiety Inventory, State-Trait Tension Scales, and the Zung Depression Scale. The JAS Type A scale showed a statistically significant positive correlation with hostility, achievement orientation and dominance as measured by the Jackson Personality Inventory. On the Eysenck Personality Questionnaire the JAS Type A scale significantly correlated in a positive direction with the measures of neuroticism and psychoticism. The JAS Type A scale did not correlate with the Locus of Personal Control but did correlate significantly (positive) with state anxiety as measured by the State-Trait Anxiety Inventory. Both state tension and trait tension as measured by the State-Trait Tension Scales were significantly associated (positive) with the JAS Type A scale. An examination of the methodology of the study suggests some reasons why the authors found such significant associations between the JAS Type A scale and other psychological variables. The population sample consisted of 115 patients awaiting coronary angiography. On the day prior to the angiography, the patients were asked to complete a questionnaire

containing the above listed measures. Out of the 115 patients requested to complete the questionnaire, 92 patients complied. Only 12% of the patients were found to have no significant heart disease. Eleven percent were free of angina on exertion. This represents a highly skewed population awaiting an anxiety producing test procedure without a control group being used to control for the effects of being hospitalized and awaiting invasive test procedures.

The role of hostility. The Jenkins Activity Survey fails to compare favorably with the Structured Interview in the ability to adequately assess the hostility level of the individual. Hostility items are not represented on the JAS as compared to the SI and Zyzanski and Jenkins (1970) speculate that this contributes to the failure of hostility to emerge as an important independent factor. It is surprising that hostility would not be represented considering Jenkin's 1966 observation: "Men with high hostility ratings had higher relative concentration of betalipoproteins ... the relation of manifest hostility to elevated serum betalipoprotein is of interest and warrants further study, using a more standard psychological index of hostility" (p. 607).

As previously suggested by Cooper et al. (1981) and Matthews (1983), it would be beneficial to use a test for hostility with a similar format to the Jenkins Activity Survey, to be given in combination with it to enhance discrimination between coronary-prone and non coronary-prone populations. One such standard psychological index of hostility was developed in 1954 by Cook and Medley--a 50 item hostility (Ho) scale from the Minnesota Multiphasic Personality Inventory. Based upon analysis of the content of the items endorsed by persons scoring high on this scale, Cook and Medley concluded that the hostile person (as defined by a high score on the Ho scale) "is one who has little

confidence in his fellow man. He sees people as dishonest, unsocial, immoral, ugly and mean, and believes that they should be made to suffer for their sins. Hostility amounts to chronic hate and anger" (pp. 417-418). Williams, Barefoot, and Shekelle (1985) suggest that the Ho scale is a measure of cynicism.

Williams et al. (1980) administered the Cook and Medley Ho scale and the Structured Interview to 424 patients who were scheduled to undergo a diagnostic coronary arteriography for suspected coronary heart disease. They found a significant ($p = 0.02$) positive relationship between Ho scores and coronary atherosclerosis. The authors observed that this was not a linear relationship--48% of the patients scoring less than or equal to 10 on the Ho scale exhibited significant coronary atherosclerosis, while every level higher than 10 were found to have about 70% with significant coronary atherosclerosis. Multivariate analysis showed that both Type A behavior pattern and hostility scores were independently related to the presence of atherosclerosis. In this analysis, however, hostility scores emerged as more strongly related to atherosclerosis than Type A behavior pattern.

Shekelle et al. (1983) examined the relationship between Ho scores and CHD over a 10 year period for 1,877 employed, predominately white middle-aged men who participated in the Western Electric Study. This prospective study of CHD showed the Ho score to be significantly ($p = 0.004$) related to the 10 year incidence of CHD. Shekelle's finding that men with Ho scores of 10 or less at the initial examination had a lower 10 year incidence of first major CHD events (myocardial infarction and death) than men with higher scores is consistent with the Williams et al. (1980) results. The authors found that the test-retest reliability of the Ho scale was $r = +.84$ in a subsample of 1,600 subjects after four

years.

Barefoot et al. (1983) examined the relationship between hostility and the subsequent health status in a 25 year follow-up of medical students who had taken the MMPI while in medical school. Two hundred and fifty physicians responded to a follow-up questionnaire mailed to them 25 years after graduation. This represented 74% of the 343 eligible graduates. The authors found that men with Ho scores above the median of 13 had a nearly sixfold higher incidence density of clinical coronary heart disease than those with scores at or below the median. Their Ho scale test-retest reliability was r = +.95 after one year. This led the authors to conclude, "the attitude measured by the Ho scale is playing an important role in the pathogenesis and course of CHD" (p. 62).

Summary and Conclusions

The Type A behavior pattern was conceptualized to be used as a predictor of coronary heart disease. The Western Collaborative Group Study and the Framingham Heart Study established the Type A construct as a definite predictive risk factor in the development of CHD (Haynes et al., 1978; Rosenman et al., 1964). It was found that the Type A risk factor worked independently of as well as intensifying the effects of traditional risk factors such as heredity, smoking, cholesterol levels, and high blood pressure (Dembroski, Weiss, Shields, Haynes, & Feinleib, 1978; Matthews, 1982; Suinn, 1982).

The Structured Interview appears to be the most reliable way to measure the Type A behavior pattern. Recent research using a component scoring system to assess subsets of the global Type A suggests that the attributes of potential for hostility and anger-in are consistent predictors of the severity of coronary artery disease. Other Type A

characteristics include intense drive and competitive lifestyle, desire for advancement and recognition, time urgency and aggressiveness. These characteristics can be measured by the Jenkins Activity Survey. The JAS has been shown to be a valid measure of the Type A behavior, a predictor of new cases of CHD (Jenkins et al., 1974), and significantly related to the risk of reinfarction in at least two studies (Jenkins et al., 1971; Jenkins et al., 1976).

The emotional correlates of Type A--hostility and anger-in--are also directly implicated in the etiology of coronary artery and heart disease (Dembroski et al., 1985; Haynes et al., 1980; Matthews et al., 1977; Medalie & Goldbourt, 1976; Williams et al., 1980) for upwardly mobile white males. The Cook-Medley Hostility scale is one self-report survey that has shown a strong association with the development of CHD (Barefoot et al., 1983; Shekelle et al., 1983; Williams et al., 1980).

The Type A research has been successful in demonstrating that the behavior pattern as measured by the JAS, SI and the Ho scale is a significant risk factor linked with coronary heart disease for employed, white, middle-aged men. For this concept to be useful, we need to be able to answer the following question: What is the incidence of the Type A behavior pattern and does its association with CHD hold up in the broader population? Specifically, is the Type A behavior pattern associated with coronary heart disease in a sample of black men? It is not known whether the Type A behavior pattern is a risk factor for CHD in the black population because there have not been any prospective or retrospective studies that examined that specific question. Based on the studies reviewed, it is fair to say that the current state of our knowledge concerning the Type A behavior pattern in a sample of black men is limited. In the absence of any data regarding black males and

the Type A behavior pattern, it would be heuristic to compare the Type A behavior pattern scores of black men suffering from CHD with a control group of black men without CHD.

In choosing what instrument to use in the assessment of the Type A behavior pattern, the present study was influenced by the recommendations cited earlier by Cooper et al. (1981) to test the utility of combining the JAS and a self-report measure of hostility, the Cook Medley Ho scale. In consideration of Matthews' (1983) suggestions for further research, the present study uses two (JAS Type A and Ho scale) continuous measures of Type A-like behavior in a population sample that is different from the original validation study.

The retrospective design of the present study replicates previous studies that showed that patients hospitalized with coronary disease scored higher on the JAS Type A than did patients hospitalized with other diseases (Cleveland & Johnson, 1962; Kenigsberg et al., 1974).

Hypotheses

This study compared heart disease patients to non-heart disease patients on two psychological scales. Furthermore, the question was asked whether the race of the participants affected their responses to the same two psychological measures mentioned above. More specifically, it was hypothesized that: (1) the mean scores for the heart disease group would be significantly higher than those for the non-heart disease group on both the Jenkins Activity Scale (JAS) and the Cook Medley Hostility Scale (Ho) and (2) that the black group would not obtain significantly different mean scores than the white group on the same instruments. Of further interest is whether the JAS and Ho could be combined to improve the differentiation between the heart disease group and the non-heart disease group. In keeping with this, the following

hypotheses are proposed:

Hypothesis 1. Combining the JAS and Ho will improve the discrimination between the coronary heart disease group and the non-heart disease group.

Hypothesis 2. The mean score for the heart disease group will be significantly higher than the mean score for the non-heart disease group on the JAS.

Hypothesis 3. The mean score for the heart disease group will be significantly higher than the mean score for the non-heart disease group on the Ho scale.

Hypothesis 4. The race of the subjects will not significantly affect the scores on the JAS and Ho.

CHAPTER II

METHOD

Purpose

The purpose of this study was threefold. One, to compare the mean scores of a coronary heart disease group to the mean scores of a non-heart disease group on the JAS and Ho. Two, to compare the mean scores of a white group to the mean scores of a black group on the JAS and Ho. Three, to assess the affects of heart disease on the combined scores of the JAS and Ho.

Design

This was a retrospective study that made the following assumptions: (1) the survivors of heart attacks would not differ from non-survivors on how they would respond to the JAS and Ho and (2) that changes in the JAS and Ho have not occurred as a result of the subjects surviving a heart attack.

Subjects

The subjects were 122 male patients between the ages of 35 and 65 admitted to Pontiac General Hospital, Pontiac, Michigan, Providence Hospital, Southfield, Michigan, and Harper Hospital, Detroit, Michigan. The subjects were placed in one of the following four groups, according to their diagnosis and race:

1. White coronary heart disease
2. Black coronary heart disease

3. White comparison group

4. Black comparison group

Patients in the first two groups were diagnosed as having experienced a myocardial infarction. Diagnosis was established by either serial ECG tracings, clinical findings, or enzyme studies. Patients in the third and fourth groups were recovering from various medical procedures, primarily surgery. These patients' medical charts were screened to rule out any reported coronary heart disease or history of a previous myocardial infarction.

