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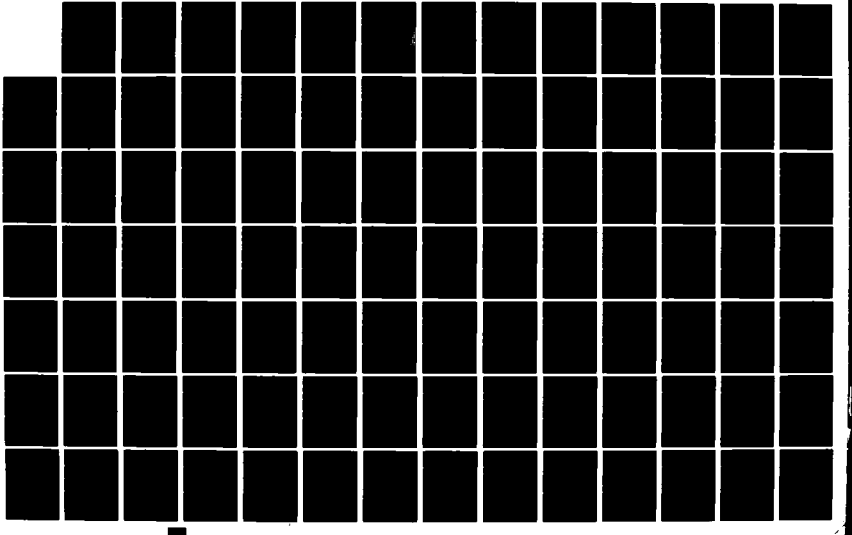

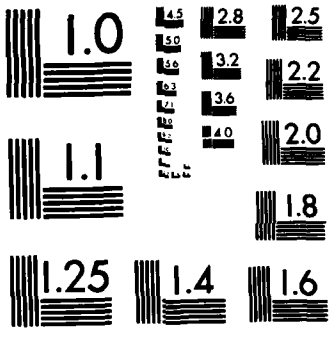

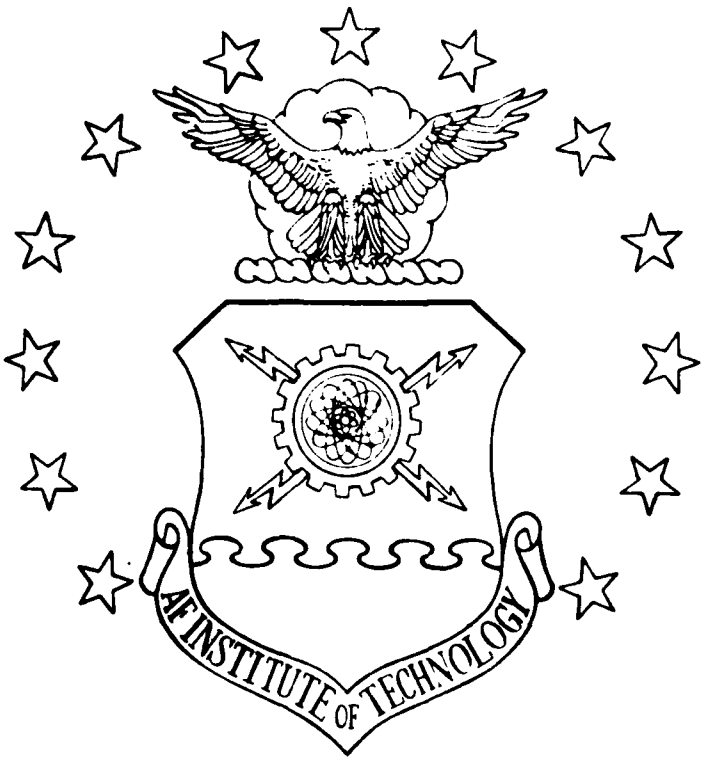


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# AN ASSESSMENT OF THE RELATIONSHIP BETWEEN THE CORONARY-PRONE (TYPE A) BEHAVIOR PATTERN, STRESS, AND CORONARY HEART DISEASE

Thomas J. McDonald, Captain, USAF

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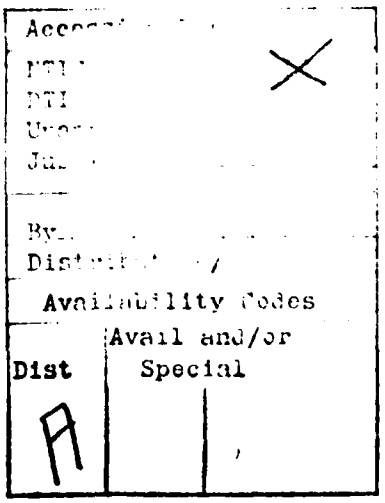


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This cross-sectional study examines the relationships between the coronary-prone (Type A)behavior pattern, stress, and coronary heart disease (CHD). Past research indicates that Type A behavior is related to both CHD and stress. Behavioral and organizational data were obtained from 438 respondents; physiological data were obtained from 368 respondents. The physiological data included cholesterol, HDL cholesterol (HDL), and cortisol. Cholesterol, HDL, and the ratio of cholesterol divided by HDL (ratio) were used as indicators of CHD. Cortisol was used as the indicator of felt stress. Factor analysis and multiple regression analysis were employed. Analyses supported using ratio, cholesterol, and HDL as indicators of CHD; cortisol was not representative of felt stress. The results indicate that Type A behavior and its job involvement dimension are only weakly and positively related to CHD. The speed and impatience dimension demonstrated a stronger, positive relationship with CHD. The hard driving and competitive dimension was inversely related to CHD, with the competitive component controlling the direction of the relationship. Type A behavior was not a significant predictor of cortisol nor did it moderate the CHD--felt stress (cortisol) relationship. The findings indicate that Type A behavior and its component dimensions are all positively related to perceived job stress.

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# AN ASSESSMENT OF THE RELATIONSHIP BETWEEN THE CORONARY-PRONE (TYPE A) BEHAVIOR PATTERN, STRESS, AND CORONARY HEART DISEASE

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Engineering Management

By

Thomas J. McDonald
Captain, USAF

September 1982

This thesis, written by

Captain Thomas J. McDonald

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN ENGINEERING MANAGEMENT

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Finally, and most of all, I wish to express my gratitude to my wife Pam. She gave up so much as I worked on this thesis. She provided me with continual encouragement and understanding. For this reason, I dedicate this effort to her.

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# CHAPTER 1

## INTRODUCTION

Coronary heart disease is the leading cause of death in the United States. Each year, over 650,000 people in the United States die of heart attacks and over 29 million Americans suffer from some form of heart and blood vessel disease (Matteson and Ivancevich, 1979). Additionally, the economic impact of heart disease is staggering; a 1976 American Heart Association report estimated the cost of heart disease in the United States to be $26.7 billion per year (Davidson and Cooper, 1981). For these reasons, a great deal of research has attempted to identify the factors leading to coronary heart disease. Included among the most important factors which are claimed to be associated with coronary heart disease are the "coronary-prone behavior pattern" (often referred to as Type A behavior) and stress. However, the actual impact that these two variables have on coronary heart disease has not been made totally clear by past research. Therefore, the purpose of this study is to attempt to clarify the relationship between an individual's coronary-prone behavior pattern, stress, and coronary heart disease. To accomplish this purpose, the primary research objectives focus on assessing the effects of the coronary-prone

behavior pattern on increasing the risk of coronary heart disease and on increasing stress levels.

Friedman and Rosenman (1974) have identified two styles of behavior pattern exhibited by individuals which they call Type A and Type B, respectively. The Type A behavior pattern is a style of behavior characterized by extreme competitiveness, striving for achievement, aggressiveness, impatience, haste, and time urgency. The individuals characterized as Type B exhibit unhurried behavior and are likely to be more introverted, relaxed, deferent, and patient (Chesney and Rosneman, 1982). Friedman and Rosenman (1974) believe that Type A behavior is the leading cause of premature coronary heart disease and many studies have found a higher incidence of coronary heart disease among Type A individuals (e.g., Brand, Rosenman, Sholtz, and Friedman, 1976; Heller, 1979; Jenkins, Zyzanski, and Rosenman, 1976). Jenkins and Zyzanski (1980:157) emphasize that the Type A construct does not reflect a form of stress, but that it is "the reaction of a psychologically predisposed person to a situation which challenges him or her." The challenge that Type A persons experience when confronted with a stressful event or situation might motivate them to master or control those situations (Glass, 1977). This fact may cause Type A persons to endure stress for longer periods of time, thereby increasing their risk of coronary heart disease.

Stress, according to Ivancevich and Matteson (1980: 25), is an

> . . . adaptive response, mediated by individual characteristics and/or psychological processes, that is a consequence of any external action, situation, or event that places special physical and/or psychological demands upon a person.

Several researchers (e.g., Cooper and Marshall, 1976; House, 1974; Schuler, 1980) indicate that coronary heart disease is one of the physical demands which can result from stress. Matteson and Ivancevich (1979) propose a model which might explain the relationship between stress and heart disease. Figure 1 illustrates this model. Matteson and Ivancevich (1979) propose that stress, which is induced by stressors (the antecedents of stress) and moderated by individual differences, results in a number of physiological and behavioral outcomes. They propose that the major consequence of these outcomes is coronary heart disease.

Furthermore, Matteson and Ivancevich (1979) propose that there is a possible relationship between behavior pattern, stress, and coronary heart disease. In their model, the coronary-prone behavior pattern is one of the prominent variables included among those described as "individual differences" which are posited to be moderators of the stress-coronary heart disease relationship. The exact nature of the moderating effect of behavior pattern is not clear, indicating the need for additional research.

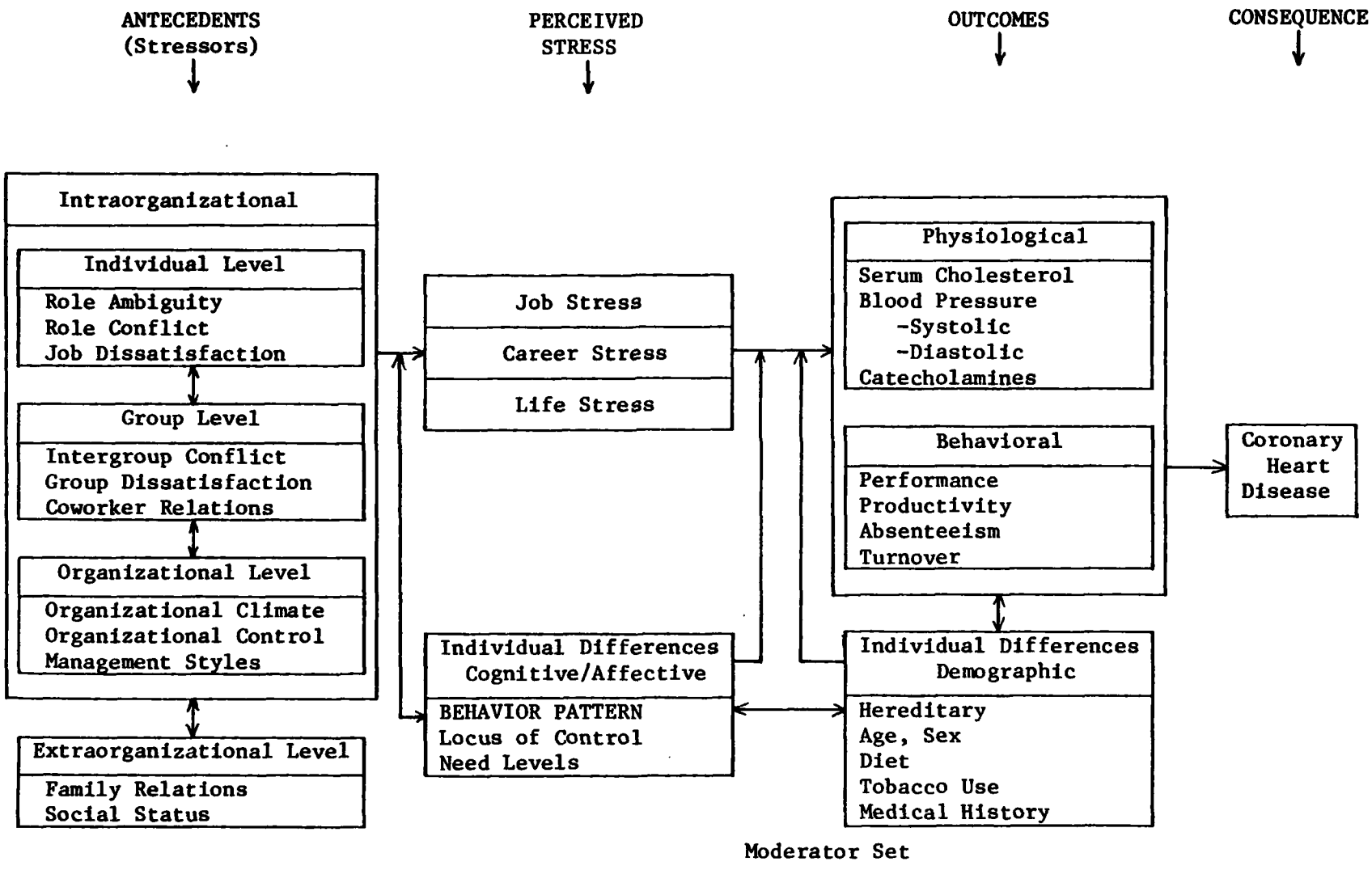


Figure 1. A Model of the Stress-Coronary Heart Disease Relationship
(Adapted from Matteson and Ivancevich, 1979)

Two primary issues, regarding behavior pattern, have been raised which need to be addressed. These issues are described in the following questions. Does the coronary-prone behavior pattern in itself result in a higher incidence of heart disease risk among Type A individuals? Does the coronary-prone behavior pattern influence the stress-coronary heart disease relationship resulting in a higher incidence of heart disease among Type A individuals? The general purpose of this study is to attempt to answer these questions. The specific research objectives of this study are described in the succeeding paragraph; the research hypotheses associated with each of these objectives will be presented in the following chapter.

This research has four primary objectives. First, I wish to examine the relative strength of the relationships between behavior pattern and several key physiological risk factors of coronary heart disease. Second, I seek to examine the relative strength of the relationships between behavior pattern and a physiological measure of felt stress, and between behavior pattern and perceived job stress. Third, I seek to examine and test the moderating effect of behavior pattern on the coronary heart disease--stress relationship. Fourth, I wish to determine whether or not behavior pattern moderates the relationship between perceived job stress and certain other variables which have been

proposed by various authors as being important antecedents of stress.

To accomplish these objectives, it was necessary to comprehensively investigate both physical and behavioral characteristics among individuals. Physical characteristics were examined to isolate the key physiological risk factors of heart disease and stress. This was accomplished by drawing blood samples from volunteer subjects and later analyzing the blood. Behavioral characteristics, both personal and organizational, were gathered and examined in an attempt to identify the individuals' behavior pattern, and to identify the various antecedents and components of stress. Subsequently, during the analysis phase of this research, the physiological and behavioral data were compared.

This comparison of physiological and behavioral data is a vital element of this research. Many other stress-related research efforts merely collected and assessed either behavioral or physiological data; therefore, the results of such efforts do not provide a very comprehensive assessment of the relationships between behavior, stress, and an individual's health. The marriage of behavioral and physiological data in the same study is both unique (in comparison to other research efforts) and critically needed to provide a more accurate assessment of the relationships between individual characteristics, organizational stress, and what is recognized

as the most serious illness confronting man today, coronary heart disease.

The content and format of this thesis is as follows. Chapter 2 will provide a review of the literature concerning the concepts and variables relevant to this research. In addition, the second chapter concludes with a brief description of the research hypotheses. The research methodology will be described in the third chapter and the research results will be presented in Chapter 4. Finally, the fifth chapter will consist of a summary of the study and conclusions.

# CHAPTER 2

## LITERATURE REVIEW, AND RESEARCH HYPOTHESES AND QUESTIONS

The purpose of this literature review is to describe the Type A and Type B behavior patterns and to assess the research regarding the relationship between behavior pattern and coronary heart disease. This review also assesses research regarding behavior pattern and stress, and behavior pattern and other variables related to either heart disease or stress. These "other" variables include cholesterol, cortisol, role ambiguity, and locus of control. Within this literature review, the major emphasis is placed on research which explored the relationship between behavior pattern and heart disease, and on research which analyzed the relationship between behavior pattern and stress. Cholesterol and cortisol literature is reviewed because these variables are believed to be linked with heart disease and felt stress, respectively. These variables may also be linked with behavior pattern. Role ambiguity research is reviewed because role ambiguity is a stressor which may link behavior pattern to stress. Finally, locus of control is examined because it also may link behavior pattern to coronary heart disease. Following this literature review, the research

hypotheses and questions of this study are presented and discussed.

## Type A and Type B Behavior Defined

It is important to begin this literature review by further describing the Type A and Type B behavior pattern constructs. These constructs were formulated by two cardiologists, Ray Rosenman and Meyer Friedman (1974). These two doctors have completed many studies concerning the roles of behavior pattern and the central nervous system in producing coronary heart disease.

The Type A behavior pattern was originally conceptualized as an individual personality trait which interacted with environmental stressors; however, it is now seen as a style of response to the events of daily life (Chesney and Rosenman, 1982). The following definition by Jenkins et al. (1979:3) has guided research on the Type A behavior pattern.

> The Type A behavior pattern is considered to be an overt behavioral syndrome or style of living characterized by *extremes* of competitiveness, striving for achievement, aggressiveness (sometimes stringently repressed), haste, impatience, restlessness, hyperalertness, explosiveness of speech, tenseness of facial muscles, and feelings of being under the pressure of time and under the challenge of responsibility. Persons having this pattern are often so deeply committed to their vocation or profession that other aspects of their lives are relatively neglected. Not all aspects of this syndrome or pattern need be present for a person to be classified as possessing it. The pattern is neither a personality trait nor a standard reaction to a challenging situation, but rather the reaction of a characterologically predisposed person to a situation that

challenges him or her. Different kinds of situations evoke maximal reactions from different persons.

The converse of Type A behavior is Type B behavior. Chesney and Rosenman (1982) state that the Type B pattern was originally conceptualized as the absence of Type A behavior. However, research has shown Type B persons to be more introverted, relaxed, deferent, and patient than Type A persons. Type B persons also exhibit unhurried behavior and, unlike Type A persons, they rarely become caught in a struggle to achieve despite the environmental constraints. While Type B persons might be interested in personal progress and achievement, they tend to take on events as they occur (Jenkins et al., 1979). For these reasons, the Type B behavior pattern represents an alternative style of responding to, and coping with, environmental challenges.