A post infarct sample was chosen to represent the CHD group. It was important to have a sample that had a clear medical diagnosis of myocardial infarction rather than a sample of CHD patients with a variety of cardiac related diseases. This follows the recommendation of Donzier (1974) who suggests that in research designed to study the association between the Type A behavior pattern and other psychosocial variables (such as hostility) specific cardiac end points (e.g., angina pectoris, myocardial infarction, sudden coronary death) should be utilized. In other words, studies should not combine different cardiac end points as though they represent the same thing. A second advantage of the post infarction sample is that the patients are all within two to three weeks of their myocardial infarction. When patients are recruited from an outpatient setting the variability of time since their MI is greatly increased. A further advantage of using a hospitalized post infarction sample was the increased access to black CHD patients who may not have been as available on an outpatient basis. The Review Panel on Coronary-Prone Behavior and Coronary Heart Disease suggested that future studies should use recruiting procedures that increased the representation of people in certain sub-populations (particularly high

risk populations such as black men) and that "further studies are needed to provide an adequate population base in terms of race, age, socioeconomic status, culture and sex variables to allow generalization of findings concerning Type A behavior to the population as a whole" (Cooper et al., 1981, p. 1200).

The rationale for using surgery patients as a noncardiovascular comparison group was to control for the impact of being hospitalized on CHD groups. The medical groups were experiencing similar anxieties and uncertainties about their hospitalization and recovery (Kenigsberg et al., 1974). At least six studies have been completed that compared a post infarct sample to a hospitalized control group (Cleveland & Johnson, 1962; Glass, 1977; Hiland, 1977; Keith, Lown, & Stare, 1965; Kenigsberg et al., 1974; Wardwell & Bahnson, 1973).

Materials

The present research used the Jenkins Activity Survey and the Cook Medley Hostility Scale to assess the characteristics of the Type A behavior pattern. As indicated in Chapter I, one purpose of the present study was to examine the feasibility of combining the JAS and Ho in an attempt to strengthen the measurement of characteristics associated with CHD.

Jenkins Activity Survey. The Jenkins Activity Survey (Form C) is a self-administered, self-report, machine-scored pencil and paper questionnaire that consists of 52 items designed to measure the Type A behavior pattern. Form C is the fifth edition of the JAS. The Jenkins Activity Survey is scored on four scales: the Type A scale, which assesses the multifactorial clinical construct of the coronary-prone behavior pattern and three factorially independent components of this construct--Hard Driving and Competitive (Factor H), Job Involvement

(Factor J), and Speed and Impatience (Factor S). A description of all the items on the JAS and their factor loadings is given by Zyzanski and Jenkins (1970).

The one to four year test-retest coefficient of reliability for the JAS falls between .60 and .70. The Jenkins Activity Survey's relationship to the Structured Interview and its ability to discriminate between Type A and Type B white males, as judged by the Structured Interview, has been discussed in Chapter I. In other validation studies, the Type A behavior pattern as measured by the JAS is a predictor of CHD (Jenkins et al., 1974) and has been found to be associated with increased risk of reinfarction among persons already having coronary heart disease (Jenkins et al., 1971; Jenkins et al., 1976). In the later study the authors suggested that the JAS did a better job of discriminating between recurrent and single-event CHD groups than between the single event and the CHD free groups.

One purpose of the study was to examine the association of the Type A behavior pattern and CHD in a sample of black men. In the Chicago Heart Association Detection Project in Industry, Waldron, Zyzanski, Shekelle, Jenkins, and Tannenbaum (1977) used the JAS to survey 5,347 men and women between the ages of 18 to 64 years. This sample included 265 black men (mostly under age 44 years) and 266 black women. The authors analyzed sex, age, educational, and racial differences in the Type A behavior pattern. Their findings suggest that the particular manner in which Type A is displayed by blacks may be different from the way it is displayed by whites. Specifically, whereas "job involvement" and "hard-driving and competitive" summarized much of the Type A behavior in whites, "striving to advance" and "hard working" were better descriptions for blacks. The authors state "Type

A scores for blacks should be interpreted with caution until there have been analogous tests of the significance of Type A behavior pattern in this ethnic group" (p. 14).

Hostility Scale. The Cook Medley Hostility Scale from the Minnesota Multiphasic Personality Inventory was developed in 1954. The authors were attempting to develop a scale that would help predict the ability of teachers to establish rapport with their students in the classroom. The authors proposed that one who scored high on this scale had little confidence in his fellow man.

The Ho scale was infrequently used until 1980. It has recently been shown to have a strong relationship with coronary heart disease and coronary atherosclerosis in both prospective and retrospective studies (Barefoot et al., 1983; Shekelle et al., 1983; Williams et al., 1980). In the above studies, the test-retest reliability was r = +.85 after one to four years. In these three studies the complete MMPI was administered because it has been recognized that the overall content of the MMPI is critical for some MMPI scales (Megargee, 1979). It was the purpose of this study to assess the use of a short assessment of hostility and using the complete MMPI would have increased the administration time to over two hours. Therefore, the present study extracted the 50 questions that comprised the original Ho from the 566 item MMPI. The Ho scale was modified further by changing the true/false format to a Likert-type scale of 1-5 (see Appendix). This change increased the subjects' choice of responses from strongly agree to strongly disagree.

Demographic data. The Type A literature suggests there is a significant relationship between the Type A score as measured by the JAS and occupational, educational, and age levels (Jenkins, 1971;

Mettlin, 1976; Shekelle et al., 1976; Waldron et al., 1977). Furthermore, Jenkins (1971) stated that social status indicators had inconsistent and conflicting associations with coronary heart disease and that the Type A behavior pattern may be the mediating mechanism. To reduce the possibility of extraneous variables unknowingly influencing the results of the present study, the following demographic data from each patient was collected: age, race, education, occupation, personal and family CHD history, and smoking history. This study used an index of social class based on two factors--occupation and education. This index is called the Hollingshead Two-Factor Index of Social Position (Hollingshead, 1957). The index ranks occupation into the following seven positions: (1) executives and proprietors of large concerns and major professionals; (2) managers and proprietors of medium concerns and minor professionals; (3) administrative personnel of large concerns, owners of small independent businesses and semi-professionals; (4) owners of little businesses, clerical and sales workers, and technicians; (5) skilled workers; (6) semi-skilled workers; and (7) unskilled workers. The educational scale is divided into seven positions: 1. graduate professional training; 2. standard college or university graduation; 3. partial college training; 4. high school graduation; 5. partial high school; 6. junior high school; and 7. less than seven years of school.

To calculate the index of social position score for an individual, the scale score for education is multiplied by the factor weight of four, and scale value for occupation is multiplied by the factor weight of seven. The resultant scores are added together and provide an index of social position score. This score may be arranged on a continuum from a low of 11 to a high of 77.

Procedure

Each hospital was visited twice a week. All of the patients that were within three days of discharge and approved for the study by their attending physicians were asked to voluntarily participate in a "health survey." Philip, Cay, Vetter, and Stuckey (1979) demonstrated that anxiety is lowest for MI patients just prior to discharge. The patients that expressed interest in completing the survey were required to sign a consent form approved by the Institutional Review Board of the hospital. (The consent form was read to the patient by the examiner with the charge nurse present. Each patient was offered the opportunity to ask questions about the study, and they were offered the option of declining to participate in the study. Item four on the consent form provided a phone number for the patients to call with any questions or concerns about the study. Ideally, the patient should have been given an alternate recourse that would allow him/her to file an anonymous complaint.) Each patient was then asked to complete the JAS and the Ho scale. The patients were told that the examiner would return in about one hour to collect the survey. Eight patients requested that the survey be read to them because of it being difficult for them to read. These eight surveys were completed with the examiner reading the questions to the patient.

Scoring and Interpretation

The clerical scoring of the Jenkins Activity Survey was accomplished by computer. The custom-written program (Lewandowski Sr., A. J.) was based on the manual for hand scoring, utilizying the tables of weighted values supplied in the manual (Jenkins et al., 1979).

For each item the response alternatives are assigned numerical points based on the product of the item regression weight and the

optimal scaling weight for that response. The sum of the points for all the items constitutes a raw score. This raw score is transformed to a standard score with a mean score of 0 and a standard deviation of 10 for all four scales. The standard scores are derived from the entire Western Collaborative Group Study participants. Positive scores indicate the Type A direction and the qualities denoted in the name of the factor. Negative scores denote the Type B behavior and the lack of qualities denoted by the name of the factor. The results of the computer scored JAS were compared with the hand scored results of the same surveys on five randomly selected protocols. The results were identical and demonstrated that the computer scoring system was able to score the JAS as accurately as the hand scoring method.

The modified Cook Medley Hostility scale was hand scored by the examiner. The percentage of items endorsed in the hostile direction was calculated for each patient. If a patient responded to a question by endorsing "undecided" then the question was omitted from the calculation of percentages. More specifically, the percentage of hostile responses was calculated as a percentage of the 50 questions minus the number of undecided responses.

CHAPTER III

RESULTS

Two interrelated questions were posed in the present study. The first and more general one was whether a group of patients suffering from coronary heart disease (CHD) could be reliably distinguished from a control group (NHD) on the basis of their responses to two psychological scales. Assuming that this finding emerged, a second question could be posited with reference to the racial composition of the groups participating in the study. Simply stated, the second question was whether a group of black patients could be reliably differentiated from a group of white patients on the basis of their responses to the same two psychological measures mentioned above.

More specifically, it was hypothesized that: (1) the mean scores for the CHD group would be significantly higher than those for the NHD group on both the Jenkins Activity Scale (JAS) and the Cook Medley Hostility Scale (Ho) and (2) that the black group would not obtain significantly different mean scores than the white group on the same instruments.

In all subsequent analyses the variables designating group composition (Study and Race) were treated as independent measures, while the responses to the JAS and Ho measures were treated as the dependent measures. Since there were multiple dependent measures a multivariate statistical technique was employed to analyze the data.

The results of the analyses are presented in two sections. The first section utilizes a multivariate analysis of variance procedure

(MANOVA) to test the null hypotheses relating to the group differences on the dependent measures. In terms of the null hypotheses there should be no difference between the mean scores for the CHD and the NHD groups nor any between the Black and White groups on the JAS or Ho measures.

In the second section, a re-analysis of the data is undertaken through the application of the multivariate analysis of covariance technique (MANCOVA). This procedure was selected because the effects of the independent measures (Study and Race) on the dependent measures could be assessed after having statistically adjusted for the effects of four important covariates. These covariates were socioeconomic status, age, family history of myocardial infarction (MI), and smoking history.

The rationale for performing two separate analyses of the data is as follows. The majority of the studies found in the research literature typically assess only main and interaction effects and ignore the possible influence of important covariates. Since the type of results generated by a MANOVA analysis would be comparable to the strategy discussed above, the results of the present study could then be compared with most of the published research findings in this area. On the other hand, one of the more or less unique features of the present study was the inclusion of additional variables that might be associated with the dependent measures. These variables were not treated as main effects but covariates. The MANCOVA procedure permitted the influence of these variables on the dependent measures to be removed statistically before the main and interaction effects were calculated.

Definition of IVs and DVs

The two independent variables (IVs) that designate group composition are Race and Study. Race has the values of White and Black. Study has the two levels that indicate the presence or absence of a history of

myocardial infarction (MI). Subjects can be divided into four groups, defined by the factorial combination of Race and Study. The groups, then, are (1) White heart disease, (2) White no heart disease, (3) Black heart disease, and (4) Black no heart disease.

Given this combination of factors, it was possible to assess the effect of race, heart disease, and the interaction between race and heart disease on the dependent variables (DVs) of interest. The primary DVs of interest were the JAS Type A scores and the Cook Medley Ho scale.

An omnibus MANOVA showed whether the JAS Type A scale and the Ho scale were associated with the two IVs (Race and Study) or their interaction (Race x Study). Then a stepdown analysis, in conjunction with the univariate F values, provided an examination of the pattern of relationships between the DVs and each IV.

Using a MANCOVA analysis, the DVs (JAS Type A and Ho scale) were examined after the effects of age, socioeconomic status, family history of MI, and smoking history were statistically controlled. Here the question was whether the two coronary prone DVs vary as a function of Race and Study after statistically adjusting for the effects of age, socioeconomic status, family history of MI, and smoking history.

Multivariate Analysis of Variance

The purpose of multivariate analysis of variance is to test whether the group assignments significantly affect an optimal linear combination of dependent variable means. Specifically, do the four group assignments of (1) White heart disease, (2) White non heart disease, (3) Black heart disease, and (4) Black non heart disease significantly affect their responses on the two dependent variables of JAS Type A and Cook Medley Ho? The present study consisted of a 2 x 2

between groups factorial design with two values for Race (White and Black) and two values for Study (heart disease, non heart disease). In this situation, a different "best linear combination" of dependent variables is formed for each main effect (Race, Study) and their interaction (Race x Study).

The data was determined to be suitable for the Multivariate analysis of variance. The variables were evaluated with respect to the practical limitations of the analysis and as reported in Appendix D, the assumptions of normality, homogeneity of covariance matrices, linearity, and multicollinearity were satisfactory.

Sample size. There were 122 patients that were initially surveyed. Of those 122 patients, 11 subjects failed to complete the survey. The primary reason for not completing the survey was that the patients were interrupted by routine hospital procedures. Therefore, the subsequent analyses were based on a sample size of 111 subjects. This large sample provided enough cases in each of the four cells to assure adequate power for the analysis. The MANOVA program found in the computer software systems, entitled The Statistical Package for the Social Sciences (SPSS-X) (Norusis, 1983), was used for the analysis. The analysis used the option for hierarchical (default) adjustment for nonorthogonality because of the unequal number of subjects in each group.

Means and standard deviations of dependent variables. The mean scores and the standard deviations for each of the four groups on the dependent variables are presented in Table 1. The dependent variables in Table 1 include the two dependent scale variables (JAS Type A and Ho) and the four dependent demographic variables that are included in the subsequent MANCOVA. After the individual mean scores are presented for each of the four groups, the subjects are clustered into combined

Table 1

Means and Standard Deviations for Each Group on the Dependent Variable

		Dependent variable					
Group		JAS Type A	Cook Medley Ho	Socioeconomic	Age (yrs.)	Fam. Hx of MI	Smoking Hx Pks. x yrs.
White heart disease	M	1.10	40.38	45.31	52.05	1.18	31.13
N = 39	SD	10.02	19.20	12.36	9.15	1.37	32.36
White control	M	-2.83	50.61	44.42	53.33	.39	31.42
N = 33	SD	9.22	21.81	16.32	8.68	.66	36.03
Black heart disease	M	-4.32	58.36	49.64	53.18	.46	32.59
N = 22	SD	13.21	18.91	16.20	8.93	.51	29.58
Black control	M	-4.95	54.06	55.82	45.47	.41	19.71
N = 17	SD	9.83	19.43	14.90	8.41	.71	16.57
Total heart disease	M	-0.86	46.87	46.87	52.46	.92	31.66
N = 61	SD	11.47	21.34	13.78	9.07	1.19	31.39
Total control	M	-3.55	51.72	48.30	50.66	.40	27.44
N = 50	SD	9.38	20.67	16.73	9.35	.67	31.32
Total white subjects	M	- .70	45.03	44.90	52.64	.82	31.26
N = 42	SD	9.86	21.15	14.33	8.94	1.17	34.09
Total black subjects	M	-4.59	56.49	52.33	49.82	.44	26.98
N = 39	SD	11.86	19.24	15.96	9.50	.60	25.57

groups based on the factors of Race and Study. Specifically, the White heart disease (N = 39) and Black heart disease (N = 22) groups are combined to form a total heart disease (N = 61) group. The White comparison (N = 33) and the Black comparison (N = 17) groups are combined to form a total comparison (non heart disease) group (N = 50). Similarly, the White heart disease (N = 39) group and the White comparison (N = 33) group are combined to form a total White group (N = 72) while the two Black groups are combined to form a total Black group (N = 39).

A 2 x 2 between groups MANOVA was performed to test the overall hypotheses of no differences in the means for the different groups. The MANOVA omnibus test answers this major question: Are there differences in the coronary prone behavior pattern, as measured by the JAS Type A and Ho scale, associated with differences in Race and Study? If this test was significant, the second step would be to conduct follow-up tests to explain the group differences.

The results of the MANOVA are presented in Table 2. The order of entry of the independent variables was Race and then Study. The dependent variables in the first analysis was JAS Type A and Cook Medley Ho, entered in that order. With the use of Wilks' criterion, the combined dependent variables were significantly affected by Race, $F(2,106) = 6.30$, $\underline{p} < .01$, but not by Study, $F(2,106) = 2.00$, $\underline{p} = .14$, or the interaction of Race x Study, $F(2,106) = 2.03$, $\underline{p} = .14$. With eta squared equal to .106, the results reflected a minimal association between Race and the combined dependent variables of JAS Type A and Hostility. Eta squared represents the variance accounted for by the best linear combination of the dependent variables. The correlation between the linear combination of the DVs and Race was .33. These

Table 2

Multivariate Analyses of Variance of JAS Type A and Cook Medley Ho Scale

Source	U statistic	Approximate F-statistic	Degrees of freedom
Race	.89382	6.296*	2/106
Study	.96363	2.000	2/106
Race x Study	.96311	2.030	2/106

*$p < .01$

results suggest that the race of the patient had a significant effect on the scores of the two coronary prone measures. Any group differences in the mean scores on the JAS Type A and Ho scale are likely to have been caused by the factor of Race rather than the presence or absence of a myocardial infarction.

Since the omnibus MANOVA showed a significant multivariate effect, it was appropriate to investigate further the nature of the relationships among the independent and dependent variables. Three kinds of information help clarify these relationships.

First, the degree to which the JAS Type A and Ho scales are intercorrelated provides information about how independent these variables are. The pooled within cell correlations appear in Table 3. The correlation of .09 indicates that the two scales are weakly correlated and do not provide the same information for the analysis. In fact, it is not likely that these two coronary prone behavior scales were measuring similar factors.

Second, univariate F values were calculated for each DV. The univariate F is produced by SPSS-X MANOVA and is the ANOVA that would have been produced if each DV had been investigated in isolation. These are shown in Table 4 for the two main effects (Race and Study) and the interaction effect (Race x Study). The Hostility Scale made a significant contribution to predicting differences between Races, univariate $F(1,107) = 8.16$, $p < .01$. No other univariate F approached significance.

Finally, a stepdown analysis allowed for an examination of the significance of the DVs in context of the MANOVA, with the Type I error rate controlled. The stepdown analysis was performed on the basis of an a priori ordering of the importance of the dependent variables such

Table 3

Pooled Within-Cells Correlations Between DVs

	Within cells correlations of DVs (STD.DEVs on diagonal)					
	A	Ho	Age	SES	Smoking	Family
A	10.475					
Ho	.090	28.181				
Age	-.331	-.115	8.862			
SES	-.408	.091	.392	14.785		
Smoking	-.271	.016	.375	.302	31.191	
Family	.057	.028	-.070	-.094	-.071	.962

Table 4

Univariate and Stepdown Analyses of Race, Study, and Interaction

IV	DV	Approximate univariate F	df	Stepdown F	df	α
Race	A	3.49	1/107	3.49	1/107	.025
	Ho	8.16[a]	1/107	8.85**	1/106	.025
Study	A	1.93	1/107	1.93	1/107	.025
	Ho	1.75	1/107	2.06	1/106	.025
Race by	A	.62	1/107	.62	1/107	.025
Study by	Ho	3.19	1/107	3.43	1/106	.025
Interaction						

[a] Significance level cannot be evaluated but would reach $p < .01$ in univariate level.