## Assessing the Coronary-Prone Behavior Pattern

The two most commonly used methods for assessing behavior pattern are the "Structured Interview" and the Jenkins Activity Survey (JAS) (Dembroski, Caffrey, Jenkins, Rosenman, Spielberger, and Tasto, 1978a). The Structured Interview is a structured challenge situation in which behavior pattern is assessed based mainly on the voice stylistics and mannerisms of the respondent. The JAS is a self-administered, machine-scored questionnaire which yields scores for Type A behavior and three subscales. The JAS is the questionnaire most frequently used for assessing Type A

behavior (Chesney and Rosenman, 1982), and it is one of the assessment devices used in this study. For this reason, research pertaining to the JAS is emphasized in this literature review.

## Dimensions of the JAS Type A Behavior Pattern

Factor analysis has identified three major dimensions of the Type A behavior pattern tapped by the JAS (Jenkins et al., 1979). These factor dimensions, labeled as speed and impatience, job involvement, and hard driving and competitive, are described as follows.

Speed and impatience relates with time urgency and is demonstrated by the behavioral style of the Type A person. Persons scoring high on this factor tend to eat rapidly, hurry others along, become impatient with the conversation of others, have strong tempers, and become irritated easily.

The job involvement factor indicates the degree of dedication a person has for his or her job. Persons scoring high on this factor usually report having challenging, high-pressure jobs. These persons work more overtime, confront important deadlines, and prefer promotion to pay. This factor relates to the type of environment which is conducive for Type A behavior.

Persons scoring high on the hard driving and competitive factor see themselves as being hard driving, conscientious, responsible, competitive, and putting forth more

effort than others. This factor describes the traits and values associated with Type A behavior.

Analysis of the factors suggest that they make independent contributions to the assessment of Type A behavior.

## Coronary Heart Disease and Behavior Pattern

A great deal of research has focused on the relationship oetween behavior pattern and coronary heart disease. The research has generally found that Type A individuals demonstrate a higher risk of coronary heart disease.

The initial and probably most comprehensive effort to measure the degree of association between behavior pattern and coronary heart disease began with the Western Collaborative Group Study (WCGS). Rosenman, Friedman, Straus, Wurn, Kositchek, Hahn, and Werthessen (1964) describe the WCGS as a prospective epidemiological study conducted initially between 1960 and 1961, involving 3,524 men who worked in 11 California corporations. This effort not only examined Types A and B behavior, but also assessed other "traditional" risk factors commonly associated with coronary heart disease. These "traditional" risk factors included age, family history of heart disease, cigarette smoking, serum cholesterol, and blood pressure. To identify differences that might be due to age, the men were divided into two groups according to their age. The younger group included men with ages ranging between 39 and 49; the older group included men with ages ranging between 50 and 59. Subsequently,

additional data were collected at periodic intervals until 1969, thus providing eight and one-half years of follow-up study.

Initially, the study by Rosenman et al. (1964) found a strong association between the Type A behavior pattern and coronary heart disease. The researchers found the incidence of already present heart disease in the Type A men to be 45.2 per 1,000 men. In contrast, the incidence of already present heart disease in Type B men was only 20.1 per 1,000 men. It was determined that the Type A men were more prone than Type B men to suffer from coronary heart disease by a ratio of 2.21 to 1.

In order to better measure the degree of association between the coronary-prone behavior pattern and coronary heart disease, Jenkins, Rosenman, and Zyzanski (1974) developed a standardized component scale for assessing the WCGS data. The scale was standardized for the population to have a mean of zero, with positive scores (greater than zero) indicating Type A behavior and negative scores indicating Type B behavior. The men who subsequently developed coronary heart disease, after the initial WCGS testing, scored an average of +1.70 on the scale. In comparison, a control group's average score was slightly less than zero. Also, the rate of new coronary heart disease was highest among men with scores greater than +5.0 and lowest among men with scores less than -5.0. This finding suggests that the more

extreme Type A individuals have a higher risk of coronary heart disease and that the more extreme Type B individuals have a lower heart disease risk.

The eight and one-half year follow-up study by Rosenman, Brand, Sholtz, and Friedman (1976) also found support for the positive relationship between Type A behavior and coronary heart disease. This follow-up study included over 90 percent of the original participants of the WCGS. The researchers used a multiple regression procedure which statistically controlled for 12 other risk factors. Even with the other risk factors taken into account, the results indicated a strong association between Type A behavior and coronary heart disease. The data revealed that the Type A behavior pattern was the second strongest predictor of coronary heart disease for the younger age group (cholesterol being the most predictive), while for the older age group Type A behavior was the strongest predictor. The researchers concluded that the direct, positive effects of Type A behavior on the incidence of coronary heart disease was greater than the effects of other traditional risk factors.

In order to verify the findings of the WCGS, Brand, Rosenman, Sholtz, and Friedman (1976) compared WCGS data with data obtained from the Framingham Heart Study. Even though there were some differences in the design of the two studies, the risk factors examined were the same allowing for good

comparison of the two studies. The researchers found, using the multiple regression equations derived from the WCGS analyses, that the coronary heart disease predictions for participants of both the WCGS and Framingham studies showed very good agreement. Their analyses reaffirmed the findings of earlier studies, indicating that the Type A behavior pattern is directly associated with heart disease. Further, Type A behavior did not diminish as a risk factor in older men compared to younger men. The researchers determined that Type A men generally experience twice the risk of contracting coronary heart disease than do Type B men.

In addition to the previously identified research, four studies reported by Jenkins et al. (1979), two reported by Zyzanski (1978), and three reported by Schekelle, Schoenberger, and Stameler (1976) have identified a positive association between Type A behavior and coronary heart disease. Thus, at least nine retrospective studies support the findings of the WCGS.

In contrast with these studies, two major studies did not find a strong relationship between Type A behavior and coronary heart disease. In one study, Schekelle et al. (1976) surveyed 4,108 men and women in the Chicago Heart Association Detection Project. The JAS was used, and like the WCGS, the study attempted to determine the correlation between Type A score and risk of coronary heart disease. The researchers concluded that, within their population, there

was no apparent correlation between the JAS Type A score and the predictive probability of developing heart disease as estimated by risk factors. These factors included age, systolic blood pressure, diastolic blood pressure, serum cholesterol, and cigarette smoking. The researchers offered two possible explanations for these results. One was that Type A score is unrelated to heart disease. Second, the association between Type A behavior and coronary heart disease could be due to the correlation of behavior pattern with some other risk factor. These possibilities, however, seriously conflict with the results of the WCGS, where Type A behavior as measured by the JAS was found to be significantly associated with heart disease, even when other risk factors were taken into account (Rosenman et al., 1976).

The other study, which found a limited relationship between coronary heart disease and Type A behavior, was the Belgian Heart Disease Project. In this study by Kornitzer, Kittel, DeBacker, and Dramaix (1981), the JAS was used to obtain data from 19,380 men aged 40-59. With other risk factors taken into account, the researchers found a significant relationship between Type A behavior and coronary heart disease only for those subjects suffering from angina pectoris (heart disease involving chest pain) or with electrocardiogram abnormalities. The researchers proposed that Type A behavior could be an outcome of coronary heart disease rather than an antecedent risk factor. In other words,

coronary diseased men could develop the behavior pattern after they become aware of the disease.

In summary, with the exception of the studies by Schekelle et al. (1976) and Kornitzer et al. (1981), the research overwhelmingly supports the premise that the Type A behavior pattern is related to coronary heart disease. The WCGS, which found a strong association between Type A behavior and coronary heart disease, is the "cornerstone" of research pertaining to behavior pattern. Regarding the vitality of the WCGS, Rowland and Sokol (1979:29) state:

> . . . because of its superior design and large number of subjects, the Western Collaboratove Group Study has distinguished research on the coronary-prone behavior pattern from all other research relating psychological variables to CHD [coronary heart disease].

In addition, the WCGS was prospective in design, thereby providing greater support for its findings. Concerning these findings, Rosenman et al. (1976:908) state that they,

> . . . indicate the presence of a direct relation of Type A behavior to the incidence of coronary heart disease in addition to any impact the behavior pattern may have by increasing levels of traditional risk factors.

The WCGS research indicates that Type A individuals have about twice as great a risk of developing coronary heart disease than do Type B individuals. Furthermore, the evidence indicates that the magnitude of risk is greatest for the more extreme Type A individuals but is smallest for the more extreme Type B individuals. Also, in retrospective studies, subjects with already present coronary heart disease

have repeatedly been found more likely to possess the Type A behavior pattern than control subjects (Rowland and Sokol, 1977). Thus, the predominance of research supports the premise that behavior pattern is strongly related to the incidence of coronary heart disease.

## Coronary Heart Disease and the JAS Dimensions

Research has also assessed the relationship between the dimensions of Type A behavior and coronary heart disease. Analysis pertaining to the dimensions has primarily involved data from the WCGS. Matthews, Glass, Rosenman, and Bortner (1977) completed additional analysis of WCGS data based on a subsample of 63 coronary diseased men. Each of these diseased men were matched with two disease-free, control subjects. This study differed from other studies in that the data was based on the interview method rather than the JAS. The results of factor analysis indicated that Type A behavior could be described in terms of five factors. Two of these factors, "competitive drive," which is similar to the JAS hard driving and competitive dimension, and "impatience," which is similar to the JAS speed and impatience dimension, were significantly associated with the later onset of coronary heart disease. From these results, the researchers theorized that the high competitive drive characteristic could cause Type A individuals to seek an ever expanding range of goals and achievements. The fact that these

individuals often lack the environmental control necessary for attaining these goals, coupled with the impatience factor, may cause Type A individuals to experience anxiety, thereby increasing the risk of coronary heart disease.

Findings similar to those of Matthews et al. (1977), however, have not been replicated. For example, Jenkins et al. (1974), in analyzing the WCGS data, found none of the JAS dimensions predictive of coronary heart disease. Similarly, in another analysis of WCGS data, Jenkins et al. (1976) found no significant relationship between the JAS factors and recurrent coronary heart disease. According to Jenkins et al. (1979), the three JAS dimensions have been repeatedly tested and found to be unrelated to most coronary heart disease risk factors. The results of these research efforts suggest that the findings obtained by Matthews et al. (1977) departed from the norm. In explaining why Type A behavior is associated with heart disease while its component dimensions are not, Jenkins et al. (1976) said that it is a combination of behaviors (associated with the dimensions), and perhaps a synergistic effect, which reacts with the central nervous system to link Type A behavior with coronary heart disease.

## Cholesterol, Heart Disease, and Behavior Pattern

### The Link Between Cholesterol and Coronary Heart Disease.

According to Friedman and Rosenman (1974), there are few investigators who are not convinced that cholesterol plays a

major role in causing coronary artery disease. They state that, in general, the higher the plasma cholesterol level of a person, the more likely the person will experience some form of coronary heart disease. This latter statement is supported by the findings of the WCGS (Rosenman et al., 1966) and the Framingham Study (Brand et al., 1976).

Fye and Staton (1981) reviewed research regarding cholesterol, coronary heart disease, and stress. Their review indicated that one type of cholesterol, HDL cholesterol (HDL), was inversely related to the incidence of coronary heart disease. In attempting to clarify the relationship among coronary heart disease, cholesterol, and HDL, they interviewed Dr. George Troxler fo the School of Aerospace Medicine, Brooks Air Force Base. Dr. Troxler, as cited by Fye and Staton (1981:60), stated that he,

> . . . believes that a ratio of total cholesterol over HDL cholesterol is strongly related to risk of coronary heart disease. The higher the value resulting from dividing total cholesterol by HDL cholesterol, the greater the risk of coronary heart disease.

Therefore, cholesterol, HDL, and the ratio obtained by dividing cholesterol by HDL (ratio) might be related to coronary heart disease and each could be used as indicators of heart disease.

Fye and Staton (1981) also reviewed literature pertaining to cholesterol and stress. They concluded that psychological stress affects a person's cholesterol level. They proposed that increased stress causes the body to

release greater levels of cholesterol, consequently increasing the incidence of coronary heart disease.

The Relationship Between Cholesterol and Behavior Pattern. Type A behavior appears to be related to cholesterol levels. Concerning this issue, Friedman and Rosenman (1974:75) state, ". . . there is no question about the fact that the serum cholesterol level may vary directly with the intensity of the Type A Behavior Pattern." This statement is primarily based on a study of the serum cholesterol levels of a group of accountants from January to June. The researchers found that as the April 15 tax deadline approached, and as the sense of time urgency increased (time urgency is a major component of Type A behavior), the level of cholesterol increased. Conversely, in May and June, when the accountants' sense of time urgency decreased, the serum cholesterol levels fell. Rosenman and Friedman (1974) concluded that the changes in serum cholesterol could only be attributed to emotional stress, since the accountants' eating, smoking, and exercise habits were unchanged during the study.

Four other studies were reviewed which assessed the relationship between Type A behavior and cholesterol. Three of these studies provided some support for the notion that a relationship does exist between these two variables; one provided no support. Blumenthal, Williams, Kong, Shanberg, and Thompson (1978) determined that Type A patients had a significantly higher mean serum cholesterol

level than Type B patients. This difference remained significant when the two means were adjusted for sex and age. It is also worth noting that the study found a significant association between serum cholesterol and the severity of coronary disease. In research by Schekelle et al. (1976), concentrations of serum cholesterol demonstrated a weak but statistically significant relationship with the JAS Type A score for men with ages ranging between 24 and 44 years. No such relationship was found for the men with ages ranging between 45 and 64 years or the women in the sample population. Lovallo and Pishkin (1980) found no differences between Type A and Type B subjects when comparing baseline and post-test cholesterol levels after stress had been induced. However, when the most extreme Type A subjects were compared with the most extreme Type B subjects, the Type A subjects had significantly higher baseline and post-test cholesterol levels. Heller (1979), in contrast, found no significant relationship between plasma cholesterol and the Bortner Type A score. This later finding may have occurred because his sample population consisted of British men, or because the Bortner score was used.

From these studies, it can be concluded that, generally, there is a relationship between Type A personality and cholesterol level. The findings also indicate that there may be some factors which limit this relationship, and that for some populations the relationship might not exist at all. One limitation might be that only the most extreme Type A

individuals experience higher serum cholesterol levels. It is also possible that age moderates the relationship between cholesterol and Type A behavior. Finally, there is support for the premise that Type A behavior, perhaps due to some linkage with stress, triggers physiological reactions which cause higher cholesterol levels, thereby increasing the risk of coronary heart disease in Type A individuals.

## Cortisol and Behavior Pattern

Cortisol and Stress. It is believed that the cortisol levels are related to felt stress (stress causing changes in physiological states) and that as stress increases, the level of cortisol in the blood increases. Two studies were reviewed which examined the relationship between cortisol and stress. In the first study, Brown, Schalch, and Reichlin (1971) studied the effects of stress induced in 11 squirrel monkeys. Squirrel monkeys were used in this research due to the similarity of many of their physiological systems with those of humans. The stress was induced by restraining the monkeys in a chair (moderate stress) and by electrical shock (acute stress). The monkeys' plasma cortisol levels were measured during rest and following the stress induced conditions. The results revealed that the monkeys' plasma cortisol levels were significantly higher after they had been placed in the restraining chair than when the monkeys were at rest. The monkeys' cortisol levels in response to the electrical

shock did not show any increase over the levels when the monkeys were placed in the restraining chair. This finding suggests that (if it is accepted that squirrel monkeys respond similarly to humans) cortisol levels increase until a certain level of stress is reached.

In the second study, by Rubin, Rahe, Clark, and Arthur (1970), the cortisol levels of 20 men were recorded at various times as the men participated in the physiologically and psychologically stressful Navy underwater team training (UDT) course. In assessing their data, Rubin et al. (1970:817) concluded, "The intensity of the overall stress of UDT was best reflected by the elevated mean cortisol levels of all the men." These researchers strongly believed that the increased cortisol levels were reflective of felt stress levels.

In summary, these two studies suggest that cortisol levels increase when stress is felt. For this reason, cortisol is used in this study as the indicator of felt stress.

The Relationship Between Cortisol and Behavior Pattern. Lundbert and Forsman (1979) assessed the behavior pattern and cortisol levels of individuals engaged in understimulating and overstimulating conditions. Understimulation was induced by having the individuals watch nonengaging movies. Overstimulation was induced by having the individuals perform a "color-word conflict task" and a reasoning task. The

findings showed that cortisol baseline levels were about the same for the Type A and Type B subjects. While not statistically significant, the Type A subjects had higher cortisol excretion levels during understimulation and lower excretion levels during overstimulation than the Type B subjects. In comparing the differences between the understimulated and overstimulated conditions, the cortisol levels of the Type A subjects were significantly higher during understimulation than for overstimulation. For the Type B subjects, there were no significant differences between the two conditions. These findings indicate that Type A individuals have higher cortisol levels when not stressed (understimulation) than when slightly stressed (overstimulation). From this, it can be inferred that Type A individuals are more distressed and more physiologically aroused than Type B persons during inactivity but not during mental work.

Stress and Behavior Pattern

Much research has assessed the relationship between Type A and Type B behavior and stress. As a result, this section is divided into three subsections. The first subsection addresses research regarding induced, controllable and uncontrollable stress and Type A behavior. Research examining the physiological differences of Type A and Type B subjects exposed to induced stress is assessed in the second subsection. The final subsection addresses four "other" studies which examine stress and behavior pattern. In most

of the experiments discussed in this section, stress was induced by exposing subjects to a challenging task or to an adversive noise. Additionally, most of the subjects in these experiments were students, and, therefore, the applicability of the results to another population, such as managers and administrators, might be limited.

Controllable and Uncontrollable Stress, and Behavior Pattern. Glass (1977) has examined the relationship between behavior pattern and uncontrollable stress in order to identify ways in which the Type A behavior pattern and stress adversely affect the cardiovascular system. He describes the Type A behavior pattern as a style of responding to environmental stressors which threaten an individual's sense of control. In comparison to Type B individuals, Types A are motivated, at least initially, to master stressful situations which they perceive as signifying a lack of control. Type A individuals, thus, are engaged in a struggle for control, whereas Type B individuals are generally free of such concerns, and of Type A behavior traits and of their possible adverse effects.