**$p < .01$

that the JAS Type A score was entered as the higher priority DV. In this stepdown procedure, the highest priority DV, JAS Type A was tested in a univariate ANOVA. Then it was treated as a covariate when the second dependent variable (Ho) was analyzed. An experiment-wise error rate of five percent was achieved by the apportionment of alpha as shown in the last column of Table 4 for each of the dependent variables. As can be seen in Table 4, a unique contribution to the prediction of differences between White and Black subjects was made by the Hostility scale, stepdown F (1,106) = 8.85, $p < .01$, eta squared equal to .07. This result is accounted for by the fact that the Black subjects scored significantly higher (M = 56.49) on the Hostility scale than the White subjects (M = 45.03). This pattern was consistent across all four groups. Specifically, the Black heart disease group scored higher on the Ho scale (Mean = 58.36) than the White heart disease group (Mean = 40.38) and the Black non heart disease group (Mean = 54.06) scored higher on the Ho scale than the White non heart disease group (Mean = 50.61). Thus, the stepdown analysis suggested that the significant effect of Race was represented in the increased Hostility scores, while Race failed to significantly affect the JAS Type A score. The strength of association between Race and Hostility was small, eta squared = .07. A Tukey-HSD post hoc comparison was performed on the Hostility variable for the four groups. The White heart disease group scored significantly ($p < .05$) lower (M = 40.38) on the Hostility scale than the Black heart disease group (M = 58.36).

Multivariate Analysis of Covariance

A re-analysis of the data was undertaken through the use of the multivariate analysis of covariance technique (MANCOVA) found in the

SPSS-X computer software system. In MANCOVA, the linear combination of JAS Type A and Ho scales were statistically adjusted for any differences in the covariates. The new adjusted linear combination of DVs represents the combination that would have been obtained if all of the subjects had started out with the same scores on all of the covariates. The MANCOVA also tests whether the changes in the DVs (JAS Type A and Ho scale) depend on changes in the IVs (Study and Race) or on changes in the covariate DVs of age, socioeconomic status, family history of MI, and smoking history.

A 2 x 2 between groups multivariate analysis of covariance (MANCOVA) was performed on the two dependent variables of JAS Type A and Ho scales. The covariates were as follows: socioeconomic status, age, family history of MI, and smoking history. The independent variables were Race and Study. The analysis was performed through the use of SPSS-X MANOVA with hierarchical (default) ordering of effects to adjust for nonorthogonality. The order of entry of the independent variables was Race, then Study. As in the first MANOVA, the sample size was reduced to 111 subjects with the deletion of 11 subjects that failed to complete the test protocol. As was previously reported, the results of the evaluation of assumption of normality, homogeneity of covariance matrices, linearity, and multicollinearity were satisfactory. The covariates were judged to be adequately reliable for the covariance analysis.

The omnibus MANOVA showed a significant relationship between the combined set of DVs and the combined set of covariates, approximate $F(8,204) = 3.87$, $p < .001$, based on the Wilks' criterion. The eta squared ratio equaled .105, which reflected a small association between the combined DVs and the combined covariates. In order to determine

which covariates effected the dependent variables, the relationships were analyzed by looking at the multiple regression analyses of each DV, in turn, with the covariates acting as multiple continuous IVs. The analyses were done on the pooled within-cell correlation matrix so that the effects of the IVs (Race and Study) and their interaction were eliminated. The results of the DV-covariates, multiple regressions are in Table 5. For the DV-JAS Type A, one of the covariates, socioeconomic status, was significantly related. None of the four covariates were significantly related to the second DV-hostility. As can be seen from the analyses, the two covariates that depict socioeconomic status and age provided for the largest adjustment to the two DVs (JAS Type A and Ho scale). The β value of -.31 for socioeconomic status was significantly different from zero, $t(103) = 3.17$, $\underline{p} < .01$.

The results of the omnibus MANCOVA are presented in Table 6. The multivariate results for the Race by Study interaction failed to reach statistical significance, $F(2,102) = 3.02$, $\underline{p} = .053$. Furthermore, the combined DVs failed to be significantly related to the main effect of Race, $F(2,102) = 2.91$, $\underline{p} = .059$, and to Study, $F(2,102) = .92$, $\underline{p} = .40$.

These results illustrate that the covariates have accounted for enough of the variance that when the covariates are adjusted for, the DVs and IVs fail to show a significant relationship. Specifically, there is no significant relationship between the combined DVs (JAS Type A and Ho scales) and the IVs (Study and Race) after the DVs have been adjusted for the differences in the covariates.

To explore this further, the next step of the analysis was an investigation of the effects of Race and Study on the dependent

Table 5

Multiple Regression Analysis for JAS Type A and Ho with Four Covariates

	Dependent variable - Type A		
Covariate	Beta	T-value	Significance of T
Age	-1.67	-1.68	.096
Socioeconomic status	- .307	-3.17	.002
Smoking	- .115	-1.20	.235
Family Hx of MI	.008	.09	.929

	Dependent variable - hostility		
Covariate	Beta	T-value	Significance of T
Age	- .191	-1.73	.086
Socioeconomic status	.156	1.46	.147
Smoking	.043	.41	.683
Family Hx of MI	.033	.33	.739

Table 6

Multivariance Analysis of Covariance of JAS Type A and Cook Medley Ho Scale

Source	U statistic	Approximate F-statistic	Degrees of freedom
Race	.946	2.915	2/102
Study	.982	.917	2/102
Race x Study	.944	3.025	2/102
Covariate	.754	3.870*	8/204

*$p < .001$

variables (Type A, Hostility) after the adjustment for the covariates of socioeconomic status, age, family history of myocardial infarction, and smoking history. This was done by investigating the dependent variables in a stepdown analysis. Here again, the Type A scale was entered into the analysis first in an a priori hierarchy of importance between the two dependent variables. This means that JAS Type A was evaluated for the four covariates. Hostility was adjusted for effects on JAS Type A as well as the four covariates. In effect, then, JAS Type A was adjusted for four covariates and the Hostility scale was adjusted for five covariates. The results of this analysis are summarized in Table 7. An experiment-wise error of five percent for each effect was achieved by the apportionment of alpha according to the values shown in the last column in Table 7 for each of the dependent variables.

After statistically adjusting for the covariates, there was no significant main effects for Race or Study on either of the two dependent variables (Type A, Hostility) in univariate and stepdown analysis. This was expected from the non-significant results of the overall or omnibus MANCOVA. In other words, the underlying model of the MANCOVA in this study was the null hypothesis. Stated in direct terms, the model statement was that all four groups have the same population mean on the JAS Type A and the Cook Medley Hostility scale after adjustment for the covariates of socioeconomic level, age, smoking history, and family history of myocardial infarction. Obviously, the hypothesis was not rejected. However, the Race by Study interaction did reach significance, stepdown $F(1,102) = 5.66$, $\underline{p} < .025$ after the effects of the covariates have been adjusted for. Figure 1 presents the unadjusted means for the four groups on the hostility scale. Figure 2 shows the adjusted means of the four groups. The significant

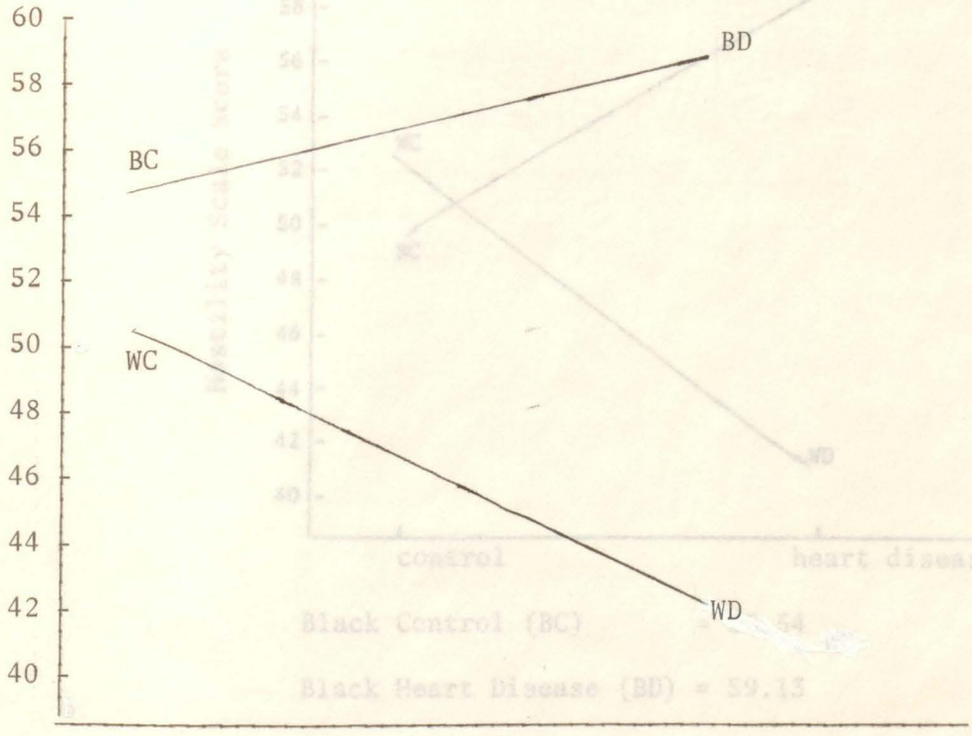
Table 7

Univariate and Stepdown Tests of Covariates, Race, Study, and Interaction

Effect	DV	Approximate univariate F	df	Stepdown F	df	∝
Covariates	Type A	6.94	4/103	6.94	4/103	.025
	Hostility	1.02	4/103	1.15	4/102	.025
Race	Type A	1.93	1/103	1.93	1/103	.025
	Hostility	3.29	1/103	3.84	1/102	.025
Study	Type A	1.62	1/103	1.62	1/103	.025
	Hostility	.11	1/103	.23	1/102	.025
Race by Study Interaction	Type A	.37	1/103	.37	1/103	.025
	Hostility	5.33[a]	1/103	5.66*	1/102	.025