Glass (1977) cites several studies to support his suppositions. In one study, 20 Type A and 20 Type B subjects were exposed to noise bursts while performing a reaction time task. Initially, the Type A subjects were slower in performing the task than the Type B subjects. However, the threat of uncontrollable noise (stress) appeared to motivate

the Type A subjects to respond more rapidly to the reaction time task. In comparison, the performance of the Type B subjects decreased due to the threat of uncontrollable noise, possibly due to a drop in motivation. These results were replicated in another experiment in which a perceived lack of control was induced by providing positive and negative reinforcements to subjects attempting to solve two cognitive problems. The results showed that enhanced performance among Type A subjects occurred after exposure to uncontrollable stress. From these two studies, Glass (1977) proposes that Type A behavior emerges in response to perceived threats to external control. It appears that Type A behavior is a way of coping with uncontrollable stress, and enhanced performing reflects an attempt by Type A persons to maintain control in response to the threat. This enhanced responding to uncontrollable stressors must, in the long run, prove to be ineffective because the extended exposure to the stress will eventually lead to the perception that no relationship exists between the responses and the outcomes. For Type A persons, the enhanced responding might be explained by the needs of Type A persons (competitive, hard driving, time urgent) to demonstrate a better performance while undergoing the stressful conditions. Thus, there is a complex relationship in which stress level mediates the reaction of Type A individuals.

Glass (1978) has proposed a biobehavioral model which includes the aforementioned aspects of stress and behavior pattern and explains the possible impact on coronary heart disease. He states that Type A individuals alternate between actively coping and giving up when confronted with stress, and they do so more frequently and more intensely than Type B individuals. Coronary heart disease might be influenced by this cycle of hyperactivity. Therefore, the greater incidence of coronary heart disease among Type A individuals might be a result of physiological responses in reaction to the interrelation between Type A behavior and uncontrollable stress.

Induced Stress and Behavior Pattern; The Physiological Differences Between Type A and Type B Individuals. Five studies are reviewed which assess the physiological differences between Type A and B individuals exposed to induced stress. These research efforts were conducted primarily because other research has suggested that stress may trigger physiological responses in Type A persons, thereby enhancing the possibility of coronary heart disease. These responses may involve traditional risk factors such as cholesterol and blood pressure; these and other physiological factors were examined in the studies which follow. In essence, these research efforts examined the physiological differences between stressed Type A and Type B persons to determine whether

interpersonal exchanges than Type B women. In addition to the increases in systolic blood pressure during the adversive exchange, the Type A women had significantly higher baseline levels. The researchers believed that this latter difference could be attributed to a greater reaction to (uncontrollable) ancillary stress, caused, in this instance, by waiting alone in an isolation room and uncertainty about upcoming events, rather than actual differences in baseline blood pressure levels. A third finding was a negative correlation between Type A score and heart rate change observed during a reaction time task. An explanation offered by the researchers was that the smaller heart rate increase may have indicated a greater degree of task involvement by the Type A subjects; this explanation is similar to one proposed by Pittner and Houston (1980).

Goldbland (1980), in examining 231 students, found that Type A students, under stressful and neutral conditions, had significant increases in pulse transit time (blood pressure decreases), whereas Type B students provided no such response. The task which elicited this behavior contained elements of competition, time urgency, and loss of control. According to Goldbland (1980:676), this result supports the proposition that ". . . the risk associated with Type A behavior is specific to certain types of environmental stressors." This indicates that Type A individuals may be most sensitive to external determinants of stress in a task.

those differences affect or mediate the relationship between behavior pattern and coronary heart disease.

Pittner and Houston (1980) evaluated the responses and performance of 218 male undergraduate students in work situations where various stress levels were induced. The Type A students responded to the work with greater physiological arousal, as measured by pulse rate, than did the Type B students. This result may have occurred because the Type A students applied greater effort on the tasks. However, if the Type A students did try harder, the researchers noted that their efforts did not result in better performance. It was also found that the Type A students demonstrated greater psychophysiological arousal (higher systolic and diastolic blood pressure) while in the high stress situation when compared to their baseline levels or the Type B students exposed to high stress. The baseline levels for both types were not statistically different. The researchers concluded that Type A persons may experience chronic sympathetic arousal and that when they are distressed, their reactions are to try to cope with the situation. This may lead Type A individuals to endure stress for longer periods than Type B individuals even though the Type A's manifest greater psychophysiological arousal. This, in turn, might explain why Type A individuals experience a higher incidence of coronary heart disease.

A study by Weidner and Matthews (1978) also found some physiological differences between Type A and Type B subjects in response to stressful situations. In evaluating the responses of 120 female students, they noted that the Type A students showed increased blood pressure and decreased hand temperature when compared to the Type B students in response to a moderately stressful situation. There were, however, no differences between the two types in the control and high stress situations. . The researchers drew no particular conclusions from this data. One explanation might be that as the Type A individual attempts to cope with a stressful situation, their physiological reactions increase, but as they give up coping in the face of higher stress levels, their physiological reactions decrease.

Other studies have not detected as great a relationship between physiological mechanisms and Type A behavior. MacDougall, Dembroski, and Krantz (1981) conducted two experiments with women in which the women were observed while performing difficult, perhaps stressful, tasks. Unlike Pittner and Houston (1980) , the findings suggest that Type A women do not experience elevated heart rate and blood pressure responses when participating in a stressful task. One exception in the second experiment was that Type A women demonstrated significantly greater increases in systolic blood pressure in response to a verbally challenging female. Thus, Type A women may be more challenged by adversive

In contrast with this finding and with the previously described research, there were no physiological differences between Type A and Type B students while exposed to the stress condition. This result may have occurred because the Type A students were not sufficiently stressed. The research indicated Type A individuals under-responsive to low level stress but over-responsive to high stress demands. Goldbland (1980:677) suggests that Type A individuals, therefore, "may abruptly switch into an overaroused state [with greater physiological reaction], which may be maintained through severe stress." This latter finding agrees with one of Weidner and Matthews' (1980) conclusions that Type A individuals may endure stress for longer periods than Type B individuals.

In another study of this type, Lovallo and Pishkin (1980) examined 80 students as the students performed three tasks. Stress was induced through the occurrence of noise bursts, failure in a task, and noise combined with task failure. There were no differences detected before or during the tasks between the Type A and Type B students regarding heart rate and blood pressure. Also, no differences were noted between Type A and Type B subjects in comparing baseline and post-task cholesterol levels. However, when the nine most extreme Type A students were compared with the 23 most extreme Type B students, the Type A students had significantly higher post-task cholesterol

levels than Type B students. This finding indicates that perhaps only extreme Type A individuals are more likely to demonstrate physiological reactions in response to stressful conditions.

These five studies, which examined induced stress, physiological reactions, and behavior pattern, produced highly varied and somewhat conflicting results. Each of the studies found some differences in the physiological reactions of Type A and Type B subjects exposed to stress, but there was no consistent trend. Only the study by Pittner and Houston (1980) found significantly greater increases in many of the physiological reactions of Type A subjects. The other studies found varying degrees of physiological reaction by Type A subjects and these reactions were not consistent. For example, Pittner and Houston (1980:155) noted "that the differences in psychophysiological arousal between Type A and B subjects were more pronounced under high stress than under low stress." Weidner and Matthews (1978), in comparison, found differences between the two types under moderate stress conditions but not under high stress conditions. These differences may have resulted because of differences in the types of stress induced or because of differences in the conditions under which the stresses were induced. Another conflict is evident when comparing the results of Pittner and Houston (1980), Weidner and Matthews (1980), and Goldbland (1980). The first two research groups found that

Type A subjects experience significant blood pressure increases while experiencing stress when compared to baseline levels. Goldbland (1980), however, found that the Type A subjects experienced blood pressure decreases. There is no apparent explanation for this difference, but it is interesting that both Pittner and Houston (1980) and Goldbland (1980) concluded that Type A subjects might be more coronary prone because of their physiological reactions. The most apparent difference regarding the results of these studies is the range of physiological reaction by Type A individuals to stress. Again, these differences could be due to differences in experiment design or the type of stress induced.

Despite these varied results, the following conclusions are drawn from the research. Based on the research by Weidner and Matthews (1978), and Pittner and Houston (1980), and drawing upon Glass's (1977) work, it is anticipated that Type A individuals will experience greater physiological reactions, increased blood pressure, heart rate, and cholesterol level, when exposed to stress. These reactions will persist as long as the individual attempts to overcome the stress and increase as the stress level increases. When the stress level increases to a point where it becomes apparent that the stress cannot be overcome, the individual will give up and his/her physiological reactions will decrease. However, as indicated by Goldbland (1980), the increase in reactions may be specific to certain types of external

stressors. Therefore, stressors which relate with the Type A individual's competitive drive, job involvement, time urgency, or impatience factors might elicit the greatest physiological reactions. Finally, as suggested by Lovallo and Pishkin (1980), the responses will be greatest among the most extreme Type A individuals and the least among the most extreme Type B individuals.

Other Studies: Stress and Behavior Pattern. Four other studies, dissimilar from the previous studies, have assessed the relationship between stress and behavior pattern. The first examined the Type A individual's preference to work alone while under stress-induced conditions. The next two studies examined perceived stress and behavior pattern, and the last study assessed the reaction of Type A individuals under actual stressful conditions.

Dembroski and MacDougall (1978) found that Type A subjects, in a work situation, displayed a significantly greater preference to work alone during stressful situations than did Type B subjects. The researchers theorized that the strong preference for working alone may impose additional stress by increasing an individual's workload or responsibility. In support of this hypothesis, it was found that the Type A individuals did impose greater workloads and work pressures on themselves. Such behavior, therefore, may increase felt stress by reducing the opportunities for help

and support from co-workers. The researchers concluded that stress might be reduced if Type A individuals would work with others more often and without interpersonal conflict or competition.

Davidson, Cooper, and Chamberlain (1980) examined perceived stress in 180 female managers and administrators. The data revealed that Type A individuals demonstrate anxiety, and increased physiological arousal when faced with situations which are perceived as being stressful. Also, the Type A females perceived having higher stress levels than their colleagues. The researchers concluded that Type A females may be more prone to higher stress levels and to stress-related illness.

Koskenvuo, Kaprio, Langinvaninio, Romo, and Sarna (1981), in a study of 11,364 Finnish adults, found that the Type A persons considered their daily activities (including work activities) to be more stressful than did the Type B persons.

The effects of a stressful situation were assessed by Caplan and Jones (1975). They observed individuals using the main computer at a large university at the end of an academic term. The researchers determined that stress had its greatest effects on strain in the Type A person. This conclusion was reached because the correlation between changes in workload and changes in anxiety was greater for Type A

persons than for Type B persons. This conclusion agrees with the results obtained by Davis, Cooper, and Chamberlain (1980).

From these studies, it can be concluded that the Type A individuals' desire to work alone may cause them to experience more stress. Additionally, Type A individuals perceive themselves as experiencing higher stress levels, and the effects of stress might be greater in Type A persons.

## Role Ambiguity and Behavior Pattern

Research pertaining to role ambiguity and behavior pattern is reviewed because role ambiguity is a stressor which may moderate the relationship between behavior pattern and stress. First, role ambiguity is defined.

Role Ambiguity. Role ambiguity occurs when a person lacks the information necessary for performing in a job role (Albanese, 1981). Due to this lack of information, the person performing the job experiences uncertainty about his role requirements and role expectations. This uncertainty, as a result, can be a major source of stress and tension in individuals (Beehr and Newman, 1978; Caplan and Jones, 1975; Matteson and Ivancevich, 1979).

The Relationship Between Role Ambiguity and Behavior Pattern. The research reviewed did not reveal a direct relationship between behavior pattern and ambiguity. Howard et al. (1977) found no significant differences regarding perceived

ambiguity between Type A and Type B persons. Burke and Weir (1980) found little correlation ($r = .01$ and not significant) between the degree of Type A behavior and role ambiguity. Keenan and McBain (1979), however, did find that there was a significantly stronger association between role ambiguity and dissatisfaction for Type A persons than for Type B persons. The Type A persons also showed a higher, but not significantly higher, association between ambiguity and tension. It can be concluded that Type A individuals, when placed in ambiguous situations, will experience greater dissatisfaction and perceive greater stress.

## Locus of Control and Behavior Pattern

Locus of control, like behavior pattern, is identified by Matteson and Ivancevich (1979) as one of the differences within individuals which may moderate the stress-coronary heart disease relationship. Research pertaining to locus of control is reviewed because locus may interact with Type A behavior in moderating the stress-coronary heart disease relationship. First, locus of control is defined.

Locus of Control. Rotter (1966) developed the locus of control construct, and this construct has two components: internal control and external control. Internal locus of control refers to individuals who believe that reinforcements and reward are contingent upon their own behavior, characteristics, or abilities. External locus of control refers to

individuals who believe that reinforcements and rewards are not contingent upon their behavior or attitudes but are controlled by outside forces such as luck, chance, fate, or powerful persons. Fye and Staton (1981) reviewed research which identified a positive relationship between stress, perceived stress, and external locus of control.

The Relationship Between Locus of Control and Behavior Pattern. Two studies examined the relationships regarding behavior pattern and locus of control. In the first study, Nowack and Sassenrath (1980) found that extreme Type A persons having an external locus of control had higher anxiety levels than did other groups. There were no significant differences between the other groups, Type A internals, Type B internals, and Type B externals. Also, the Type B internals had the lowest, although nonsignificant, anxiety levels. The researchers concluded that the Type A externals, due to their feelings of anxiety, might be more prone to coronary heart disease.

In the second study, Manuck, Craft, and Gold (1978) examined behavior pattern and locus of control as variables which might influence the incidence of coronary heart disease. To accomplish this, the researchers assessed differences in blood pressure, heart rate, and state anxiety for subjects required to perform a cognitive test. The findings indicated that the Type A subjects had significantly greater systolic blood pressure increases during the task than did the Type B

persons. In comparison, there were no significant differences in systolic blood pressure between the internals and externals. From these findings, the researchers concluded that behavior pattern was a stronger predictor of systolic blood pressure response than was locus of control. From this conclusion it might be inferred that behavior pattern is a better predictor of coronary heart disease than is locus of control.

In summary, these studies identify two different possibilities regarding behavior pattern and locus of control. First, Type A externals may be more coronary prone than others. Second, behavior pattern might be a better predictor of coronary heart disease than locus of control.

## Research Hypotheses and Questions

The preceding review of literature in conjunction with the research objectives indicated in Chapter 1 have resulted in the formulation of the following research hypotheses and questions.

$H_1$ : Type A personality will be significantly and positively related to the predictors of coronary heart disease (cholesterol, HDL cholesterol, and the ratio of cholesterol divided by HDL cholesterol).

This hypothesis is based on the findings of the WCGS (e.g., Jenkins et al., 1974; Rosenman et al., 1966; Rosenman et al., 1976), and the retrospective studies (Rowland and Sokol, 1977)

which have identified a positive relationship between behavior pattern and coronary heart disease. Additionally, research has generally shown that there is a relationship between behavior pattern and cholesterol (e.g., Blumenthal et al., 1978; Friedman and Rosenman, 1974).

$H_2$ : Type A persons will exhibit higher felt stress levels by having higher cortisol levels than Type B persons.

Glass's (1977) research provides the foundation for this hypothesis. Since Type A persons attempt to maintain control of uncontrollable stress for longer periods of time than Type B persons, it is believed that the Type A persons will have higher cortisol levels. The research by Dembroski and MacDougall (1978), Pittner and Houston (1980), and Caplan and Jones (1975) also suggests support for this hypothesis.

$H_3$ : Type A persons will report higher perceived job stress levels than Type B persons.

The research by Davidson et al. (1980) and Kosenvou et al. (1981) suggests support for this hypothesis. These studies identified higher perceived work stress and higher perceived stress in daily activities among Type A individuals.

$H_4$ : Type A behavior will moderate the relationship between role ambiguity and perceived stress.

This hypothesis is based on the conclusion drawn from Keenan and McBain (1979) that Type A persons in ambiguous situations would experience greater stress.

$H_5$ : Type A behavior will moderate the relationship between perceived stress and external locus of control.

This hypothesis is derived from the work of Nowack and Sassenrath (1980). They found that Type A persons having an external locus of control had significantly higher anxiety levels than others. Anxiety is considered one of the consequences of stress.

Research Question One. Is behavior pattern one of the more significant predictors of coronary heart disease?

Rosenman et al. (1976) found a highly significant relationship between the Type A behavior pattern and coronary heart disease even when 12 other "risk" factors were statistically taken into account. This research question is proposed to test this finding.

Research Question Two. Is behavior pattern a more significant predictor of coronary heart disease than locus of control?

The question will be assessed in order to evaluate the conclusion drawn from Manuck et al. (1978) that Type A behavior is a better predictor of coronary heart disease than locus of control.

Research Question Three. Does behavior pattern moderate the relationship between coronary heart disease and stress?

Several researchers propose that stress is positively related to coronary heart disease and that behavior pattern moderates this relationship (e.g., Cooper and Marshall, 1976; Matteson and Ivancevich, 1979). It is possible that Type A individuals, when confronted with adverse situations, are more greatly stressed than others due to their desire to control those situations.

Research Question Four. Is behavior pattern one of the more significant predictors of stress (stress as indicated by cortisol levels)?

This question will be assessed, primarily, to determine whether or not Type A behavior influences stress levels after other factors are taken into account.

Research Question Five. Is behavior pattern one of the more significant predictors of perceived job stress?

This question will be examined to more fully assess the findings of Davidson et al. (1980) and Kosenvou et al. (1981) that behavior pattern is related to perceived stress.

The methods employed to test these hypotheses and research questions will be described in the following chapter.

# CHAPTER 3

# RESEARCH DESIGN

## General Design

The major objective of this research is to examine the relationships among behavior pattern, coronary heart disease, stress, and other related variables. Behavior pattern, perceived stress, and variables associated with stress and heart disease were measured by using questionnaires. The coronary heart disease risk of a respondent was assessed by drawing a sample of blood and analyzing the blood to determine the respondent's cholesterol and HDL cholesterol levels. Felt stress was assessed by analyzing the blood for cortisol. The nature of the data gathered is cross-sectional and the major methods employed for analyzing the data are Pearson correlation analysis, factor analysis, and multiple regression analysis.

## Sample

The data for this research were collected primarily from United States Air Force military and civilian personnel employed at five different Air Force bases. In addition, a portion of the data was obtained from the employees of two civilian organizations, a large private hospital in San Antonio and a health services organization in Denver. All of the participants were volunteers and most were full-time

employees. The total sample size was 438, with 438 people completing the Stress Assessment Package (SAP) and 96 completing the JAS. The number of respondents for each location was as follows:

| Location | Number Completing the SAP | Number Completing the JAS |
|---|---|---|
| Denver CO | 118 | 33 |
| Langley AFB VA | 116 | |
| Wright-Patterson AFB OH | 60 | 53 |
| San Antonio TX | 29 | |
| Randolph AFB TX | 59 | |
| Wilford Hall, Lackland AFB TX | 40 | |
| Brooks AFB TX | 26 | 10 |
| | 438 | 96 |

The age distribution for those completing the SAP ranged from 18 to 74 with a mean of 40.2 and a standard deviation of 9.8. Approximately 61 percent of the total sample were males and 39 percent females. For those completing the JAS, the ages ranged from 22 to 63 with a mean of 40.8 and a standard deviation of 9.5. Within the JAS subsample, approximately 80 percent of the respondents were male and 20 percent female.