[a]Significance level cannot be evaluated but would reach $p < .025$ in univariate level

*$p < .025$



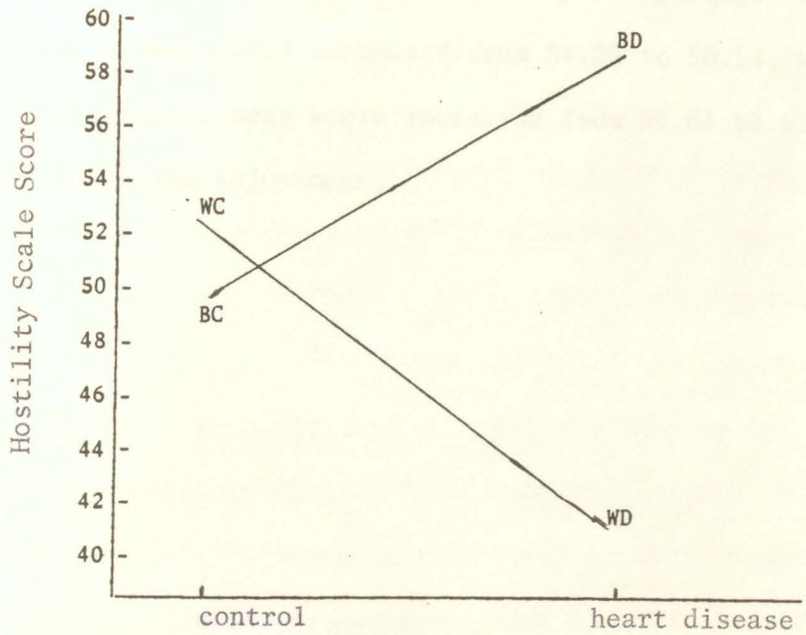
Black Control (BC) = 54.06

Black Heart Disease (BD) = 58.36

White Control WC) = 50.61

White Heart Disease (WD) = 40.38

Figure 1. Mean Ho responses for the four groups.



Black Control (BC) = 50.54

Black Heart Disease (BD) = 59.13

White Control (WC) = 52.53

White Heart Disease (WD) = 41.13

Figure 2. Adjusted mean Ho responses for the four groups.

interaction is represented in Figure 2 and is a result of the statistical adjustment for the effects of the covariates of age, socioeconomic status, family history of MI, and the patient's history of smoking. The Black comparison group's mean score decreased from 54.06 to 50.54, while the White comparison group's mean score increased from 50.61 to 52.53 as a result of the covariate adjustment.

CHAPTER IV

DISCUSSION

The primary purpose of this study was to determine whether a group of patients suffering from coronary heart disease (CHD) could be reliably distinguished from a control group (NHD) on the basis of their responses to the Jenkins Activity Survey (JAS) and the Cook Medley Hostility Scale (Ho). Of particular interest was whether the combined JAS and Ho scale would significantly differentiate between the two groups. This aspect of the study was important because of the recommendations cited in Chapter I calling for the development of a short self-report scale that combined aspects of the Type A construct and a hostility scale (Cooper et al., 1981).

The second purpose of this study was to determine whether a group of black patients would score significantly different than a group of white patients on the JAS and Ho. This portion of the study was important because of the lack of information about how black patients responded to these two scales and whether the Type A behavior pattern could be generalized to population samples that were different from the original validation sample.

This chapter will first review the four hypotheses and the results of the multivariate analysis of variance (MANOVA). This will familiarize the reader with how the four groups responded to the JAS and Ho. These results will also be compared to results of previous research that used the JAS and Ho scale. The second section will examine the demographic

variables that may have influenced the results. The third section will re-examine the data with the use of MANCOVA. The MANCOVA will adjust for the effects of the demographic variables on the two dependent variables of JAS and Ho. The fourth section will review the design of the study and discuss the methodological limitations. The last section will discuss the implications of these results for further research.

Hypothesis 1. It was hypothesized that the Jenkins Activity Survey and the Cook Medley hostility scale could be combined to form a scale that would be effective in discriminating between coronary heart disease patients and non heart disease patients. In terms of a multivariate analysis of variance the question becomes, does the independent variable Study (the presence or absence of heart disease) significantly affect the optimal linear combination of the dependent variable (JAS and Ho) means? In the MANOVA a new dependent variable is formed that is based on the best linear combination of the two dependent variables of JAS and Ho. The MANOVA then performs an analysis of variance on the newly created dependent variable. The results indicated that the main effect of Study did not have a significant effect on the combined dependent variables. Specifically, the patients' scores on the JAS and Ho were not significantly affected by whether the patients had heart disease. In addition, the best linear combination of the two dependent variables did not improve the discrimination of the CHD patients from the non CHD patients. Therefore, the MANOVA results did not support the hypothesis that combining the JAS and Ho would improve the discrimination between the coronary heart disease group and the non coronary heart disease group. The reason for the negative results appear to be that the JAS had a weak association with coronary heart disease but the Hostility scale failed to account for enough additional variance to reach the

significance level. This does not support Williams' et al. (1980) finding that a combination of behavioral and personality measures provided a more complete assessment of the potential for heart problems. However, his study used the Structured Interview as the measure of behavior and the personality component was measured by the Hostility subscale from the complete MMPI. Furthermore, Williams' study sample consisted of patients that were undergoing coronary arteriogram studies rather than recovering from a recent myocardial infarction. These three research design factors and their effect on the results will be examined more fully in the fourth section of this chapter.

Hypothesis 2. It was further hypothesized that the mean scores for the heart disease group would be significantly higher than the mean scores for the non heart disease group on the JAS Type A scale. It was also anticipated from the review of the literature that the heart disease group would have a positive mean score, while the non heart disease group would have a mean score in the negative direction. The Jenkins Activity Survey was standardized in such a way that a positive score on the JAS Type A scale would indicate the presence of the Type A behavior pattern while a negative score on the JAS Type A scale would indicate the absence of the Type A behavior pattern. However, the results indicate that the 61 patients with coronary heart disease had a mean score of -0.86, while the 50 patients without heart disease had a mean score of -3.55. This difference was not significant at the .05 level and failed to support the hypothesis that the heart disease group would have a significantly higher mean score than the non heart disease group. However, when the White heart disease group is compared to the White non heart disease group the mean scores are in the predicted direction. The positive mean score for the White heart disease group

(M = 1.10) indicates the presence of the Type A behavior pattern, while the negative mean score for the White non heart disease group (M = -2.83) indicates the absence of the Type A behavior pattern. The results for the White patients replicates the Kenigsberg et al. (1974) findings. When Kenigsberg et al. surveyed 90 hospitalized patients with the JAS, they found that the 48 patients with heart disease (selected from the post-coronary care unit) had a mean score of 2.88. The 42 patients without heart disease had a mean score of -1.83 on the JAS Type A scale.

This trend does not hold up when the results of the Black heart disease patients are examined. The 22 Black patients with CHD had a mean score of -4.32 on the JAS Type A scale. This would indicate the absence of the Type A behavior pattern in these patients. The Black comparison group had a similar mean score (M = -4.95) on the JAS. This suggests that the JAS is not able to reliably distinguish between Black heart disease patients and Black medical patients. Furthermore, these results support the position taken by the authors in the Chicago Heart Association Detection Project in Industry (Waldron et al., 1977) when they emphasized that Type A scores for Blacks should be interpreted with caution. These results also suggest that the link between the Type A behavior pattern, as measured by the JAS, should not be generalized to the population as a whole, particularly to Black males in urban settings.

Hypothesis 3. It was also hypothesized that the mean scores for the heart disease group would be significantly higher than the mean scores for the non heart disease group on the Ho scale. The 61 heart disease patients had a mean score of 47 on the Hostility scale. This indicates that, on the average, they endorsed 47% of the statements in the hostile direction. However, the 50 non heart disease patients had a mean score of 52 on the Hostility scale. The five point difference in

the mean scores does not represent a statistically significant difference. Therefore, the results do not support hypothesis 3. There was not a significant difference in the mean scores for the two groups. The Hostility scale failed to differentiate the heart disease group from the non heart disease group in this study. This is not consistent with previous research that demonstrated that patients with atherosclerosis (Williams et al., 1980) or those who were to develop heart disease over the next 10 years (Shekelle et al., 1983) to 25 years (Barefoot et al., 1983) scored higher on the Hostility scale than did their control groups. However, this study's control group of hospitalized patients who are experiencing other health problems is significantly different from the group used in the previous research.

Critics of the Ho studies have suggested that the Ho scale is not measuring a special susceptibility to heart disease but rather a psychological attitude of cynicism and mistrust that makes people more susceptible to many health problems. After reviewing their research, Williams et al. (1985) concluded that "we can have considerable confidence that 'something' measured by the Ho scale is in fact associated with a wide range of adverse health consequences" (p. 180). If Williams is correct, then it is not surprising that a control group consisting of hospitalized men with a variety of health problems endorses over 50% of the items on the Ho scale in the hostile direction.

Hypothesis 4. It was hypothesized that the race of the patient would not significantly affect the patients' score on the JAS and Ho scales. In terms of the multivariate analysis of variance, the question becomes, does the independent variable of Race significantly affect the optimal linear combination of dependent variable means? The results of the MANOVA indicated that the combined dependent variables of JAS and Ho

were significantly affected by the independent variable, Race, $F(2,106) = 6.30$, $p < .01$. Nearly 11% of the variance was accounted for by the best linear combination of the JAS and Ho scales. These results suggest that the race of the patient had a significant effect on the mean scores of the JAS and Ho. The subsequent step-down analysis showed that the Black patients scored significantly higher (M = 56) on the Hostility scale than did the White patients (M = 45). A Tukey-HSD post hoc comparison was performed on the four groups' mean hostility scores. The White heart disease group had a significantly lower mean score (M = 40) than the Black heart disease group (M = 58). The White patients' mean score on the Jenkins Activity Survey was -.70. This was higher than the Black patients' score (M = -4.59) but did not reach significance at the .05 level. However, it does suggest that the White subjects were endorsing more JAS items in the Type A direction than the Black patients. Therefore, in this study, the race of the patients had a significant effect on the mean scores of the Hostility scale and appeared to influence the mean scores of the JAS Type A scale.

Specifically, the Black patients endorsed more hostile items, on the average, than the White subjects endorsed. There are no other heart disease studies that these results can be compared to for the Black patients. However, in related research on Blacks and hypertension, Gentry (1985) proposed that it was the combination of hostility and the suppression of anger that offered the greatest risk for hypertension, and he further suggested that this combination was highest in Black males. It has also been suggested that the suppression of anger combines with race, sex, and sociological stress areas to create group differences in the risk status for hypertension that ranges from less than seven percent (White females who express anger openly and live in

low stress areas) to 39% (Black males, residing in high stress areas, who suppress anger) (Gentry, Chesney, Gary, Hall, & Harburg, 1982). In a related study of 1,006 residents of Detroit, Gentry, Chesney, Kennedy, Hall, Gary, and Harburg (1983) found that Black males were significantly more likely to hold anger in than were other race-sex groups. The fact that the Black patients in the present study are endorsing more hostile items is in clear agreement with the findings of the research in hypertension that shows that Black males that experience negative emotions are vunerable to increased health risks.

In summary, an examination of the results of the MANOVA reveals that (a) this study failed to develop a linear combination of the JAS and Ho that could successfully discriminate between patients with coronary heart disease and patients without heart disease, (b) the coronary heart disease patients in this study did not score significantly different on either the JAS or the Ho from the patients without heart disease, and (c) the Black patients endorsed more items on the Hostility scale in the hostile direction than did the White patients.

Demographic variables. It is important that in epidemological and retrospective studies there is an attempt to control the demographic variables that may have an effect on the dependent and independent variables under study.

This study sampled 122 patients in three different hospitals from three different cities. The research design provided for the control of sex (all patients were male), range of age (35-65), and the disease end point (recovering from a recent myocardial infarction). If significant results were found for the effects of Race or Study on the JAS Type A scale and the Ho scale it would be important to rule out as many extraneous variables as possible that might have contributed to the

significant main effect.

The JAS Type A scale has been shown to be influenced by age, occupational and educational levels. Waldron et al. (1977) found that years of education and the JAS Type A were related. Specifically, White subjects with a college education had significantly higher JAS Type A scores than White subjects with less education. However, for the Black subjects, the difference was not significant. Their study also found differences in the JAS Type A mean scores for male versus female subjects. However, when Shekelle et al. (1976) adjusted these mean scores for their socioeconomic status, they found that men did not score significantly different on the JAS Type A scale from women. Shekelle also found age to be inversely related to the JAS Type A scale for both sexes.

In the Western Collaborative Group Study, higher JAS Type A scores were also associated with higher occupational levels. This was consistent with Mettlin's (1976) study that found a similar high relation between occupations, education, and the JAS Type A score. Kenigsberg et al. (1974) examined whether the significant association that was found between the JAS Type A scores and heart disease status could be attributed to age or sex effects and determined that these demographic variables had a negligible effect on the association between CHD and JAS Type A.

The Cook Medley Hostility scale has been shown to negatively correlate ($r = -0.21$) with occupational status (Shekelle et al., 1983). However, this association did not affect the significant relationship that was found between high Ho scores and total mortality from all illness over a 20 year follow-up period.

In light of the above findings, the demographic variables of age

and socioeconomic status (a combination of education and occupation) were collected from each of the patients. Two other factors that have been linked with coronary heart disease were also reported for each patient, personal smoking history and family history of myocardial infarction.

Multivariate analysis of covariance. The results of the MANOVA indicated a significant main effect for the independent variable Race on the dependent variables of JAS Type A and Ho scale. This finding was followed by a MANOVA analysis that examined the dependent variables and their relationship with the four demographic variables. The results did show that there was a significant relation between the combined dependent variables and the combined covariates. Further analysis demonstrated that the dependent variable of JAS Type A was positively related to the socioeconomic status variable. This finding is consistent with the research presented in the previous section that clearly showed that the JAS Type A score is significantly related to the socioeconomic status of the subject.

The combined dependent variables were then analyzed with the use of the MANCOVA technique to determine whether there was a significant relationship with the independent variables after the effects of the covariates were controlled. The omnibus MANCOVA failed to show a significant relationship between the combined dependent variables and the combined independent variables after the effects of the covariate were controlled for. This suggests that the results for hypothesis 4 that showed Race having a significant effect on the mean scores for the JAS and Ho are influenced by the effects of the four demographic variables. The primary influence comes from two of the variables--age and socioeconomic status. When the variance accounted for by the

demographic variables is adjusted for, there is no significant relationship between the race of the subject and his scores on the JAS Type A and the Ho scale. Furthermore, the MANCOVA results did not indicate any mean differences on the JAS Type A and Ho scores caused by either Race or Study after the effects of the covariates are adjusted for. This points out how research that reports a significant association between the JAS Type A or Ho scale and coronary heart disease needs to determine the amount of variance associated with the demographic variables, particularly socioeconomic status and age. This is consistent with Shekelle's et al. (1976) finding that there was no significant difference between male and female responses to the JAS Type A after the scores were adjusted for the effect of the socioeconomic status.

The interaction effect of Race and Study did reach significance after the MANCOVA adjusted for the effects of the four demographic variables. This finding appears to be the result of the fact that the Black comparison group was younger and less socioeconomically established than the other three groups. This group's mean score on the Ho scale was adjusted from 54.06 to 50.54. The oldest and most socioeconomically established group was the White comparison group, and their mean score on the Ho scale was adjusted from 50.61 to 52.53 as a result of the MANCOVA analysis. This appears to be an artifact of the data and does not have any interpretable significance.

Research design limitations. This retrospective study makes two assumptions: (1) the survivors of heart attacks do not differ from non-survivors on the JAS and Ho scales, and (2) that changes in the response to the JAS and Ho have not occurred as a result of the subjects surviving a heart attack. Lebovits, Shekelle, Ostfeld, and Paul (1966) suggest that retrospectively designed studies that use the MMPI

erroneously make the above assumptions and that any investigation of the causal relationship between personality variables and life-threatening disease should proceed by the prospective method. However, Wardwell and Bahnson (1964) have pointed out that retrospective studies may be preferable in epidemiological studies where the incidence of disease is low. With prospective studies there is a need to follow large numbers of patients for long periods of time to establish causal relations between psychological variables and disease. In their review of the Framingham Heart Study they noted that this well-designed prospective study lost 31% of the subjects to follow-up after four years. This included 22.6% that were uncooperative from the beginning.

A number of studies have also suggested that the association between coronary heart disease and the Type behavior pattern (as measured by the JAS) may not be as robust in certain high risk groups, such as post-infarct patients (Case, et al., 1985) and patients with increased levels of risk factors (Shekelle, Hurley, Neation, Billings, Borhami, Gerace, Jacobs, Lasser, Mittlemack, & Stamler, 1985). Even though it has been shown that the JAS Type A score is unaffected by post-infarct administration (Jenkins et al., 1976), more recent studies utilizing the JAS after an infarct have failed to establish an association between the JAS and the risk for a recurrent coronary event (Case et al., 1985; Shekelle et al., 1985). Both the Case et al. (1985) study and the present study assessed the Type A behavior pattern with the JAS within two weeks after the myocardial infarction. The results suggest that the power of the JAS may be diminished with recent post-infarct patients.

A further limitation to the present study is the changes made in the Cook Medley Hostility scale. The extracted Ho scale was not able to differentiate between the coronary heart disease group and the comparison

groups. However, the previous research used the Ho to differentiate between medically ill patients (many with coronary heart disease) and healthy patients, while the present research attempted to differentiate between two medically ill patient groups. To rule out any possible distortion of the Ho by the use of a Likert type scale, a post hoc study was run that showed a correlation of .92 between the true-false format and the Likert format (see Appendix E). It is unlikely that the modification of the Cook Medley Hostility scale distorted the results.

Summary of Findings and Implications

The coronary heart disease patients in this study did not score significantly different on either the JAS or Ho scale from the patients without heart disease. Furthermore, the race of the patient did not have an influence on their JAS and Ho scale after the demographic variables were statistically adjusted for. These results support the conclusions of three recent reviews of the Type A Behavior Pattern (Booth-Kewley & Friedman, 1987; Fischman, 1987; Linden, 1987). Specifically, the Jenkins Activity Survey Type A scale is a particularly weak predictor of coronary risk and does not necessarily generalize to the broader population.

The results of this study also suggest that the Ho scale may be measuring a psychological attitude associated with a wide range of health problems rather than coronary heart disease specifically. This would explain why the Ho scale was not able to differentiate between two hospitalized patient samples.

It is also implied that any research purporting to find differences between subjects based on Race should carefully examine the effects of the demographic variables such as age and socioeconomic status.

It is recommended that research attempting to generalize the Type A construct to minority populations be continued. This should include studies that focus on the psychological correlates of coronary heart disease for Black men. The control groups should consist of both normal, healthy persons of the same age, sex, and race, and a random sample of people suffering from other serious illnesses. The effects of the demographic variables of age and socioeconomic status should be considered before drawing any conclusions about the association between the JAS Type A scale and coronary heart disease. Of primary importance in the suggested areas of research is the need to accurately define the population being studied and develop the appropriate sampling techniques to expand the generalizability of the Type A behavior construct.