## Research Instruments

Two questionnaires were used in this research: the Jenkins Activity Survey (JAS) and the Stress Assessment Package (SAP). These two instruments will be described separately.

The Jenkins Activity Survey. The JAS was used to collect data regarding behavior pattern. The survey form, which contains 52 questions, was obtained from and machine-scored by the Psychological Corporation, New York NY. The corporation provided standardized scores for Type A/B behavior and the JAS factors of speed and impatience, job involvement, and hard driving and competitive. The scoring procedure is described in the Jenkins Activity Survey Handbook (Jenkins et al., 1979).

The JAS was used because it is the best instrument available for measuring behavior pattern (Dembroski et al., 1978). It was specifically constructed to measure Type A behavior and was developed and used during the WCGS (Jenkins et al., 1979). The survey form has been revised several times since it was first developed in 1964, and it is now in its fifth edition. Additionally, the reliability and validity of the JAS has been verified by its developers and by others during research studies.

Reliability of the JAS. The reliability of a survey, the internal consistency and stability of an assessment device, is an important characteristic of any measurement instrument. Reliability is often expressed as a coefficient and can vary from between 0.0 to 1.0. The closer the coefficient is to 1.0, the greater the reliability of the instrument (Jenkins et al., 1979; Stone, 1978).

Jenkins et al. (1979) state that the JAS has been evaluated regarding two reliability estimates: internal

consistency and test-retest. Internal consistency, according to Stone (1978), is the extent to which there is a high degree of intercorrelation among the items (questions) of an instrument. In other words, internal consistency is the degree to which the items of an instrument measure a unified concept. Test-retest reliability assesses the correlation between the test scores of the same individuals on separate occasions (Stone, 1978). Jenkins et al. (1979) state that the internal consistency values of the JAS Type A scale, based on a 25 percent random sample of men participating in the WCGS, as derived from Kendall's tau b and the squared multiple correlation were .83 and .85, respectively. The internal consistency of the three other JAS dimensions as assessed by the squared multiple correlation ranged from .73 to .85. Jenkins et al. (1979) also computed four separate test-retest reliability estimates of the JAS for time intervals ranging from one to four years, and the estimates ranged from .60 to .70. These correlation coefficients for internal consistency and test-retest were all high, indicating the JAS to be a reliable instrument. It can be concluded that the JAS measures unified concepts and that it is stable over time.

Validity of the JAS. Validity is the degree to which an instrument actually measures what it purports to measure (Stone, 1978). The validity of the JAS has been established by evaluating the association between the JAS and coronary heart disease. The WCGS, a prospective study,

identified a strong relationship between the JAS Type A score and coronary heart disease. Predictive studies also provide evidence that there is a relationship between JAS Type A scores and coronary heart disease (e.g., Jenkins et al., 1974; Jenkins et al., 1976). Regarding the JAS and the results of predictive studies, Jenkins et al. (1974:14) conclude, "Predictive studies have established that individuals with higher JAS scores are more likely to sustain heart attacks." In addition, Chesney and Rosenman (1982) cite eight other studies where JAS Type A scores were found to be significantly related to the prevalence of coronary heart disease. In comparison, two studies found a limited or no relationship between JAS scores and coronary heart disease (Kornitzer et al., 1981; Schekelle et al., 1976). Most of the research, however, provides support for the relationship between Type A scores and coronary heart disease, and it is concluded that the JAS possesses a good level of validity.

The Stress Assessment Package (SAP). The SAP was originally developed and evaluated by Fye and Staton (1981) and it has been further evaluated and revised by Air Force Institute of Technology (AFIT) faculty and students (Martin and Simard, 1982). The purpose of the SAP is to capture data regarding factors believed to be related to stress and coronary heart disease. It does this by capturing job and home environment factors, personal and demographic factors, and perceived stress data. The SAP used in this research contains

(1) introductory and instructional information; (2) a "Privacy Act Statement"--a requirement for any survey administered to Air Force employees; (3) 160 questions to capture the data; and (4) a page for the respondents to list and describe the use and dosage of any medication being taken. A copy of the SAP is contained in the appendix. The 160 questions in the SAP are grouped as follows:

| Grouping Title | Number of Questions |
|---|---|
| Personal Beliefs (Locus of Control) | 14 |
| Personal Attributes (Behavior Pattern) | 15 |
| Perceived Productivity | 4 |
| Job Inventory | 30 |
| Supervisor Inventory | 15 |
| Organizational Climate Inventory | 17 |
| Job Satisfaction | 7 |
| Assertiveness Inventory | 5 |
| Social Environment Inventory | 8 |
| Perceived Stress | 10 |
| Family Inventory | 5 |
| Food Consumption Inventory | 5 |
| Background and Demographic Information | 25 |

With some exceptions, these questions employ a seven-point, Likert response scale. Martin and Simard (1982) describe the SAP in greater detail in their report.

Questionnaire Administration

The questionnaires were administered to the attendants of "Stress Seminars" conducted by the Organizational Sciences Department of AFIT. At least one seminar was conducted at each location and the size of a given session was usually limited to no more than 35 people. Each session

was similar in format, with the attendants first being briefed on the general objectives of this on-going AFIT stress research program. After the briefing, each attendant was given a SAP and randomly selected people were given the JAS since only 100 JAS's were available. The attendants were also given a two-page (front and back) machine-scored response sheet upon which they recorded their answers for the SAP. These response sheets were pre-coded with a four-digit number which was used to identify respondents. Responses for the JAS were recorded on the survey form itself, and the same four-digit code was placed on the JAS's. Once the questionnaires and response sheets were distributed, the seminar adjourned for two to three hours allowing time for the respondents to complete the questionnaires and eat lunch. The seminar reconvened in the afternoon; the respondents were then shown a film, given feedback on some of their responses, and volunteers were asked to provide blood samples. The blood was drawn by medical technicians between the hours of 3:30 and 4:00 pm to control for the diurnal cycle of cortisol. Also, the volunteers had been notified during the morning session to refrain from imbibing caffeine. The blood samples were identified by labeling them with the same four-digit code placed on their survey responses. Finally, the respondents were informed that the code number would only be used to cross-reference the survey responses with blood samples and that the respondents' identity would remain anonymous.

## Blood Analysis; The Indicators of Heart Disease and Stress

Blood Analysis. The blood samples were analyzed by the USAF School of Aerospace Medicine, Brooks AFB, Texas, to determine the total cholesterol, HDL cholesterol, and cortisol levels of the respondents. From this analysis, for those who had completed the SAP, cholesterol and HDL cholesterol levels were determined for 368 respondents, and cortisol levels were determined for 356 respondents. For those who had completed the JAS, cholesterol and HDL cholesterol levels were determined for 75 respondents, and cortisol levels were determined for 74 respondents. The specific procedures used to analyze the blood are described by Fye and Staton (1981).

The Indicators of Heart Disease and Stress. Cholesterol levels were measured because cholesterol has been linked to both heart disease and stress. As stated in the literature review, Rosenman and Friedman (1974) believe that cholesterol plays a major role in coronary disease. This belief is supported by the results of the WCGS (Rosenman et al., 1966) and the Framingham Study (Brand et al., 1976). Cholesterol is linked with stress because it is believed that stress causes cholesterol levels to increase, and if the stress condition persists, cholesterol deposits will accumulate along arterial walls (Friedman and Rosenman, 1974; Ivancevich and Matteson, 1980). The accumulation of cholesterol will cause the arteries to narrow and the flow of blood through

the arteries can eventually become restricted, increasing the possibility of heart attack. Due to cholesterol's link to heart disease, it is used in the analyses as one of the indicators of heart disease.

HDL cholesterol (HDL) levels were measured because HDL is also a good predictor of coronary heart disease. However, unlike cholesterol, HDL appears to be inversely related to coronary heart disease, because it may reduce the risk of disease by removing cholesterol from arterial walls (Kritchevsky, 1978). For this reason, HDL cholesterol is used in the data analysis as one of the indicators of heart disease.

The ratio obtained by dividing cholesterol by HDL (which will be referred to as ratio) is another predictor of coronary heart disease. Fye and Staton (1981), in citing Dr. Goerge Troxler, state that the higher the value of ratio, the greater the risk of coronary heart disease. For this reason, ratio is used in the data analysis as one of the indicators of heart disease, and it is probably the best of the indicators used.

Cortisol levels were measured because it is believed that cortisol is directly linked to stress. Two studies suggest that stress causes cortisol levels to increase (Brown et al., 1971; Rubin et al., 1970). For this reason, cortisol is used in the data analyses as the indicator of felt stress.

In summary, cholesterol, HDL cholesterol, and ratio are associated with coronary heart disease and are used in this study as indicators of heart disease. Of these, ratio is believed to be the best indicator of coronary heart disease. Cortisol is associated with stress and it is used in this research as the indicator of felt stress.

## Data Analysis Procedures

This section describes the analytical procedures used in this study. The procedures employed include Pearson product-moment correlation analysis, factor analysis, reliability analysis, partial-correlation analysis, and multiple regression analysis.

Correlational Analysis. Pearson product-moment correlations are used to identify the direction and degree of a relationship between two variables. In other words, the Pearson correlation, symbolized by r, is a measure of association indicating the strength of the linear relationship between two variables (McClave and Benson, 1979). When continuous variables are compared, the correlation coefficient has a range of +1.0 to -1.0 with a positive value indicating a direct relationship and a negative score indicating an inverse relationship. When a dichotomous variable is correlated with continuous variable, the r coefficient is formulated through point-biserial computations and r has a range of 0.0 to ±0.76. An r value of zero implies little or

no relationship; the greater the r value, the stronger the linear relationship between two variables. A high r value, however, does not imply causality; therefore, r coefficients must be interpreted with caution (McClave and Benson, 1979; Nie, Hull, Jenkins, Steinbrenner, and Bent, 1975). In this study, Pearson product-moment correlations were used to determine the extent to which the variation in one variable was linked to the variation in another variable (variance is a measure of the variability or lack of homogeneity in a variable). The Pearson product-moment correlations in this study were obtained by using the Statistical Package for the Social Science (SPSS) subprógram PEARSON CORR (Nie et al., 1975).

Partial Correlation Analysis. Nie et al. (1975:302) state that partial correlation analysis provides "a single measure of association describing the relationship between two variables while adjusting for the effects of one or more variables." Stated differently, partial correlation provides an indication of the relationship between a dependent variable and an independent variable while statistically removing the effects of control variable(s) (Nie et al., 1975). In this study, partial correlation was used to identify spurious correlations and to confirm actual correlations. Partial correlations were determined by using the SPSS subprogram PARTIAL CORR (Nie et al., 1975).

Factor Analysis. Factor analysis is possibly the most powerful method of validating constructs. Factor analysis reduces the information contained in a number of variables into a smaller set of factors (Hair, 1979). It searches for and defines a smaller grouping of factors which may be contained within a larger variable group. There are different types of factor analysis; common factor analysis was used in this study. Common factor analysis is used, primarily, to identify factors not easily recognized, by defining pattern of common variance among a group of variables (Hair, 1979).

The objective in using factor analysis was to identify the factors captured by the SAP and to separately analyze the factors in the Personal Beliefs section (V15-V29). The factoring criterion and methods used in analyzing the SAP variables are described by Martin and Simard (1982). The criteria and methods used for analyzing the Personal Beliefs section were as follows. First, each factor must have had at least two items with loading greater than .40. This permitted the factors to be clearly identified. Second, to determine the number of factors, the factor eigenvalue must have been greater than one (1.0). Eigenvalues indicate the amount of variance explained by factors. These criteria were applied in assessing the statistics which resulted from rotated factor matrices while varying the number of factors (Hair, 1979; Nie et al., 1975). The specific SPSS factoring method used was principle factoring with iteration (Nie

et al., 1975). As the number of factors was varied, variables which did not "load" on a factor or which loaded on several factors were eliminated. From the final solution, scales were developed and labeled based on the variables with the highest loadings within each factor. Factor analyses were computed by using the SPSS subprogram FACTOR (Nie et al., 1975).

Reliability Analysis. To evaluate the internal consistency of the factors, reliability estimates were obtained, based on coefficient alpha. The coefficient alpha is used to determine the degree of measurement error resulting from a lack of internal consistency within each factor (Cronbach, 1951). Since the coefficient alpha has an upper limit (it can range from 0.0 to 1.0), a low coefficient indicates that the items making up a factor have little in common. In this study, when the alpha value was greater than 0.5, the internal consistency was considered good. Internal consistency calculations for evaluating the factors were made by using the SPSS subprogram RELIABILITY (Hull and Nie, 1981).

Multiple Regression Analysis. Multiple regression analysis was used in evaluating each of the research questions. These questions primarily focus on determining whether or not behavior pattern is one of the significant predictors of heart disease, felt stress, and perceived stress. Multiple regression is a statistical technique which analyzes the

relationship between a dependent or criterion variable and a group of independent or predictor variables (Nie et al., 1975). Nie et al. (1975:321) describe the most important uses of multiple regression as follows:

> (1) to find the best linear prediction equation and evaluate its accuracy; (2) to control for other confounding factors in order to evaluate the specific contribution of a specific variable or set of variables; and (3) to find structural relations and provide explanations for seemingly complex multivariate relationships.

Each of these uses was employed in assessing the research questions.

The regression analysis procedure employed was the stepwise method (Nie et al., 1975). The stepwise procedure is used to identify a subset of predictor variables which yield an optimal prediction equation. It does this by allowing variables to be entered into the equation in the order of their respective contribution to the explained variance of the dependent variable (Nie et al., 1975). The stepwise procedure provides two key statistics: the coefficient of determination and the standardized regression coefficient. The coefficient of determination ($R^2$) indicates the percentage of variance in the dependent variable explained by the independent variable(s) (McClave and Benson, 1979). The standardized regression coefficient, also called Beta, is used to compare the relative effect of each independent variable on the dependent variable (Nie et al.,

1979). The multiple regression analyses were computed by using the SPSS subprogram REGRESSION (Nie et al., 1975). The specific regression equations used will be described in the next chapter.

# CHAPTER 4

## RESULTS AND DISCUSSION

The factor analysis of the variables in the SAP resulted in the extraction of 25 factors (Martin and Simard, 1982). These factors are labeled as follows: external locus of control, Type A behavior, perceived productivity, job autonomy, planning time, intergroup conflict, task significance, group goal setting/problem solving, goal clarity-specificity, need for enrichment, job enhancement, problem solving participation, supervision quality, supervisor control, micro-supervision, general organizational climate, organizational control, coworker relationships, job satisfaction, assertiveness, community-social activities, intolerance for change, home/family relationships, dietary fat and exercise. For most of these factors, the meaning and nature of the construct is self-evident. However, to ensure the meaning of these constructs is clear, they are briefly detailed in Table 1. Computed reliabilities for these factors are also shown in the table. The factor analysis and reliability analysis of the SAP variables are described in detail by Martin and Simard (1982).

For the purposes of this study, variables 15-29 were independently factor analyzed. These variables pertain to behavior pattern. Four factors resulted from this analysis

Table 1

Labels, Direction, and Reliability Coefficients of the SAP Factors (N=438)

| Factor Name | Direction: The Higher the Score Indicates | Coefficient Alpha |
|---|---|---|
| Locus of Control | External Locus | .81 |
| Type A Behavior | Type A Behavior | .77 |
| Job Autonomy | Greater Autonomy | .89 |
| Perceived Productivity | Greater Quality Productivity | .83 |
| Planning Time | Greater Time to Plan | .82 |
| Intergroup Conflict | Greater Conflict | .67 |
| Task Significance | Greater Significance | .89 |
| Group Goal Setting | Greater Goal Setting | .68 |
| Goal Clarity | Greater Clarity | .83 |
| Need for Enrichment | Greater Need | .84 |
| Job Enhancement | Greater Enhancement | .86 |
| Problem Solving Participation | Greater Participation | .92 |
| Supervision | Better Supervision | .86 |
| Supervisor Control | Tighter, Closer Control | .81 |
| Micro-Supervision | Unnecessary Detail/Paperwork | .72 |
| General Organizational Climate | Better Climate | .87 |
| Organizational Control | Unnecessary Control | .88 |
| Coworker Relationships | Better Relations | .69 |
| Job Satisfaction | Higher Satisfaction | .90 |
| Assertiveness | Greater Assertiveness | .82 |
| Community-Social Activities | Greater Participation/ Involvement | .82 |
| Intolerance For Change | Greater Intolerance | .71 |
| Home/Family Relationships | Better Relations | .92 |
| Dietary Fat | Greater Fat Consumption | .57 |
| Exercise | More Exercise | .82 |

and they are labeled impatience, hard driving, work involvement, and competitiveness. The loadings for each of these factors are all relatively high ranging from .50 to .86. The variables and factor loadings in the orthagonal rotated matrix for these four factors are depicted in Table 2. The "impatience" factor, composed of items 17, 22, and 29, indicates the degree to which the individual dislikes waiting. The "hard driving" factor consists of items 19, 23, and 26, and it measures the degree to which a person hurries and tries to accomplish too much. The "work involvement" factor consists of items 20, 25, and 28. It measures the degree to which a person sets high work standards, and becomes upset when (1) those standards are not met, and (2) when others are slow to make a point. The "competitiveness" factor consists of items 15 and 21, and it measures the degree to which a person desires winning.

The reliabilities of these factor scales were determined by using coefficient alpha and are shown in Table 3. The coefficients are satisfactory, ranging from .60 to .74.

These scales appear to be very similar to the JAS Type A dimensions of speed and impatience, job involvement, and hard driving and competitive. To determine the degree to which the SAP Type A scales are similar to the JAS factors, Pearson correlations were computed for each of the SAP scales and JAS dimensions. These correlations are shown in Table 4.