APPENDICES

APPENDIX A

CONSENT FORM

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

1. I have been asked to participate in a research study which will involve my answering questions on the following two questionnaires: the Jenkins Activity Survey and a portion of the Minnesota Multiphasic Personality Inventory. These questionnaires are designed to ascertain the feelings and behaviors of physically ill people.

2. I understand that the purpose of the study is to provide information that will be useful in providing future patient care.

3. I understand that the study information identifying me will remain confidential and will not be disclosed outside the hospital except with my written permission or as required by law.

4. I have discussed this study with Mr. Hyde and he has offered to answer any questions I may have concerning this study. I am aware that I should contact Mr. Hyde at _____ if I have any questions regarding the research, research subjects, rights, or my participation in the study at its outcome.

5. In giving my consent, I acknowledge that my participation in this research study is voluntary and that I may withdraw from it any time without prejudice to me.

_____ _____
signature of patient date

_____ _____
witness not associated with research study but present during explanation to patient date

_____ _____
investigator's signature date

APPENDIX B

JENKINS ACTIVITY SURVEY

Jenkins Activity Survey

C. David Jenkins, Ph.D. Stephen J. Zyzanski, Ph.D. Ray H. Rosenman, M.D.

FORM C

Name (last name first)

Age

Male ○
Female ○

The *Jenkins Activity Survey* asks questions about aspects of behavior that have been found helpful in medical diagnosis. Each person is different, so there are no "right" or "wrong" answers.

For each question, choose the answer that is true for you, and fill in the space in front of that answer. Use a black lead pencil, and make your marks heavy and dark. Mark only one answer for each question. If you change your mind, erase the old mark completely.

Do not make any stray marks.

1. Do you ever have trouble finding time to get your hair cut or styled?
A○ Never
B○ Occasionally
C○ Almost always

2. How often does your job "stir you into action"?
A○ Less often than most people's jobs
B○ About average
C○ More than most people's jobs

3. Is your everyday life filled mostly by
A○ problems needing a solution?
B○ challenges needing to be met?
C○ a rather predictable routine of events?
D○ not enough things to keep me interested or busy?

4. Some people live a calm, predictable life. Others often find themselves facing unexpected changes, frequent interruptions, inconveniences, or "things going wrong." How often are you faced with these minor (or major) annoyances or frustrations?
A○ Several times a day
B○ About once a day
C○ A few times a week
D○ Once a week
E○ Once a month or less

5. When you are under pressure or stress, what do you usually do?
A○ Do something about it immediately
B○ Plan carefully before taking any action

6. Ordinarily, how rapidly do you eat?
A○ I'm usually the first one finished.
B○ I eat a little faster than average.
C○ I eat at about the same speed as most people.
D○ I eat more slowly than most people.

7. Has your spouse or a friend ever told you that you eat too fast?
A○ Yes, often
B○ Yes, once or twice
C○ No, never

8. How often do you find yourself doing more than one thing at a time, such as working while eating, reading while dressing, or figuring out problems while driving?
A○ I do two things at once whenever practical.
B○ I do this only when I'm short of time.
C○ I rarely or never do more than one thing at a time.

9. When you listen to someone talking, and this person takes **too long** to come to the point, how often do you **feel** like hurrying the person along?
A○ Frequently
B○ Occasionally
C○ Almost never

10. How often do you actually "put words in the person's mouth" in order to speed things up?
A○ Frequently
B○ Occasionally
C○ Almost never

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9-174004

11. If you tell your spouse or a friend that you will meet somewhere at a definite time, how often do you arrive late?
A○ Once in a while
B○ Rarely
C○ I am never late.

12. How often do you find yourself hurrying to get places even when there is plenty of time?
A○ Frequently
B○ Occasionally
C○ Almost never

13. Suppose you are to meet someone at a public place (street corner, building lobby, restaurant) and the other person is already 10 minutes late. What will you do?
A○ Sit and wait
B○ Walk about while waiting
C○ Usually carry some reading matter or writing paper so I can get something done while waiting

14. When you have to "wait in line" at a restaurant, a store, or the post office, what do you do?
A○ Accept it calmly
B○ Feel impatient but not show it
C○ Feel so impatient that someone watching can tell I am restless
D○ Refuse to wait in line, and find ways to avoid such delays

15. When you play games with young children about 10 years old (or when you did so in past years), how often do you purposely let them win?
A○ Most of the time
B○ Half the time
C○ Only occasionally
D○ Never

16. When you were younger, did most people consider you to be
A○ definitely hard-driving and competitive?
B○ probably hard-driving and competitive?
C○ probably more relaxed and easygoing?
D○ definitely more relaxed and easygoing?

17. Nowadays, do you consider yourself to be
A○ definitely hard-driving and competitive?
B○ probably hard-driving and competitive?
C○ probably more relaxed and easygoing?
D○ definitely more relaxed and easygoing?

18. Would your spouse (or closest friend) rate you as
A○ definitely hard-driving and competitive?
B○ probably hard-driving and competitive?
C○ probably relaxed and easygoing?
D○ definitely relaxed and easygoing?

19. Would your spouse (or closest friend) rate your general level of activity as
A○ too slow—should be more active?
B○ about average—busy much of the time?
C○ too active—should slow down?

20. Would people you know well agree that you take your work too seriously?
A○ Definitely yes
B○ Probably yes
C○ Probably no
D○ Definitely no

21. Would people you know well agree that you have less energy than most people?
A○ Definitely yes
B○ Probably yes
C○ Probably no
D○ Definitely no

22. Would people you know well agree that you tend to get irritated easily?
A○ Definitely yes
B○ Probably yes
C○ Probably no
D○ Definitely no

23. Would people who know you well agree that you tend to do most things in a hurry?
A○ Definitely yes
B○ Probably yes
C○ Probably no
D○ Definitely no

24. Would people who know you well agree that you enjoy a "contest" (competition) and try hard to win?
A○ Definitely yes
B○ Probably yes
C○ Probably no
D○ Definitely no

25. How was your temper when you were younger?
A○ Fiery and hard to control
B○ Strong but controllable
C○ No problem
D○ I almost never got angry.

26. How is your temper nowadays?
A○ Fiery and hard to control
B○ Strong but controllable
C○ No problem
D○ I almost never get angry.

27. When you are in the midst of doing a job and someone (not your boss) interrupts you, how do you usually feel inside?
A ○ I feel O.K. because I work better after an occasional break.
B ○ I feel only mildly annoyed.
C ○ I really feel irritated because most such interruptions are unnecessary.

28. How often are there deadlines on your job?
A ○ Daily or more often
B ○ Weekly
C ○ Monthly or less often
D ○ Never

29. These deadlines usually carry
A ○ minor pressure because of their routine nature.
B ○ considerable pressure, since delay would upset my entire work group.
C ○ Deadlines never occur on my job.

30. Do you ever set deadlines or quotas for yourself at work or at home?
A ○ No
B ○ Yes, but only occasionally
C ○ Yes, once a week or more

31. When you have to work against a deadline, what is the quality of your work?
A ○ Better
B ○ Worse
C ○ The same (Pressure makes no difference.)

32. At work, do you ever keep two jobs moving forward at the same time by shifting back and forth rapidly from one to the other?
A ○ No, never
B ○ Yes, but only in emergencies
C ○ Yes, regularly

33. Are you content to remain at your present job level for the next five years?
A ○ Yes
B ○ No, I want to advance.
C ○ Definitely no; I strive to advance and would be dissatisfied if not promoted in that length of time.

34. If you had your choice, which would you rather get?
A ○ A small increase in pay **without** a promotion to a higher level job
B ○ A promotion to a higher level job **without** an increase in pay

35. In the past three years, have you ever taken less than your allotted number of vacation days?
A ○ Yes
B ○ No
C ○ My type of job does not provide regular vacations.

36. In the last three years, how has your personal yearly income changed?
A ○ It has remained the same or gone down.
B ○ It has gone up slightly (as the result of cost-of-living increases or automatic raises based on years of service).
C ○ It has gone up considerably.

37. How often do you bring your work home with you at night, or study materials related to your job?
A ○ Rarely or never
B ○ Once a week or less
C ○ More than once a week

38. How often do you go to your place of work when you are not expected to be there (such as nights or weekends)?
A ○ It is not possible on my job.
B ○ Rarely or never
C ○ Occasionally (less than once a week)
D ○ Once a week or more

39. When you find yourself getting tired on the job, what do you usually do?
A ○ Slow down for a while until my strength comes back
B ○ Keep pushing myself at the same pace in spite of the tiredness

40. When you are in a group, how often do the other people look to you for leadership?
A ○ Rarely
B ○ About as often as they look to others
C ○ More often than they look to others

41. How often do you make yourself written lists to help you remember what needs to be done?
A ○ Never
B ○ Occasionally
C ○ Frequently

For questions 42-46, compare yourself with the average worker in your present occupation, and mark the most accurate description.

42. In amount of effort put forth, I give
A ○ much more effort.
B ○ a little more effort.
C ○ a little less effort.
D ○ much less effort.

43. In sense of responsibility, I am
A○ much more responsible.
B○ a little more responsible.
C○ a little less responsible.
D○ much less responsible.

44. I find it necessary to hurry
A○ much more of the time.
B○ a little more of the time.
C○ a little less of the time.
D○ much less of the time.

45. In being precise (careful about detail), I am
A○ much more precise.
B○ a little more precise.
C○ a little less precise.
D○ much less precise.

46. I approach life in general
A○ much more seriously.
B○ a little more seriously.
C○ a little less seriously.
D○ much less seriously.

For questions 47-49, compare your present work with your work setting of five years ago. If you have not been working for five years, compare your present job with your first job.