Table 2

Factor Loadings for the Four SAP Type A Variables (N=438)

| VARIABLE NUMBER | IMPATIENCE | HARD DRIVING | WORK INVOLVEMENT | COMPETITIVENESS |
|---|---|---|---|---|
| V15 | .20056 | -.00041 | .18132 | .56049 |
| V17 | .74656 | .05768 | .11143 | .17535 |
| V19 | -.04467 | .72367 | .13034 | .01805 |
| V20 | .04459 | .23011 | .56599 | .21987 |
| V21 | .20765 | .11080 | .18860 | .85701 |
| V22 | .74735 | .12641 | .15184 | .29906 |
| V23 | .47585 | .54848 | .22686 | .16412 |
| V25 | .15804 | .22907 | .61671 | .21414 |
| V26 | .10440 | .76730 | .27608 | .03629 |
| V28 | .40496 | .10373 | .50120 | .07503 |
| V29 | .56022 | .01831 | .35601 | .10557 |

Table 3

Reliability Coefficients for SAP Type A Scales
(N = 438)

| Factor | Coefficient Alpha |
|---|---|
| Impatience<br>Items 17, 22, and 29 | Alpha = .74 |
| Hard Driving<br>Items 19, 23, and 26 | Alpha = .70 |
| Work Involvement<br>Items 20, 25, and 28 | Alpha = .61 |
| Competitiveness<br>Items 15 and 21 | Alpha = .60 |

Table 4

Pearson Correlation Coefficients for the SAP Type A Scales and JAS Dimensions (N = 96)

| JAS Factors \ SAP Factors | Impatience | Hard Driving | Work Involvement | Competitiveness |
|---|---|---|---|---|
| Type A Behavior | .32** | .38** | .45** | .36** |
| Speed and Impatience | .51** | .42** | .52** | .31** |
| Job Involvement | .03 | .02 | .19* | .23* |
| Hard Driving and Competitive | -.07 | .14 | .20* | .04 |

* $p \leq .050$

** $p \leq .001$

Table 4 shows that all of the SAP scales are strongly associated with the JAS Type A and speed and impatience factors. The association between the SAP scales and the job involvement and hard driving and competitive dimensions is relatively weak in comparison. This may indicate that the SAP work involvement scale might be a poor substitute for the JAS job involvement dimension. The fact that the JAS hard driving and competitive dimension is a single entity might be the reason why it does not significantly correlate with either the SAP hard driving scale or competitive scale.

## The Relationships Between the Variables of Concern

Various Pearson product-moment correlations were computed and placed into tabular form in order to identify the basic relationships between variables. This was done for three reasons. First, the correlations were used to evaluate hypotheses one, two, and three. Second, the correlations were used to identify the independent or predictor variables which should be regressed with the dependent variables (ratio, cholesterol, HDL, cortisol, and perceived job stress). Third, the correlation tables were used to help explain peculiar or unexpected relationships. During the correlation analyses, "listwise deletion" was used as the method of dealing with missing data (Nie et al., 1975).

The correlation values and their significance are presented in Tables 5 through 9, 11, and 12. Table 5 shows

correlations of the JAS factors and their quartile extremes with the indicators of heart disease and felt stress. Table 6 reveals the correlations of the SAP Type A scales with the indicators of heart disease and felt stress. Table 7 depicts correlations of the JAS factors with the SAP factors and other variables of potential concern. These "other variables" are described in the following paragraph. Table 8 shows correlations of the JAS factors' quartile extremes with the SAP factors and other variables. Table 9 shows correlations of the SAP Type A scales with the SAP factors and other variables. Table 11 depicts correlations of ratio, cholesterol, HDL, cortisol, and perceived job stress with the SAP factors and other variables. Finally, Table 12 contains a correlation matrix of ratio, cholesterol, HDL, and cortisol.

The "other variables" mentioned in the preceding paragraph refer to questions contained in the background section of the SAP. These variables include sex (1=male, 2=female), number of people supervised, number worked with, reported coronary heart disease (CHD) problem, reported diagnosed ulcer, reported blood pressure problem, reported frequency/severity of headaches, jogging, cigarette smoking, cigar/pipe smoking, intent to remain with the organization, and weight to height category. Correlations with these variables were computed primarily due to their believed link with heart disease or stress.

Table 5

Correlations of the JAS Type A Factors With the Indicators of Heart Disease and Felt Stress

| | The Indicators | | | |
|---|---|---|---|---|
| Jenkins Factors | Ratio | Cholesterol | HDL Cholesterol | Cortisol[b] |
| Type A Personality (N=75) | -.03 | -.05 | -.04 | -.08 |
| Type A Personality Quartile Extremes[a] (N=36) | -.00 | .05 | -.03 | -.18 |
| Speed and Impatience (N=75) | .08 | -.06 | -.18* | -.15* |
| Speed and Impatience Quartile Extremes[a] (N=40) | .10 | -.15 | -.24* | -.24* |
| Job Involvement (N=75) | -.07 | -.20** | -.10 | -.20** |
| Job Involvement Quartile Extremes[a] (N=37) | -.04 | -.11 | -.09 | -.18 |
| Hard Driving and Competitive (N=75) | -.18* | .05 | .20** | .00 |
| Hard Driving and Competitive Quartile Extremes[a] (N=42) | -.11 | .18 | .24* | -.09 |

*$p \leq .10$

**$p \leq .05$

[a]Correlations for the quartile extremes are point-biserial.

[b]The N for cortisol is always one less than indicated for the row.

Table 6

Correlations of the SAP Type A Scales With the Indicators of Heart Disease and Felt Stress

| SAP Type Scales | Ratio (N=368) | Cholesterol (N=368) | HDL Cholesterol (N=368) | Cortisol (N=356) |
|---|---|---|---|---|
| Impatience | .11** | .10** | -.09** | -.03 |
| Hard Driving | .07* | .00 | -.10** | -.05 |
| Work Involvement | .05 | .03 | -.05 | -.04 |
| Competitiveness | -.01 | -.08* | -.11** | .04 |

*$p \leq .1$

**$p \leq .05$

Table 7

Correlations of the JAS Type A Factors With the SAP Factors and Other Variables (N=96)

| | Type A Personality | Speed and Impatience | Job Involvement | Hard Driving and Competitive |
|---|---|---|---|---|
| Age | -.07 | .05 | -.37*** | -.07 |
| Perceived Job Stress | .27*** | .12 | .18* | .20* |
| Locus of Control | .18* | .27** | .03 | .13 |
| Perceived Productivity | -.16 | -.15 | -.15 | .00 |
| Job Autonomy | .05 | -.03 | -.14 | -.02 |
| Planning Time | .01 | -.01 | -.08 | .33*** |
| Intergroup Conflict | .12 | .29* | .24** | .10 |
| Task Significance | .11 | -.06 | .22* | .26* |
| Goal Clarity | .19* | -.23* | -.24** | .16 |
| Need for Enrichment | .22* | .16 | .13 | .28** |
| Group Goal Setting | -.08 | -.29* | .12 | .16 |
| Problem Solving Participation | .06 | -.05 | .06 | .05 |
| Job Enhancement | .09 | -.12 | .07 | .17 |
| Supervision | -.22* | -.29** | -.06 | -.03 |
| Supervisor Control | -.21* | -.15 | -.10 | -.06 |
| Micro-Supervision | .11 | .27** | .03 | -.09 |
| General Organizational Climate | -.04 | -.29** | .10 | .18* |
| Organizational Control | .10 | .11 | .08 | .07 |
| Coworker Relations | -.32*** | -.39*** | -.13 | -.04 |
| Assertiveness | .25** | .21* | .23 | .14 |
| Community/Social Activities | .10 | -.06 | .04 | .01 |
| Home/Family Relations | -.04 | .03 | .03 | -.18* |
| Exercise | .07 | .04 | .26** | .04 |
| Job Satisfaction | -.03 | -.21* | -.00 | .17* |
| Intolerance for Change | .00 | .06 | -.13 | -.20* |

Table 7 (Continued)

| | Type A Personality | Speed and Impatience | Job Involvement | Hard Driving and Competitive |
|---|---|---|---|---|
| Dietary Fat | .02 | .19* | .01 | -.14 |
| Sex | -.07 | -.25** | -.25** | .23* |
| Number Supervised | .10 | .04 | .19* | .06 |
| Number Worked With | .19* | .01 | .15 | .10 |
| Reported Diagnosed CHD | .02 | .06 | -.15 | -.00 |
| Reported Diagnosed Ulcer | .02 | -.04 | .11 | -.22* |
| Reported Blood Pressure Problem | .10 | .02 | -.16 | .13 |
| Frequency/Severity of Headaches | -.08 | .04 | -.13 | .17* |
| Jogging | .10 | .00 | .23* | -.00 |
| Cigarette Smoking | -.06 | .04 | -.18* | -.05 |
| Cigar/Pipe Smoking | .11 | .05 | .02 | -.11 |
| Intent to Remain | -.17* | -.37*** | .04 | -.05 |
| Weight to Height | -.11 | .08 | -.18* | -.14 |

*$p \leq .050$

**$p \leq .010$

***$p \leq .001$

Table 8

Correlations of the JAS Type A Factor Quartile Extremes With the SAP Factors and Other Variables[a]

| | Type Personality Extremes (N=47) | Speed and Impatience Extremes (N=51) | Job Involvement Extremes (N=45) | Hard Driving and Competitive Extremes (N=53) |
|---|---|---|---|---|
| Age | -.05 | .05 | -.52*** | -.04 |
| Perceived Job Stress | .38*** | .09 | .32* | .18 |
| Locus of Control | .18* | .29** | .15 | .15 |
| Perceived Productivity | -.23 | -.10 | -.29* | -.06 |
| Job Autonomy | .08 | .02 | -.32* | -.01 |
| Planning Time | .03 | .06 | -.15 | .36** |
| Intergroup Conflict | .26* | .28* | .38** | .11 |
| Task Significance | .21 | -.07 | .32* | .24* |
| Goal Clarity | -.28* | -.23 | -.26** | .13 |
| Need for Enrichment | .43*** | .36** | .13 | .48*** |
| Group Goal Setting | -.08 | -.27* | .15 | .04 |
| Problem Solving Participation | .16 | -.09 | .06 | -.03 |
| Job Enhancement | .15 | -.11 | .05 | .16 |
| Supervision | -.30* | -.38** | -.22 | -.20 |
| Supervisor Control | -.32* | -.24* | -.22 | -.21 |
| Micro-Supervision | .16 | .33** | .09 | -.12 |
| General Organizational Climate | -.03 | -.33** | -.05 | .10 |
| Organizational Control | .12 | .05 | .12 | .12 |
| Coworker Relations | -.42*** | -.50*** | -.30* | -.15 |
| Assertiveness | .31* | .25* | .42** | .12 |
| Community/Social Activities | .10 | -.05 | .05 | .00 |
| Home/Family Relations | -.00 | .01 | .05 | -.14 |
| Exercise | .09 | .17 | .24 | .06 |
| Job Satisfaction | -.04 | -.23 | -.01 | .21 |

Table 8 (Continued)

| | Type A Personality Extremes (N=47) | Speed and Impatience Extremes (N=51) | Job Involvement Extremes (N=45) | Hard Driving and Competitive Extremes (N=53) |
|---|---|---|---|---|
| Intolerance for Change | -.05 | .05 | -.23 | -.34** |
| Dietary Fat | .10 | .26* | -.09 | -.21 |
| Sex | -.12 | -.24* | -.20 | .32** |
| Number Supervised | .16 | .06 | .29* | -.01 |
| Number Worked With | .31* | -.04 | .29* | -.05 |
| Reported Diagnosed CHD | b | .16 | -.15 | .00 |
| Reported Diagnosed Ulcer | -.00 | -.06 | .15 | .20 |
| Reported Blood Pressure Problem | .21 | .08 | -.20 | .11 |
| Frequency/Severity of Headaches | .04 | .09 | -.09 | .28* |
| Jogging | .17 | .03 | .19 | -.01 |
| Cigarette Smoking | -.08 | .08 | -.26* | -.06 |
| Cigar/Pipe Smoking | .20 | .03 | -.02 | -.20 |
| Intent to Remain | -.28* | -.47*** | -.20 | -.06 |
| Weight to Height | -.18 | .05 | -.20 | -.14 |

*$p \leq .050$

**$p \leq .010$

***$p \leq .001$

[a]All correlations in this table are point-biserial.

[b]This correlation was uncomputable.

Table 9

Pearson Product-Moment Correlations of the SAP Type A Scales, Impatience, Hard Driving, Work Involvement, and Competitiveness, With the Other SAP Factors and Variables (N=438)

| | Impatience | Hard Driving | Work Involvement | Competitiveness |
|---|---|---|---|---|
| Age | .00 | -.05 | -.09 | -.04 |
| Perceived Job Stress | .17*** | .31*** | .28*** | .15*** |
| Locus of Control | .18*** | .24*** | .20*** | -.06 |
| Perceived Productivity | .02 | .15*** | .10* | .08 |
| Job Autonomy | .10* | -.07 | -.01 | .09* |
| Planning Time | .02 | -.11** | -.02 | .04 |
| Intergroup Conflict | .05 | .11** | .19*** | .06 |
| Task Significance | .03 | .06 | .09* | .05 |
| Goal Clarity | -.06 | -.06 | -.06 | -.04 |
| Need for Enrichment | .06 | .11* | .19** | .06 |
| Group Goal Setting | .02 | -.08* | .00 | .09* |
| Problem Solving Participation | .06 | .01 | .04 | .11* |
| Job Enhancement | .05 | .05 | .02 | .10** |
| Supervision | .00 | .03 | -.07 | .08 |
| Supervisor Control | -.04 | .05 | -.07 | .00 |
| Micro-Supervision | .03 | .11* | .11* | -.02 |
| General Organizational Climate | -.09* | -.04 | -.07 | .06 |
| Organization Control | .12** | .16*** | .13** | .03 |
| Coworker Relations | -.09* | -.08 | -.06 | -.01 |
| Assertiveness | .16*** | -.08* | -.09* | .13** |
| Community/Social Activities | -.09* | .01 | -.08 | .02 |
| Home/Family Relations | -.08* | -.09* | -.07 | .02 |
| Exercise | -.02 | -.09* | -.09* | .11* |
| Job Satisfaction | .00 | -.02 | -.05 | .01 |
| Intolerance for Change | .28*** | .23*** | .28*** | .19*** |

Table 9 (Continued)

| | Impatience | Hard Driving | Work Involvement | Competitiveness |
|---|---|---|---|---|
| Dietary Fat | .17*** | .08 | .07 | .06 |
| Sex | -.11* | .07 | .03 | -.22*** |
| Number Supervised | .12** | .11** | .13** | .20*** |
| Number Worked With | .00 | .10* | .07 | .02 |
| Reported Diagnosed CHD | -.02 | -.01 | .01 | -.11* |
| Reported Diagnosed Ulcer | -.05 | .05 | .04 | -.06 |
| Reported Blood Pressure Problem | .04 | .07 | .09* | -.03 |
| Frequency/Severity of Headaches | -.03 | .17*** | .11** | -.09* |
| Jogging | .02 | -.04 | .01 | .16*** |
| Cigarette Smoking | .06 | .02 | .08 | .01 |
| Cigar/Pipe Smoking | .01 | .04 | .03 | .01 |
| Intent to Remain | -.07 | -.06 | -.07 | .02 |
| Weight to Height | .03 | -.03 | -.05 | .02 |

*$p \leq .050$

**$p \leq .010$

***$p \leq .001$

Type A Personality and Coronary Heart Disease - Evaluating Hypothesis One

Hypothesis one was tested by computing Pearson product-moment correlations of the JAS Type A factors and the quartile extremes of these factors with the indicators of heart disease. The quartile extremes compared the (approximate) 25 percent most extreme Type A persons with the 25 percent most extreme Type B persons. The quartile extreme correlations were computed because some research suggests that the more extreme Type A persons are more prone to coronary heart disease (e.g., Jenkins et al., 1974). These correlations are shown in Table 5. Correlations between the SAP Type A scales and the indicators of heart disease were also computed and are shown in Table 6.

The data do not provide support for hypothesis one because neither the Type A personality type nor the personality type quartile extremes significantly correlated with the indicators at the .10 level of confidence. This finding may have occurred because of the limited sample size, N = 96. It is also possible that some of the dimensions making up the Type A construct are not related to coronary heart disease. This second possibility is further assessed by examining the correlations of the other JAS factors and the SAP Type A scales with the indicators of heart disease.

Speed and Impatience/Impatience. The JAS speed and impatience factor is negatively correlated with HDL ($p \leq .10$). This

finding suggests that this factor may be positively related to heart disease. The relationship between speed and impatience achieved even greater significance when cortisol was controlled, $r = -.20$ , $p \leq .05$ . Therefore, this relationship does not achieve significance due to some link between speed and impatience and cortisol or between HDL and cortisol. The speed and impatience quartile extreme is also negatively correlated with HDL ($p \leq .10$) indicating that extreme Type A speed and impatience individuals produce less HDL than extreme Type B speed and impatience persons.

The above findings are further supported by the SAP impatience scale correlations which are significant with each of the indicators ($p \leq .05$). Impatience is positively correlated with ratio and cholesterol, and negatively correlated with HDL. This finding supports the conclusion that the speed and impatience factor, especially the impatience component, is strongly linked to coronary heart disease. This conclusion agrees with the finding by Matthews et al. (1977) in which a Type A "impatience" factor was significantly associated with the later onset of coronary heart disease.

Job Involvement/Work Involvement. The JAS job involvement factor is negatively related to cholesterol. This correlation, however, appears to be due to links between the job involvement factor and other variables related to cholesterol. The correlation loses significance when

age was controlled ($r = -.13$, $p \leq .129$) and when age, sex, and exercise were controlled ($r = -.07$, $p \leq .277$). It appears, therefore, that the job involvement factor does not correlate with any of the indicators of heart disease at the .10 level of confidence when other variables are taken into account. This statement is supported by the correlation regarding the SAP work involvement scale since none of the correlations involving work involvement and the indicators of heart disease are significant.

Hard Driving and Competitive/Hard Driving/Competitiveness. Table 5 indicates that the JAS hard driving and competitive factor is inversely related to ratio and positively related to HDL. However, the relationship between this factor and ratio loses significance ($r = -.14$, $p \leq .118$) when the height to weight category was controlled. The correlation of competitiveness with HDL loses significance ($r = .13$, $p \leq .138$) when both sex and weight to height category were controlled. Though not significant when other factors were controlled, the direction of these relationships indicates that the hard driving and competitive factor may not be a coronary heart disease risk factor.

Type A Personality and Felt Stress - Evaluating Hypothesis Two

Pearson product-moment correlations were used to test whether Type A persons exhibit higher felt stress levels by exhibiting higher cortisol levels than Type B persons.

Table 5 shows that neither Type A personality nor the Type A personality quartile extremes correlate significantly ($p \leq .10$) with cortisol. For this reason, hypothesis two is not accepted.

Type A Personality and Perceived Stress - Evaluating Hypothesis Three

Hypothesis three predicted that Type A persons would perceive having greater job stress. The Pearson correlations in Table 7, row 2, fully support this hypothesis. The JAS Type A personality factor is significantly ($p \leq .001$) related to perceived job stress (V118). Moreover, the Type A personality quartile extremes are even more highly correlated with perceived job stress (see Table 8). Together these findings indicate that Type A persons perceive having more job stress than do Type B persons, and these feelings increase as the degree of Type A behavior increases. These feelings decrease as the degree of Type B behavior increases. For these reasons, hypothesis three is accepted.

The Moderating Effects of Type A Behavior - Evaluating Hypothesis Four

The proposal that Type A behavior moderates the relationship between perceived job stress and role ambiguity was tested by using partial correlation analysis. For this test, the SAP factor "goal clarity" was substituted for role ambiguity in the analysis. This substitution is acceptable because role ambiguity and goal clarity very nearly occupy

opposite ends of the same continuum scale. For the JAS subsample (N=96), the Pearson correlation for the perceived job stress--role clarity relationship is (r=) -.16 with a significance of $p < .01$. When the perceived stress--goal clarity relationship is evaluated controlling for personality type, the correlation value and significance both decrease slightly, $r = -.22$ and $p < .02$, respectively. Hence, the Type A personality does moderate, albeit very slightly, the perceived job stress--role ambiguity relationship. For this reason, hypothesis four is accepted.

To better determine the direction of the moderating affects of Type A behavior, a Pearson correlation analysis was computed. This analysis examined only Type A individuals who reported having unclear work goals (N=25). The resulting correlation value and significance are $r = -.28$ and $p < .09$, respectively. The decrease in significance is probably due to the decrease in sample size. The increase in the correlation value from $r = -.26$ to $-.28$ implies that Type A behavior causes people with unclear or ambiguous work goals to perceive greater job stress.

## The Moderating Effects of Type A Behavior - Evaluating Hypothesis Five

Hypothesis five proposes that Type A behavior will moderate the relationship between perceived job stress and external locus of control. The job stress--locus of control relationship was tested by using partial correlation analysis

to control for the effects of the Type A behavior pattern and the other JAS dimensions. For the sample completing JAS forms, the Pearson correlation and significance for job stress and locus of control are $r = .24$ and $p < .01$, respectively. When this relationship controls for Type A personality and the JAS dimensions, the correlations and their significances change as shown in Table 10. In each instance, the correlation and significance improves over the values obtained without controlling for Type A behavior. From this data, it can be inferred that behavior pattern and each of its dimensions moderate the relationship between perceived job stress and locus of control. For this reason, hypothesis five is accepted.

To better determine the nature and direction of the relationship between these three variables, a Pearson correlation analysis was computed. This analysis was used to determine the correlation between locus of control and perceived job stress for Type A individuals only (N=61). The correlation and significance which resulted are $r = .31$ and $p < .01$, respectively. This finding suggests that Type A personality causes people with an external locus of control to perceive greater job stress.

Evaluating Research Questions One Through Five

Pearson correlations and multiple regression analysis were used to evaluate each of the research questions. The following procedure was employed. First, Pearson

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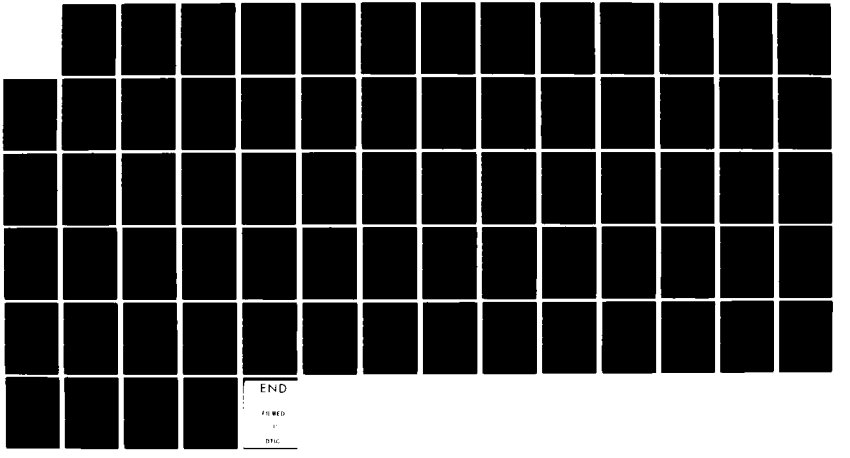


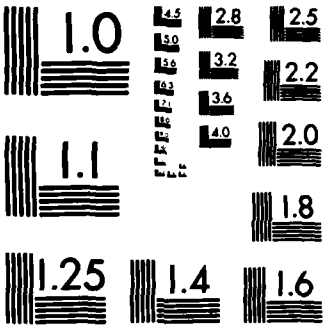


Table 10

The Moderating Effects of Type A Behavior on the Perceived Job Stress--Locus of Control Relationship

| Correlations of | Controlled Variable | Type A Personality | Speed and Impatience | Job Involvement | Hard Driving and Competitive |
|---|---|---|---|---|---|
| Perceived Job Stress and Locus of Control | correlation | .26 | .28 | .30 | .28 |
| | significance | .005 | .003 | .002 | .003 |

product-moment correlations were computed for each of the intended dependent variables with each factor and variable of potential interest. These correlations are shown in Tables 11 and 12. From these tables, the factors and variables correlating most significantly with the dependent variables were identified for use in the regression analyses with the dependent or criterion variables. Missing values were treated by substituting mean values for missing values. The specific procedures used and results obtained are described in greater detail in the following sections.

## Behavior Pattern and the Indicators of Coronary Heart Disease - Evaluating Research Question One

Research question one centers on determining whether or not behavior pattern is one of the significant predictors of coronary heart disease. In evaluating this question, six separate multiple regression analyses were performed. For three of these analyses, the JAS factors were treated as independent or predictor variables with ratio, cholesterol, and HDL, respectively, used as dependent (criterion) variables. The SAP Type A scales were treated as independent variables in the other three analyses with ratio, cholesterol, and HDL, respectively, used as criterion variables. Other "selected" variables and factors were also used as predictor variables for the six analyses. Thus, there were two analyses for each of the indicators of heart disease. The set

Table 11

Pearson Product-Moment Correlations of Ratio, Cholesterol, HDL Cholesterol, Cortisol, and Perceived Job Stress With the SAP Factors and Other Variables

| | Ratio (N=368) | Cholesterol (N=368) | HDL Cholesterol (N=368) | Cortisol (N=356) | Perceived Job Stress (N=438) |
|---|---|---|---|---|---|
| Age | .06 | .30*** | .15** | .00 | -.13** |
| Perceived Job Stress | -.02 | -.06 | -.02 | .03 | 1.0 |
| Locus of Control | -.04 | -.02 | .03 | -.08 | .24*** |
| Perceived Productivity | .04 | -.00 | .02 | -.03 | .04 |
| Job Autonomy | .10* | .07 | -.06 | .02 | -.27*** |
| Planning Time | -.04 | .07 | .12** | .02 | -.11** |
| Intergroup Conflict | -.06 | .06 | .10* | .07 | .25*** |
| Task Significance | -.01 | .03 | .01 | -.04 | -.02 |
| Goal Clarity | .01 | .05 | .06 | -.00 | -.24*** |
| Need for Enrichment | -.05 | -.03 | .03 | -.03 | .00 |
| Group Goal Setting | .06 | .11* | .01 | .04 | -.08 |
| Problem Solving Participation | .11* | .05 | -.12* | .03 | -.15*** |
| Job Enhancement | -.01 | -.01 | -.02 | -.02 | -.13** |
| Supervision | .06 | -.02 | -.06 | .03 | -.21*** |
| Supervisor Control | -.08 | -.10* | .06 | -.05 | -.04 |
| Micro-Supervision | -.09* | -.04 | .05 | -.10* | .22*** |
| General Organizational Climate | .05 | .02 | -.02 | -.07 | -.22*** |
| Organizational Control | -.01 | -.02 | -.03 | .01 | .29*** |
| Coworker Relations | -.04 | -.07 | .05 | .09* | -.13** |
| Assertiveness | .07 | .12** | -.01 | .09* | -.04 |
| Community/Social Activities | .04 | .02 | -.01 | .10* | -.13** |

Table 11 (Continued)

| | Ratio (N=368) | Cholesterol (N=368) | HDL Cholesterol (N=368) | Cortisol (N=356) | Perceived Job Stress (N=348) |
|---|---|---|---|---|---|
| Home/Family Relations | .06 | .03 | -.06 | .15** | -.08 |
| Exercise | -.11* | -.06 | .10* | .00 | -.08* |
| Job Satisfaction | .00 | .01 | .01 | -.03 | -.26*** |
| Intolerance for Change | -.04 | -.07 | -.04 | -.14** | .19*** |
| Dietary Fat | .14** | .07 | -.21*** | .01 | .09* |
| Sex | -.36*** | -.05 | .49*** | -.09* | -.05 |
| Number Supervised | .13 | .05 | -.15** | -.10* | .08 |
| Number Worked With | -.00 | .05 | .00 | -.14** | .06 |
| Reported Diagnosed CHD | .10* | -.08 | -.10* | -.06 | .08 |
| Reported Ulcer | .07 | .06 | -.03 | -.01 | -.04 |
| Reported Blood Pressure Problem | .17*** | .14** | -.08 | .04 | -.05 |
| Frequency/Severity of Headaches | -.02 | .04 | .06 | .00 | .17*** |
| Jogging | -.09* | -.09* | .05 | -.02 | -.05 |
| Cigarette Smoking | .12* | .10* | -.09* | -.09* | -.01 |
| Cigar/Pipe Smoking | .14** | .07 | -.12* | .02 | .01 |
| Intent to Remain | -.03 | -.04 | .00 | -.02 | -.19*** |
| Weight to Height | .31*** | .16*** | -.26*** | .06 | -.02 |

*$p \leq .050$

**$p \leq .010$

***$p \leq .001$

Table 12

Pearson Product-Moment Correlations of Ratio, Cholesterol, HDL Cholesterol, Cortisol Matrix

| | Ratio (N=368) | Cholesterol (N=368) | HDL Cholesterol (N=368) | Cortisol (N=356) |
|---|---|---|---|---|
| Ratio | 1.0 | .45** | -.77** | -.01 |
| Cholesterol | | 1.0 | .03 | .10* |
| HDL Cholesterol | | | 1.0 | .05 |
| Cortisol | | | | 1.0 |

*$p \leq .050$

**$p \leq .001$

of analyses using the SAP Type A scales was performed because it allowed the use of a much larger sample (N of 368 versus 75).

Ratio Used as the Dependent Variable. Table 11 identifies the factors and variables which correlate significantly with ratio. Dietary fat, number of people supervised, reported blood pressure problem, pipe or cigar smoking, and weight to height category are most significantly correlated with ratio. The direction of these correlations is as expected. Job autonomy, problem solving participation, micro-supervision, exercise, cigarette smoking, and reported diagnosed coronary heart disease problem are also significantly correlated with ratio. The direction of the relationship between two of these variables and ratio is not as

expected; greater problem solving participation correlates positively with ratio, and micro-supervision negatively correlates with ratio. There is no apparent explanation for this finding.

In the first regression analysis, micro-supervision, exercise, dietary fat, sex, cigarette smoking, cigar or pipe smoking, number of people supervised, reported diagnosed blood pressure problem, height to weight category, jogging, three variables on egg and dairy product consumption, perceived stress, and the JAS factors were used as predictor variables. (Only 17 predictor variables were entered into the regression equation due to the small sample size of 75.) The results of this analysis are shown in Table 13.

Table 13

The Predictors of Coronary Heart Disease (Ratio) Including the Jenkins Activity Survey Factors

| Independent Variable[a] | Standardized Regression Coefficient | Dependent Variable--Ratio (N=75) | |
|---|---|---|---|
| | | $R^2$ | $R^2$ Change |
| Number of people supervised | .32 | .10 | .10** |
| Hard driving and competitive | -.20 | .14 | .04* |

*$p \leq .10$

**$p \leq .01$

[a]The independent variables are shown in the order in which they entered the regression equation.

Only two variables, number of people supervised and hard driving and competitive have significant effects on ratio. The data indicates, based on the significance of the Beta coefficients, that ratio increases with the number of people supervised, but decreases when a person possesses a more extreme hard driving and competitive personality. The former finding is logical; it is expected that increased supervisory requirements would be associated with greater job demands and complex problems. These factors in turn could lead to feelings of pressure, anxiety, tension, and stress, thereby increasing the potential of coronary heart disease. The later finding indicates that the hard driving and competitive factor captures or is associated with elements negatively related to heart disease. This second finding is addressed later in this section.

In the second regression analysis, job autonomy, problem solving participation, micro-supervision, sex, exercise, food, cigarette smoking, cigar or pipe smoking, number of people supervised, reported blood pressure problem, height to weight category, perceived job stress, three variables on egg and dairy consumption, and the SAP Type A scales were entered in the equation as predictor variables. The variables with significant effects ($p \leq .10$) on ratio are shown in Table 14. Undoubtedly, the differences between this regression analysis and the previous one were due to the difference in sample size (N=75 versus N=368).

Table 14

The Predictors of Coronary Heart Disease (Ratio)
Including the SAP Type A Scales

| Independent Variable[a] | Standardized Regression Coefficient | Dependent Variable--Ratio (N=368) $R^2$ | $R^2$ Change |
|---|---|---|---|
| Sex (Male=0,Female=1) | -.38 | .13 | .13**** |
| Weight to Height Category | .23 | .19 | .06**** |
| Reported Blood Pressure Problem | .15 | .22 | .03*** |
| Cigarette Smoking | .12 | .24 | .02*** |
| Jogging | -.11 | .25 | .01** |
| Micro-Supervision | -.13 | .26 | .01*** |
| Cigar/Pipe Smoking | .10 | .27 | .01** |
| Hard Driving | .12 | .28 | .01** |
| Competitiveness | -.10 | .29 | .01** |

*p ≤ .1

**p ≤ .05

***p ≤ .01

****p ≤ .001

[a]The independent variables are shown in the order in which they entered the regression equation.

The table reveals that six "traditional" coronary heart disease factors, sex, weight to height, blood pressure, cigarette smoking, pipe or cigar smoking, and exercise, have significant effects on ratio. These effects are all in the expected direction. A behavioral variable, micro-supervision, has significant negative effects on ratio, and it entered the equation before cigar or pipe smoking. The

final two variables to enter the regression equation are the SAP Type A scales of hard driving and competitiveness. Based on the Beta coefficients, the data indicates that ratio increases when a person is more hard driving and decreases with greater competitiveness. This infers that a person with a hard driving nature might place harmful physical and emotional demands on himself, thereby causing increased stress and strain (both physiologically and psychologically) and correspondingly increasing his risk of coronary heart disease. The competitive person, in contrast, probably enjoys competing and benefits from competition which serves as an emotional outlet.

These findings are better understood after examining and further analyzing the Pearson correlations in Table 6. First, the hard driving scale appears to be positively related to coronary heart disease as indicated by its positive correlation with ratio and negative correlation with HDL. Second, at first glance, the competitive scale appears to be very weakly related to heart disease as indicated by its weak correlation with ratio, but further analysis shows that there is an inverse relationship with heart disease. Although the competitiveness scale is negatively correlated with HDL, this correlation is no longer significant when sex was controlled. In contrast, the negative correlation with cholesterol remains significant ($p \leq .10$) even when exercise, jogging, sex, height to weight category, and

dietary fat consumption were controlled. Further, the correlation between ratio and competitiveness gains significance ($p \leq .085$) in the inverse direction when sex was controlled. The competitiveness scale, therefore, appears to capture some positive elements which reduce the potential for developing heart disease. Applying these proposals to the JAS hard driving and competitive factor, it is possible that the hard driving component of this factor is positively associated with heart disease while the competitive component is negatively associated with heart disease.

HDL Cholesterol Used as the Dependent Variable. Table 11 identifies the variables which correlate significantly with HDL cholesterol. Of these, age, sex, number of people supervised, planning time, weight to height, and dietary fat category correlate most significantly with HDL. Intergroup conflict, problem solving participation, exercise, cigarette smoking, and pipe or cigar smoking are also significantly correlated with HDL. The directional nature of these relationships is as expected with two exceptions: intergroup conflict is positively related to HDL and problem solving participation is negatively related to HDL. It is possible that the intergroup conflict construct captures data regarding constructive conflict and the problem solving participation construct reflects the degree to which the person is involved in solving problems, but in a taxing environment.

Two multiple regression analyses were conducted using HDL as the criterion variable. In the first regression analysis, the variables identified above, the JAS factors, three variables on egg and dairy product consumption, perceived stress, and cortisol, were used as predictor variables. The results of the analysis are shown in Table 15.

Table 15

The Predictors of HDL Cholesterol Including the Jenkins Activity Survey Factors

| Independent Variables[a] | Standardized Regression Coefficient | Dependent Variable--HDL Cholesterol (N=75) | |
|---|---|---|---|
| | | $R^2$ | $R^2$ Change |
| Number of People Supervised | -.30 | .09 | .09*** |
| Hard Driving and Competitive | .28 | .15 | .06** |
| Speed and Impatience | -.20 | .19 | .04* |

*p ≤ .10

**p ≤ .05

***p ≤ .01

[a]The independent variables are shown in the order in which they entered the regression equation.

As with ratio, the number of people supervised and the JAS hard driving and competitive factor are the first two variables to enter the regression equation and both have significant effects on HDL. In addition, the JAS speed and impatience factor has a significant, and negative, effect on

HDL. The remaining predictor variables have no significant effects on HDL. The data indicates that the speed and impatience characteristic could increase a person's risk of heart disease by causing the level of HDL in the blood to decrease.

The same variables were used in the second multiple regression analysis involving HDL, except that the SAP Type A scales replaced the JAS factors. The results of the analysis, shown in Table 16, are quite different from those of the first analysis. Here, sex, weight to height category, exercise, age, cigarette smoking, hard driving, intergroup conflict, cigar or pipe smoking, and planning time have significant effects on HDL as indicated by the significance of the Beta coefficient. The data indicates that people who smoke cigarettes, smoke pipes or cigars, are relatively overweight, and are hard driving reduce their HDL level and increase their potential for developing coronary heart disease. HDL levels appear to be greater for females, older people, people who exercise, people who experience intergroup conflict, and people with adequate planning time. Of note is the fact that the hard driving characteristic seems to reduce HDL levels, providing additional support that this characteristic can lead to heart disease.