47. I worked more hours per week
A○ at my present job.
B○ five years ago.
C○ Cannot decide

48. I carried more responsiblity
A○ at my present job.
B○ five years ago.
C○ Cannot decide

49. I was considered to be at a higher level (in prestige or social position)
A○ at my present job.
B○ five years ago.
C○ Cannot decide

50. How many different job titles have you held in the last 10 years? (Be sure to count shifts in kinds of work, shifts to new employers, and shifts up and down within a firm.)
A○ 0-1
B○ 2
C○ 3
D○ 4
E○ 5 or more

51. How much schooling did you receive?
A○ 0-4 years
B○ 5-8 years
C○ Some high school
D○ Graduated from high school
E○ Trade school or business college
F○ Some college (including junior college)
G○ Graduated from a four-year college
H○ Post-graduate work at a college or university

52. When you were in school, were you an officer of any group, such as a student council, glee club, 4-H club, sorority or fraternity, or captain of an athletic team?
A○ No
B○ Yes, I held one such position.
C○ Yes, I held two or more such positions.

STOP. Do not make any marks below this line.

If machine scoring is desired, complete the following information (see Scoring Service Fact Sheet for instructions). Return questionnaire to The Psychological Corporation, Data Services Division, JAS Scoring, 757 Third Avenue, New York, NY 10017.

Identification Code

Mo.		Day		Year	

Indicate desired scoring service:
○ **Individual Report Form** (Standard Service)
○ List Report and Punched Cards
○ Magnetic Tape

Return report to:

Name (please print)

Address

Billing address:

Name (please print)

Address

1 2 A B C D E 3 4 5 6 7 8 9 10 11 12

APPENDIX C

COOK MEDLEY HOSTILITY SURVEY

Questionnaire

Please respond to each item in terms of several degrees of agreement or disagreement.

For example: (1) strongly agree; (2) agree; (3) undecided; (4) disagree; (5) strongly disagree

1.	When I take a new job, I like to be tipped off on who should be gotten next to.	1 2 3 4 5
2.	When someone does me wrong I feel I should pay him/her back if I can, just for the principle of the thing.	1 2 3 4 5
3.	I prefer to pass by school friends or people I know but have not seen for a long time, unless they speak to me first.	1 2 3 4 5
4.	I have often had to take orders from someone who did not know as much as I did.	1 2 3 4 5
5.	I think a great many people exaggerate their misfortunes in order to gain sympathy and help of others.	1 2 3 4 5
6.	It takes a lot of argument to convince most people of the truth.	1 2 3 4 5
7.	I think most people would lie to get ahead.	1 2 3 4 5
8.	Someone has had it in for me.	1 2 3 4 5
9.	Most people are honest chiefly through fear of being caught.	1 2 3 4 5
10.	Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it.	1 2 3 4 5
11.	I commonly wonder what hidden reason another person may have for doing something nice for me.	1 2 3 4 5
12.	It makes me impatient to have people ask my advice or otherwise interrupt me while I am working on something important.	1 2 3 4 5
13.	I feel that I have often been punished without cause.	1 2 3 4 5
14.	I am against giving money to beggars.	1 2 3 4 5
15.	Some of my family have habits that bother and annoy me very much.	1 2 3 4 5
16.	My relatives are nearly all in sympathy with me.	1 2 3 4 5

17. My way of doing things is apt to be misunderstood by others. 1 2 3 4 5

18. I don't blame anyone for trying to grab everything he/she can get in this world. 1 2 3 4 5

19. No one cares much what happens to you. 1 2 3 4 5

20. I can be friendly with people who do things which I consider wrong. 1 2 3 4 5

21. It is safer to trust nobody. 1 2 3 4 5

22. I do not blame a person for taking advantage of someone who lays himself/herself open to it. 1 2 3 4 5

23. I have often felt that strangers were looking at me critically. 1 2 3 4 5

24. Most people make friends because friends are likely to be useful to them. 1 2 3 4 5

25. I am sure I am being talked about. 1 2 3 4 5

26. I am not likely to speak to people until they speak to me. 1 2 3 4 5

27. Most people inwardly dislike putting themselves out to help other people. 1 2 3 4 5

28. I tend to be on my guard with people who are somewhat more friendly than I expected. 1 2 3 4 5

29. People often disappoint me. 1 2 3 4 5

30. I have often met people who are supposed to be experts who were no more better than I. 1 2 3 4 5

31. It makes me feel like a failure when I hear of the success of someone I know well. 1 2 3 4 5

32. People generally demand more respect for their own rights than they are willing to allow for others. 1 2 3 4 5

33. I am quite often not in on the gossip and talk of the group I belong to. 1 2 3 4 5

34. I have often found that people are jealous of my good ideas, just because they had not thought of them first. 1 2 3 4 5

35. I have sometimes stayed away from another person because I feared doing or saying something that I might regret afterwards. 1 2 3 4 5

36. I would certainly enjoy beating a crook at his/her own game. 1 2 3 4 5

37. I have at times had to be rough with people who were rude and annoying. 1 2 3 4 5

38. There are certain people whom I dislike so much that I am inwardly pleased when they are catching it for something they have done. 1 2 3 4 5

39. I am often inclined to go out of my way to win a point with someone who has opposed me. 1 2 3 4 5

40. The man who had most to do with me when I was a child (such as my father, stepfather, etc.) was very strict with me. 1 2 3 4 5

41. I like to keep people guessing what I'm going to do next. 1 2 3 4 5

42. When a man is with a woman he is usually thinking about things related to her sex. 1 2 3 4 5

43. I do not try to cover up my poor opinion or pity of a person so that he/she won't know how I feel. 1 2 3 4 5

44. I have frequently worked under people who seem to have things arranged so that they get credit for good work but are able to pass off mistakes onto those under them. 1 2 3 4 5

45. I strongly defend my own opinions as a rule. 1 2 3 4 5

46. I frequently ask people for advice. 1 2 3 4 5

47. People can pretty easily change me even though I thought that my mind was already made up on the subject. 1 2 3 4 5

48. Sometimes I am sure that other people can tell what 1 2 3 4 5

49. A large number of people are guilty of bad sexual conduct. 1 2 3 4 5

50. I am not easily angered. 1 2 3 4 5

APPENDIX D

THE SUITABILITY OF THE DATA FOR THE MANOVA AND MANCOVA TECHNIQUE

Suitability of Data for MANOVA and MANCOVA

The variables were evaluated with respect to the practical limitations of the MANOVA and MANCOVA technique. This evaluation is presented below.

Outliers. The MANOVA is very sensitive to outliers. Therefore, tests were run for univariate and multivariate outliers separately for each cell of the design through the use of SPSS-X CONDESCRIPTIVE and REGRESSION CASEWISE. A standardized score of ± 3.00 was designated as a cutoff for identifying outlying cases. It was determined that no cases were outliers based on that criteria.

Homegeneity of Variance-Covariance Matrices

The MANOVA and MANCOVA models assume that the variance-covariance matrices within each group are sampled from the same population variance-covariance matrix. A general guideline for testing this assumption in MANOVA with unequal sample sizes is the Boxs' M test with $p < .001$. The test for homogeneity of covariance matrices performed through SPSS-X MANOVA produced $F(63,13754) = 1.49$, $p = .007$ for Boxs' M, showing no statistically significant deviation from homogeneity of covariance matrices.

Multivariate normality. The MANOVA and MANCOVA models assume that the sampling distributions of the means of the dependent variables in each group are normally distributed as are the linear combinations of the dependent variables. Tabachnick and Fidell (1983) suggest that with unequal sample sizes, a sample size of about 20 subjects in the smallest group should ensure robustness of the test if there are just a few dependent variables. In the present study, the reduced sample size of 111 subjects included between 17 and 39 subjects in each of the four

groups of the 2 x 2 between groups design after the elimination of subjects that failed to complete the surveys. The individual dependent variables were fairly normally distributed with no glaring skewness observed.

Linearity. When using the MANOVA and MANCOVA technique it is assumed that the dependent variables and covariates have a linear relationship within each group. The deviation from linearity between any pairs of dependent variables will reduce the power of MANOVA and MANCOVA. To test for any deviation from linearity, 10 of the 15 within group scatterplots were examined for linearity through SPSS-X and SCATTERGRAM. There was no suggestion of a curvilinear relationship between any of the plotted DVs.

Reliability of covariates. It is assumed in MANOVA and MANCOVA that all of the covariates are measured within acceptable error parameters. For the stepdown analysis in MANOVA the dependent variable of JAS Type A acts as a covariate. As reported in Chapter I, the test-retest reliability of the JAS Type A scales exceeds + .80. The dependent variables of socioeconomic status, age, family history of MI, and smoking history act as covariates in the MANCOVA. Based on the data collection procedures, there is no reason to expect unreliability of a magnitude harmful to covariance analysis.

Multicollinearity and singularity. A condition of multicollinearity or singularity occurs when the dependent variables are highly correlated and most of the variance is covariance. In other words, multicollinearity and singularity occurs when one dependent variable provides information that has already been provided by other dependent variables. A calculation of the determinant of the within-cell correlation matrix was completed through SPSS-X MANOVA and was

found to be 0.99. This was sufficiently different from zero that neither multicollinearity nor singularity was judged to be a problem.

APPENDIX E

A POST HOC STUDY ON THE USE OF THE HO SCALE WITH A LIKERT FORMAT

A Post Hoc Study on the Use of the Ho Scale with a Likert Format

A post hoc study was completed for the purpose of comparing the Cook Medley Ho scale using two different formats. The Likert format was compared to the true-false format. Eighty-five undergraduate students completed both formats of the Ho scale. One half of the students completed the Likert Ho scale before they completed the true-false Ho scale while the other half of the student group completed the true-false Ho scale first.

A Pearson product-movement correlation coefficient was calculated on the set of paired observations. The calculated r value was equal to .92.

This suggests that the Likert Ho is very similar to the true-false Ho scale and should yield similar results.

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VITA AUCTORIS

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