Cholesterol as the Dependent Variable. Table 11 identifies the variables significantly correlating with cholesterol. Age, assertiveness, reported blood pressure problem, and height to weight category are most significantly correlated

Table 16

The Predictors of HDL Cholesterol Including the SAP Type A Scales

| Independent Variable[a] | Standardized Regression Coefficient | Dependent Variable--HDL Cholesterol (N=356) | |
|---|---|---|---|
| | | $R^2$ | $R^2$ Change |
| Sex | .45 | .24 | .24**** |
| Weight to Height Category | -.18 | .26 | .02**** |
| Exercise | .10 | .28 | .02** |
| Age | .13 | .30 | .02*** |
| Cigarette Smoking | -.12 | .32 | .01[b]*** |
| Hard Driving | -.11 | .33 | .01** |
| Intergroup Conflict | .10 | .34 | .01** |
| Cigar/Pipe Smoking | -.10 | .34 | .01[b]** |
| Planning Time | .10 | .35 | .01** |

*p .1

**p .05

***p .01

****p .001

[a]The independent variables are shown in the order in which they entered the regression equation.

[b]Differences between the $R^2$ and $R^2$ change columns are due to rounding.

with cholesterol. Group goal setting, supervisor control, cigarette smoking, jogging, and cortisol (Table 12) are less significantly related to cholesterol. The direction of most of the relationships is as expected; one unexpected finding is that group goal setting is positively related to cholesterol. There is no apparent explanation for this finding.

Two multiple regression analyses using cholesterol as the dependent variable were conducted. In the first analysis, the JAS factors, age, assertiveness, height to weight category, group goal setting, supervisor control, sex, jogging, cigarette smoking, pipe or cigar smoking, cortisol, dietary fat, and three variables on egg and dairy consumption were entered in the regression equation as predictor variables. The results of this analysis are shown in Table 17. Only two of the variables, cortisol and butter and sour cream consumption, have significant effects on cholesterol. None of the JAS factors have significant effects on cholesterol. The data indicates that cholesterol levels increase as cortisol levels increase and as more butter and sour cream are consumed. If cortisol levels are reflective of felt stress, the former finding indicates that felt stress is positively related to cholesterol, and possibly to coronary heart disease.

The same predictor variables were used in the second regression analysis except that the SAP Type A scales replaced the JAS factors. Table 18 depicts the results of this

Table 17

The Predictors of Cholesterol Including the Jenkins Activity Survey Factors

| Independent Variable[a] | Standardized Regression Coefficient | $R^2$ | $R^2$ Change |
|---|---|---|---|
| Cortisol | .27 | .09 | .09** |
| Butter and Sour Cream Consumption | .20 | .13 | .04* |

*$p \leq .100$

**$p \leq .050$

[a]The variables are shown in the order in which they entered the regression equation.

analysis. Age, butter and sour cream consumption, weight to height category, supervisor control, assertiveness, dietary fat, and competitiveness have significant effects on cholesterol. Based on the significance of the Beta coefficients, the data indicates that cholesterol levels increase with age, greater egg consumption, greater dairy product consumption, greater fat consumption, greater weight in relation to height, and greater assertiveness. Because of this, these variables probably increase an individual's potential for developing coronary heart disease. The data also shows that cholesterol levels decrease when supervisors provide close control (perhaps reducing ambiguity and improving goal clarity, thereby reducing stress) and as the competitive

Table 18

The Predictors of Cholesterol Including the SAP Type A Scales

| Independent Variable[a] | Standardized Regression Coefficient | Dependent Variable--Cholesterol (N=368) | |
|---|---|---|---|
| | | $R^2$ | $R^2$ Change |
| Age | .32 | .10 | .10**** |
| Butter and Sour Cream Consumption | .16 | .13 | .03**** |
| Weight to Height Category | .11 | .14 | .01** |
| Supervisor Control | -.10 | .15 | .01** |
| Assertiveness | .10 | .16 | .01** |
| Dietary Fat | .10 | .17 | .01* |
| Competitiveness | -.09 | .18 | .01* |

*p .100

**p .050

***p .010

****p .001

[a]The independent variables are shown in the order in which they entered the regression equation.

attitude of a person increases. These two variables probably decrease the potential for developing coronary heart disease.

The finding that the competitiveness reduces cholesterol level reinforces the previous finding that competitiveness reduces ratio. Together, these two findings lend greater support to the notion that competitiveness reduces the risk of coronary heart disease.

Behavior Pattern and Locus of Control as Predictors of Coronary Heart Disease - Evaluating Research Question Two

Research question two centers on determining whether behavior pattern is a more significant predictor of coronary heart disease than locus of control. Three multiple regression analyses were conducted to test this hypothesis. Each analysis treated one of the three physiological indicators of heart disease as the criterion variables. In each analysis, the variables and factors which were significantly correlated ($p \leq .05$) with the respective criterion variable, along with locus of control and the JAS Type A factor, were treated as predictor variables.

The results of the analyses are summarized in Table 19. The data in the table shows that for each criterion variable, locus of control enters the regression equation before Type A behavior. Although neither locus of control nor Type A behavior had significant effects with any of the criterion

variables, it can be inferred that, for this sample, locus of control is the better predictor of coronary heart disease. It should be noted that, based on the Beta coefficients, an external locus of control seems to reduce the risk of heart disease, while Type A behavior seems to increase the risk of heart disease.

Table 19

Comparison of the Predictive Strength of Locus of Control and Type A Behavior (N=75)

| | Locus of Control | | Type A Behavior | |
|---|---|---|---|---|
| Criterion Variable | Relative Position in Regression Equation | Standardized Regression Coefficient | Relative Position in Regression Equation | Standardized Regression Coefficient |
| Ratio | 11 of 16 | -.08 | Never Entered | Not Applicable |
| Cholesterol | 10 of 17 | -.08 | 17 of 17 | .02 |
| HDL | 6 of 16 | .10 | 13 of 16 | -.05 |

## The Moderating Effects of Behavior Pattern on the Coronary Heart Disease--Felt Stress Relationship - Evaluating Research Question Three

The focus of research question three is on determining whether or not behavior pattern influences the relationship between coronary heart disease and felt stress. In evaluating this question, two types of analyses were conducted. First, partial correlation analysis was used to assess the change in the correlations between cortisol (the indicator of

stress) and the three physiological indicators of heart disease when Type A behavior was controlled. Second, three multiple regression analyses were then computed to test the moderating effect of Type A behavior while controlling for other variables.

The results of the correlation analysis imply that Type A behavior does not moderate the coronary heart disease--felt stress relationship. Within the subsample completing the JAS, the correlations between cortisol and the three indicators of heart disease are as shown below.

| | Ratio | Cholesterol | HDL (N=72) |
|---|---|---|---|
| r-value | .3066 | .3034 | -.1475 |
| significance | .004 | .005 | .108 |

The correlation values when controlled for Type A behavior are as shown below.

| | Ratio | Cholesterol | HDL |
|---|---|---|---|
| r-value | .3063 | .3035 | -.1492 |
| significance | .005 | .005 | .107 |

The changes in the correlation values are minimal suggesting that Type A behavior does not moderate the relationship.

The multiple regression analyses collaborate this finding. For each analysis, cortisol, the JAS Type A score, and the variables and factors most significantly correlated with the respective criterion variable were used as predictor variables. Cortisol (felt stress) had significant effects on

ratio and cholesterol; in both cases the Beta values were significant at the .02 confidence level. Type A behavior, however, did not have significant effects on either ratio or cholesterol. These findings strongly suggest that, for this sample, Type A behavior does not moderate the coronary heart disease--felt stress relationship.

### Behavior Pattern and the Predictors of Felt Stress - Evaluating Research Question Four

Research question four focuses on assessing the degree to which behavior pattern influences felt stress, with cortisol level being an indicator of felt stress. Two multiple regression analyses were computed to test this question. Among the predictor variables used were those variables and factors shown in Table 11 which significantly correlate with cortisol. Of these variables, home and family relations, intolerance for change, and the number of people worked with are most significantly associated with cortisol. Micro-supervision, coworker relations, assertiveness, community/social activities, sex, number supervised, cigarette smoking, and cholesterol are less significantly related to cortisol.

The direction of some of the relationships involving cortisol is odd, with good coworker relations, and good home and family relations reflecting higher cortisol levels, and, therefore, higher stress levels. It is doubtful that these relations, when considered good, would cause stress to be felt. Moreover, unnecessary micro-supervision and the

number of people supervised are negatively related to cortisol, but one would normally expect these two work related variables to create stress. In comparison, Table 11 shows that micro-supervision is positively related ($p \leq .001$) to and good coworker relations is negatively related ($p \leq .050$) to perceived job stress. One possible explanation for these findings is that cortisol is not a good indicator of felt stress.

Two multiple regression analyses were conducted to assess the impact of behavior pattern on stress. In the first regression, all of the variables significantly correlated with cortisol, along with perceived job stress, external locus of control, height to weight category, and the four JAS Type A factors were used as predictor variables. Data pertaining to this analysis is shown in Table 20. Of these variables, only cholesterol has significant effects on cortisol. It is worth noting that while not significant, speed and impatience, Type A behavior, and job involvement are the third, fifth, and sixth variables entering the regression equation. Therefore, if cortisol is indicative of felt stress, these JAS factors might be, at least, weak predictors of felt stress since they entered the regression equation ahead of most of the other predictor variables.

In the second regression analysis, the same variables were used except that the SAP Type A scales were substituted for the JAS factors. The results of this analysis are shown

Table 20

The Predictors of Cortisol Including the JAS Factors

| Independent Variable[a] | Standardized Regression Coefficient | Dependent Variable--Cortisol (N=74) | |
|---|---|---|---|
| | | $R^2$ | $R^2$ Change |
| Cholesterol | .30 | .09 | .09* |
| Weight to Height Category | + NS | | |
| Speed and Impatience | - NS | | |
| Home and Family Relations | + NS | | |
| Type A Behavior | + NS | | |
| Job Involvement | - NS | | |

*$p \leq .010$

NS = Not significant at the .10 confidence level

[a]The variables are shown in the order in which they entered the regression equation.

in Table 21. None of the four SAP Type A scales have significant effects on cortisol. Again, the direction of the relationships of some of the variables (family and home relations, coworker relations, micro-supervision, and number of people supervised) with cortisol is opposite of the direction expected. This finding casts some doubt on the validity of using cortisol as an indicator of felt stress.

In summary, the results of these two analyses reveal that none of the JAS factors nor SAP Type A scales are significant predictors of cortisol. Based on this, research question four is answered.

## Behavior Pattern and the Predictors of Perceived Job Stress - Evaluating Research Question Five

Research question five centers on determining whether or not behavior pattern is one of the significant predictors of perceived job stress. In evaluating this question, two multiple regression analyses were conducted. For both analyses, locus of control, intergroup conflict, supervision, supervisory detail, general organizational climate, organizational control, coworker relations, job satisfaction, intolerance for change, job enhancement, goal clarity, and home and family relations were entered as predictor variables. These variables were selected as predictor variables because they all demonstrate significant correlations with perceived job stress ($p \leq .010$) (see Table 11). Perceived job stress was used as the criterion variable in these analyses.

Table 21

The Predictors of Cortisol Including the SAP Type A Scales

| Independent Variable[a] | Standardized Regression Coefficient | Dependent Variable--Cortisol (N=356) | |
|---|---|---|---|
| | | $R^2$ | $R^2$ Change |
| Family/Home Relations | .14 | .02 | .02*** |
| Number of People Worked With | -.10 | .04 | .02* |
| Intolerance for Change | -.13 | .06 | .01[b]* |
| Coworker Relations | -.12 | .07 | .01* |
| Micro-Supervision | -.14 | .08 | .01** |
| Perceived Job Stress | .12 | .09 | .01* |
| Assertiveness | .12 | .10 | .01* |
| Number of People Supervised | -.13 | .11 | .01* |
| Cigarette Smoking | -.08 | .11 | .01[b]* |

*$p \leq .10$

**$p \leq .05$

***$p \leq .01$

[a]The independent variables are shown in the order in which they entered the regression equation.

[b]Differences between the $R^2$ and $R^2$ change columns are due to rounding.

In the first multiple regression analysis, the JAS factors were included among the predictor variables. The results of this analysis are shown in Table 22.

Table 22

The Predictors of Perceived Job Stress Including the JAS Factors

| Independent Variable[a] | Standardized Regression Coefficient | Dependent Variable--Perceived Job Stress (N=96) | |
|---|---|---|---|
| | | $R^2$ | $R^2$ Change |
| External Locus of Control | .26 | .09 | .09** |
| Goal Clarity | -.28 | .15 | .06** |
| Hard Driving and Competitive | .22 | .19 | .04* |

*$p \leq .050$

**$p \leq .010$

[a]The independent variables are shown in the order in which they enter the regression equation.

Three predictor variables have significant effects on perceived job stress: external locus of control, goal clarity, and hard driving and competitive. Thus, people with an external locus of control and those with the hard driving and competitive characteristic perceive higher job stress levels. Those persons with clear, specific work goals perceive less job stress.

In the second regression analysis, the SAP Type A scales were included among the predictor variables. Table 23

Table 23

The Predictors of Perceived Job Stress Including the SAP Type A Scales

| Independent Variable[a] | Standardized Regression Coefficient | Dependent Variable--Perceived Job Stress (N=438) | |
|---|---|---|---|
| | | $R^2$ | $R^2$ Change |
| Job Autonomy | -.20 | .09 | .09*** |
| Organizational Control | .11 | .14 | .05* |
| Hard Driving | .14 | .17 | .04[b]** |
| External Locus of Control | .10 | .19 | .02* |
| Intergroup Conflict | .12 | .21 | .01[b]* |
| Job Satisfaction | -.23 | .22 | .01*** |
| Job Enhancement | .23 | .24 | .02*** |
| Goal Clarity | -.13 | .24 | .01[b]** |
| Intolerance for Change | .10 | .25 | .01[b]* |

*$p \leq .050$

**$p \leq .010$

***$p \leq .001$

[a]The independent variables are shown in the order in which they enter the regression equation.

[b]Difference between the $R^2$ and $R^2$ change columns are due to rounding..

reveals the results of this analysis. The predictor variables having significant effects on perceived job stress are job autonomy, organizational control, hard driving, external locus of control, intergroup conflict, job satisfaction, job enhancement, goal clarity, and intolerance for change. The data indicates, based on the significance of the Beta coefficients, that perceived job stress decreases with greater job autonomy, job satisfaction, and goal clarity. The data also provides evidence that perceived job stress increases when organizations have constrictive rules and policies, a person has hard driving characteristics, a person has an external locus of control, intergroup conflict is perceived to exist, job enhancement exists, and the person has an intolerance for change. The direction of the effect of each of these variables, with the exception of job enhancement, is in the expected direction. It is expected that job enhancement would reduce perceived job stress since the job, where job enhancement is high, is tailored to the person's talents and abilities. These jobs, however, may also have greater and more taxing role requirements, thereby resulting in perceived job stress. It should be noted that hard driving scale is the third variable entering the regression equation.

In assessing the results of the two analyses as they pertain to behavior pattern, only the JAS hard driving and competitive factor, and the SAP hard driving scale have significant effects on perceived job stress. This indicates

a strong association between the hard driving component and perceived job stress. The other behavior pattern factors and scales, including the JAS Type A factor, demonstrate no significant association with perceived job stress. Based on these findings, question five is answered.

# CHAPTER 5

## SUMMARY AND CONCLUSIONS

The primary objective of this study has been to examine the degree to which the coronary-prone behavior pattern affects coronary heart disease, felt stress, and perceived job stress. As pointed out in Chapter 2, research has generally found that the behavior pattern is positively related to these three variables. To accomplish the objectives of this study, five research hypotheses and five research questions were proposed after having reviewed literature pertaining to these variables. These research hypotheses and questions were then tested and evaluated. The results of these tests and evaluations were presented in Chapter 4. This chapter will identify some of the limitations of the study, summarize the findings, and provide some conclusions as a result of the findings.

### Possible Limitations

Sample Size. There was one administrative factor which may have adversely influenced the results pertaining to behavior pattern. Only a relatively small number of people completed the JAS (96) and, of these, only 75 usable blood samples were obtained. As a result, the sample might not be representative of a more universal population.

The Indicators of Coronary Heart Disease and Felt Stress. Ideal measures of coronary heart disease and felt stress were not available. Therefore, other physiological indicators were used to represent these two variables. Cholesterol, HDL cholesterol, and the ratio of cholesterol divided by HDL cholesterol were used as physiological indicators of heart disease. Cortisol was used as the indicator of felt stress. It is possible that these measures were poor indicators of the items they were supposed to represent. Therefore, before the results involving these physiological measures are discussed, the validity of the measures is assessed.

In this study, ratio, cholesterol, and HDL appear to be valid indicators of coronary heart disease. This conclusion was reached after having evaluated the correlations in Table 11. Specifically, ratio was positively correlated with reported coronary heart disease problems ($p \leq .025$) and reported blood pressure problems ($p \leq .001$). Cholesterol, although negatively related to reported coronary heart disease problems (perhaps because of the link between cholesterol and age), was positively associated with reported blood pressure problems ($p \leq .005$). HDL was negatively associated with reported coronary heart disease problems ($p \leq .035$) and reported blood pressure problems ($p \leq .075$). These findings, with the exception of the correlation between cholesterol and reported coronary heart disease problems, all lend support to the use of ratio, cholesterol, and HDL as indicators of

coronary heart disease. Additionally, the direction of the correlations between these three physiological indicators and variables frequently identified as coronary heart disease risk factors (i.e., cigarette smoking, pipe or cigar smoking, ratio of weight to height, and dietary fat consumption) were all consistent, that is, ratio and cholesterol were positively associated with these risk factors and HDL was negatively associated with the factors. For these reasons, ratio, cholesterol, and HDL were accepted as valid physiological indicators of coronary heart disease.

The Indicator of Stress. On the other hand, cortisol does not appear to be a valid measure of felt stress. This conclusion was reached by comparing the correlations pertaining to cortisol and perceived job stress (Table 11). One would expect felt stress and perceived job stress to be correlated with one another and to have similar correlations with the other variables contained in the table. This, however, was not the case. The correlation between cortisol and perceived job stress was very small and nonsignificant. Also, there were four variables with which both felt stress and perceived stress significantly correlated, but, in each instance, the correlations were in opposite directions. In addition, perceived stress significantly correlated with 13 of the SAP factors, but cortisol did not correlate significantly with any of these factors. Moreover, cortisol was also positively correlated with factors considered to be nonstressors

(i.e., good coworker relations and good home and family relations). For these reasons, cortisol was not a good physiological indicator of felt stress in this study.

Data Analysis. Pearson product-moment analysis and multiple regression analysis were the two primary methods used in this study to assess the relationships between variables. These two analytic methods provide data which indicate the strength of the linear relationship between variables. Therefore, the association between variables with curvilinear relationships might not have been identified.

## Summary and Conclusions

The results with respect to hypothesis one and research question one do not support the proposition that Type A behavior is significantly related to coronary heart disease. The results, however, advance several important issues concerning the JAS Type A dimensions.

Type A behavior appeared to be only weakly related to coronary heart disease. The JAS Type A score did not correlate significantly with any of the physiological indicators of coronary heart disease. Additionally, the Type A score did not demonstrate any significant effects on the coronary heart disease indicators during the regression analyses. Based on the regression analysis using ratio as the criterion variable, where Type A score demonstrated positive effects on ratio, it was determined that Type A

behavior was positively associated with coronary heart disease. However, the association between Type A behavior and coronary heart disease was weak relative to the three JAS Type A dimensions. For the regression analyses using ratio and HDL as the criterion variables, Type A score entered the regression equation after the three Type A dimensions. There are several feasible explanations for these findings. One is that the relatively small sample size (N=96) may have influenced the results due to a lack of universal representativeness within the subsample. For example, the Type A subsample jogged more, exercised more, smoked cigarettes less frequently, and had lower weight to height ratios than the Type B subsample (see Table 7). Another feasible explanation is that some components of the dimensions making up the JAS Type A construct are either not related or inversely related to heart disease. This latter issue is further examined by assessing the repsective relationships between the JAS Type A dimensions and coronary heart disease.

The three JAS Type A dimensions were related to the heart disease indicators in varying degrees and directions. Of the three dimensions, the speed and impatience factor was most related to coronary heart disease. The speed and impatience factor negatively correlated with HDL and it had significant, negative effects with HDL during the multiple regression analysis. In addition, the speed and impatience

factor's correlation with ratio, while not significant, demonstrated a positive relationship. There is additional support that the impatience component of this factor is related to coronary heart disease. The SAP impatience scale was significantly and positively related with both ratio and cholesterol and negatively related with HDL. Furthermore, during the regression analyses of ratio and cholesterol, the impatience scale was the first variable to enter the regression equation after those variables with significant effects entered. This evidence indicates that the speed and impatience dimension is probably positively related to coronary heart disease.

The hard driving and competitive dimension, in contrast, appeared to be negatively related to coronary heart disease. This dimension was negatively correlated to ratio and positively correlated to HDL. The results of the multiple regression analyses further supported these findings. These results revealed that the hard driving and competitive factor was a significant predictor of ratio (negative relationship) and HDL (positive relationship). The negative relationship between coronary heart disease and the hard driving and competitive factor may be due to the beneficial effects associated with the competitive component of the factor. This possibility was supported by separate analyses of the two components. The multiple regression analyses consistently demonstrated that competitiveness was inversely

related to coronary heart disease, while hard driving appeared to be positively related to coronary heart disease.

It appears that the competitive component captures some beneficial aspects of behavior, and has influenced the nature and direction of the relationship between the hard driving and competitive dimension and coronary heart disease. In explaining this proposition, competitiveness could be beneficial when a person enjoys competing or attains feelings of exhilaration and reward after competing. On the other hand, a competitive nature could be detrimental when competing causes tension, anxiety, or fear. It appears that the JAS only captured data pertaining to the general aspect of competitiveness, providing no means by which we could separate the beneficial effects from the negative effects. Therefore, it is proposed that the JAS be revised to capture the negative aspects of competitiveness. One possibility is to include the following questions in the JAS. Do you try to win at all costs? Do you experience feelings of tension or anxiousness when competing? Does your sense of competition often create conflict or hard feelings with others? Another possibility for improving the JAS might be to change the questions in the JAS in order to link the hard driving and competitive components more closely to one another. This might result in a "competitive drive" factor similar to the one developed by Matthews et al. (1977). In any case, it is believed that the questions in the JAS pertaining to competitiveness can be improved.

The multiple regression analyses indicated that the hard driving component of Type A behavior was positively related to coronary heart disease. Of the different facets of Type A behavior examined in this study, the hard driving component demonstrated the strongest, most consistent relationship with coronary heart disease. In the multiple regression analyses, the hard driving scale demonstrated significant positive effects on ratio and significant negative effects on HDL. Thus, the hard driving demonstrated a positive association with coronary heart disease even when other relevant factors were taken into account.

The findings concerning the JAS job involvement dimension indicated a very weak but positive relationship with coronary heart disease. The correlation data indicated an inverse relationship between job involvement and coronary heart disease. However, based on the regression analysis using ratio as the criterion variable and with the effects of other relevant factors taken into account, job involvement demonstrated a positive association with ratio. As a result, it was determined job involvement was positively related to coronary heart disease.

The findings pertaining to the Type A behavior pattern are summarized as follows. First, Type A behavior and its job involvement dimension were slightly, yet positively, related to coronary heart disease. Second, speed and impatience appeared to have a relatively stronger, positive

relationship with heart disease. Third, the hard driving and competitive dimension appeared to be inversely related to coronary heart disease, with the competitive component of this dimension influencing the direction of the relationship. The data provided strong indications that the competitive component was inversely related to coronary heart disease, while the hard driving component was positively related to heart disease. The finding regarding Type A behavior was not as expected because an abundance of research has identified Type A behavior as a heart disease risk factor. The findings concerning the speed and impatience, and hard driving and competitive dimensions also were not expected and conflicted with previous research. Jenkins et al. (1979) indicated that the JAS dimensions have been repeatedly tested and found to be unrelated to coronary heart disease risk factors. In contrast, this study's findings agree with those obtained by Matthews et al. (1977). Matthews et al. (1977) found a significant relationship between the onset of heart disease and two Type A dimensions, labeled "impatience" (similar to the JAS speed and impatience dimension) and "competitive drive" (comparable with the hard driving and competitive dimension). This study's findings indicate that future research should assess the relationships of both Type A behavior and its dimensions with heart disease. This should be done to determine whether the combination of

behaviors captured by the Type A construct or the individual component dimensions are more predictive of heart disease.

The results with respect to research question two further substantiate the finding that Type A behavior has only a weak relationship with coronary heart disease. This research question centered on determining whether or not Type A behavior would be a more significant predictor of coronary heart disease than locus of control. Although neither Type A behavior nor locus of control were significant predictors of coronary heart disease, locus of control was the better predictor of the two (see Table 19).

Hypothesis three and research question five both concerned evaluating the relative strength of the relationship between Type A behavior and perceived job stress. The The results obtained indicated that Type A behavior and its component dimensions were all positively related to perceived job stress. Although in this sample Type A behavior was not a significant predictor of perceived job stress, the evidence indicates that Type A individuals perceive having much greater job stress than Type B individuals. The hard driving component of Type A behavior might be the major contributor to this greater feeling of job stress since the data revealed a strong relationship between this component and perceived job stress. The higher perceived stress levels among the Type A persons might also be due to their outlcok and attitude pertaining to the work situation. For example, the

Type A persons in this study reported having ambiguous goals, poor supervision, weak supervisory controls, and poor coworker relations. Clearly, people with perceptions such as these would also perceive greater job stress. The Type A individuals might also perceive having greater job stress because of their desire to master stressful situations, causing them to endure stress for longer periods of time (Glass, 1977; Pittner and Houston, 1980). As a consequence of these higher stress perceptions, the Type A individuals might experience anxiety and increased physiological arousal, increasing their risk of coronary heart disease.

In assessing the moderating effects of Type A behavior (Hypotheses 4 and 5), the data revealed that Type A behavior influences the relationships between perceived job stress and locus of control, and between perceived job stress and role ambiguity. The data showed that perceived job stress increased for those Type A individuals with an external locus of control. Type A individuals with unclear or ambiguous goals also perceived having greater job stress. Thus, for individuals characterized as "externals" (locus of control) or individuals experiencing greater role ambiguity, a Type A behavior pattern may exacerbate the problems associated with perceived job stress.

The results concerning research question four must be interpreted with caution. This question asked whether or not Type A behavior would demonstrate a positive association

with felt stress, and is based on the assumption that cortisol is indicative of felt stress. The results with respect to cortisol, however, cast doubt on the validity of this assumption. Consequently, the results obtained might only pertain to cortisol itself.

In assessing the results pertaining to research question four, assuming that cortisol is a valid indicator of felt stress, it appeared that Type A behavior, speed and impatience, and job involvement were reasonably good predictors of felt stress when other stress-related variables were taken into account. Based on the regression analysis (Table 20), the data indicated that Type A persons tended to feel more stress and that persons possessing the speed and impatience and job involvement characteristics tended to feel less stress. This finding is perplexing; how can the Type A behavior pattern be positively related to stress when two of its component dimensions are negatively related to stress? One possible answer to this question is that the results do not pertain to stress, particularly if cortisol is a weak indicator of stress. Another possible answer might be that the sample size (N=74) was too small to provide reliable results.

The results obtained when assessing research question three, which concerns the moderating impact of Type A behavior on the coronary heart disease--stress relationship, strongly suggest that Type A behavior does not moderate the relationship between coronary heart disease and felt stress. This

result is contrary to popular theory regarding stress (e.g., Cooper and Marshall, 1976; Matteson and Ivancevich, 1979) and may have occurred because cortisol is not a good measure of felt stress or because of the limited sample size.

Finally, the results of the analyses of this study suggest a number of issues which should be addressed by future research.

1. This study only assessed the linear relationship between variables. It is possible that the relationship between Type A behavior and coronary heart disease is curvilinear. Further analyses should be conducted to determine whether or not a curvilinear relationship is present.

2. The Type A score should be examined as the dependent variable in multiple regression analyses. These analyses would possibly identify the factors which are predictive of Type A behavior. These analyses might also provide some explanation as to why past research has identified a strong relationship between Type A behavior and coronary heart disease.

3. The moderating influence which Type A behavior exerts on perceived job stress needs to be further assessed. For example, Type A behavior may moderate the relationship between perceived job stress and intergroup conflict, or between perceived job stress and coworker relations. This could identify the variables with which Type A behavior interacts to increase perceived job stress.

4. The SAP should be revised to gather data regarding variables often linked with Type A behavior, such as hostility, time urgency, and work overload. It is possible that one of these variables links Type A behavior with coronary heart disease. Also, these variables might interact with Type A behavior to increase felt stress or perceived stress.

5. The SAP should be revised to more comprehensively measure the Type A construct. Specifically, the SAP needs to be improved regarding the job involvement, and hard driving and competitive dimensions.

6. The relationship between the physiological indicators of heart disease and each of the individual variables making up the SAP hard driving and competitiveness scales should be analyzed. This might identify the specific items within these scales which contribute to coronary heart disease.

7. The relationship between Type A behavior and stressful life events needs to be further assessed. It is possible that Type A individuals who have experienced stressful life events also experience higher stress levels, thereby leading to a higher incidence of coronary heart disease among those individuals.

8. The SAP has two variables which collected data pertaining to stress in the home environment and life stress, respectively. The relationship between these two forms of

stress, the coronary-prone behavior pattern, and the physiological indicators of coronary heart disease should be assessed for the data already obtained.

In conclusion, the topic of stress and its impact on the individual in the workplace is receiving a great deal of attention by behavioral and medical scientists. However, there is an apparent need for these two scientific disciplines to integrate their ideas and to couple their research efforts. In this regard, this study represents an effort to bring both the behavioral and medical perspectives together in an attempt to more comprehensively assess an extremely difficult and challenging issue, namely the influence of individual characteristics and organizational stress on the individuals' health. Specifically, the focus of this study was on the relationship between the coronary-prone behavior pattern, stress, and the physiological risk factors associated with coronary heart disease--the disease which, today, results in the leading cause of death in the United States, heart attack.

This study deals with just a few important pieces of the much needed research on the coronary-prone behavior pattern and stress. The results of this study provide some clarification to the issues introduced earlier and raise some new questions about these issues as well. Hopefully, this study has provided some insights as well as contributed

greater lucidity to what we thus far know about a most perplexing and serious topic, the impact of individual characteristics and stress on coronary heart disease.

# APPENDIX

# THE STRESS ASSESSMENT PACKAGE

SCN 81-115
STRESS ASSESSMENT PACKAGE
(Version 2)

The Stress Assessment Package (SAP) is a tool designed to aid in measuring your personal stress level and determine some of the original components that may contribute to stress.

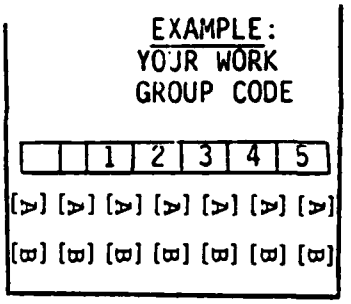
You will find the terms work group, organization, and supervisor used extensively as you complete this questionnaire. The term work group refers to a group of individuals working for the same supervisor, while the term organization refers to the overall organizational unit. For example, if your position is within a section of a squadron then the squadron is your organization and your section is your work group.

Using the answer sheet provided, please mark your responses with a number 2 pencil only. Make heavy black marks that completely fill the appropriate space.

It is important that you answer all items honestly. This is the only way an accurate stress assessment can be made.

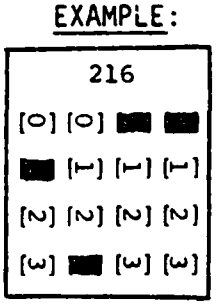
Your individual responses will be held in the strictest confidence, and will not be provided to any organization or persons. Only those directly involved in this research will have access to your completed SAP.

In the information block labeled "your work group code," fill in the appropriate code provided by your survey monitor and blacken the corresponding spaces.




Follow the same procedure for the other blocks as they pertain to you. Fill in yes or no for the supervisor block. If you are a supervisor, fill in your subordinate's work group code, also given by the survey monitor. If you are employed by the Department of Defense, fill in the "Base Unit" code and your Air Force Specialty Code (AFSC).

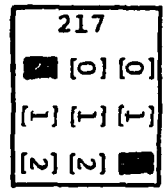
In block 216, blacken the numbers corresponding to your NORMAL Monday through Friday WAKE-UP TIME using a 24-HOUR CLOCK. For example, you normally get up at 1 p.m. for shift work. Using the 24-hour clock, you would blacken in the numbers for 1300, one number per column.



If you are in the military service, or are a civil service employee, use block 217 to fill in your rank corresponding to the code below:

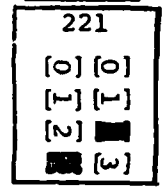
| Officers | Civil Service GS |
|---|---|
| O-1 fill in O-1 | GS-1 fill in 4-1 |
| O-2 fill in O-2, etc. | GS-2 fill in 4-2 |
| | . |
| Warrent Officer | . |
| | . |
| W-1 fill in 2-1 | GS-7 fill in 4-7 |
| W-2 fill in 2-2, etc. | SES fill in 4-16 |
| Enlisted | WG |
| E-1 fill in 3-1 | WG-1 fill in 5-1 |
| E-2 fill in 3-2, etc. | WG-2 fill in 5-2 |
| | . |
| | . |
| | . |
| | WG-7 fill in 5-7, etc. |

EXAMPLE




In block 221, fill in your age by blackening the appropriate numbers. For example, a 32 year old person would used the 3 in the first row and the 2 in the second row.

EXAMPLE




The scales provided next are either 5, 6, or 7-point scasles with an additional space provided for not applicable (NA) responses. For example:

Scale:

| | |
|---|---|
| NA = Not Applicable | 4 = Neither Agree nor Disagree |
| 1 = Strongly Disagree | 5 = Slightly Agree |
| 2 = Moderately Disagree | 6 = Moderately Agree |
| 3 = Slightly Disagree | 7 = Strongly Agree |

Item Statement:

1. My supervisor is a good planner.

Answer Response:

D NA

|| || 001 |1| |2| |3| |4| |5| |6| ■

In the example above the individual selected option 7 since he or she strongly agreed with the statement. If the response had been considered to be not applicable, the NA response space would have been filled in.

DO NOT STAPLE OR OTHERWISE DAMAGE THE ANSWER SHEET

## PRIVACY STATEMENT

In accordance with paragraph 8, AFR 12-35, the following information is provided as required by the Privacy Act of 1974.

a. Authority

(1) 5 U.S.C. 301, Departmental Regulations, and/or

(2) 10 U.S.C. 8012, Secretary of the Air Force, Powers, Duties, Delegation by Compensation; and/or

(3) DOD Instruction 1100.13, 17 Apr 68, Surveys of Department of Defense Personnel, and/or

(4) AFR 30-23, 22 Sep 76, Air Force Personnel Survey Program.

b. Principal Purpose. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DOD.

c. Routine Uses. The survey data will be converted to information for use in research of management related problems. Results of the research, based on the data provided, will be included in written master's theses and may also be included in published articles, reports, or text. Distribution of the results of the research, based on the survey data, whether in written form or presented orally, will be unlimited.

d. Participation in this survey is entirley voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

## PERSONAL BELIEFS

### Instructions

This portion of the questionnaire relates the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives numbered 1 or 2. Using the scale below, indicate which statement most closely follows your own beliefs and record it on your answer sheet.

1 = I strongly agree more with statement 1
2 = I moderately agree more with statement 1
3 = I slightly agree more with statement 1
4 = I slightly agree more with statement 2
5 = I moderately agree more with statement 2
6 = I strongly agree more with statement 2

1. 1 Usually people get the respect they deserve in this world.
   2 An individual's worth often passes unrecognized no matter how hard he/she tries.

2. 1 The idea that teachers are unfair to students is nonsense.
   2 Most students don't realize the extent to which their grades are influenced by accidental happenings.

3. 1 Becoming a success is a matter of hard work; luck has little or nothing to do with it.
   2 Getting a good job depends mainly on being in the right place at the right time.

4. 1 Most citizens can have an influence in government decisions.
   2 This world is run by the few people in power, and there is not much the little guy can do about it.

5. 1 For me, getting what I want has little or nothing to do with luck.
   2 Many times we might just as well decide what to do by flipping a coin.

6. 1 Getting people to do the right thing depends upon ability; luck has little or nothing to do with it.
   2 Who gets to be the boss often depends on who was lucky enough to be in the right place first.

7. 1 There is really no such thing as luck.
   2 Most people don't realize the extent to which their lives are controlled by accidental happenings.

8. 1 It is impossible for me to believe that chance or luck plays an important role in my life.
   2 Many times I feel that I have little influence over the things that happen to me.

9. 1 What happens to me is my own doing.
   Sometimes I feel that I don't have enough control over the direction my life is taking.

## PART II

Indicate your agreement with the statement below using the following scale:

NA = Not Applicable
1 = Strongly Disagree
2 = Moderately Disagree
3 = Slightly Disagree
4 = Neither Agree nor Disagree
5 = Slightly Agree
6 = Moderately Agree
7 = Strongly Agree

10. What happens to me is usually because of my own doing.

11. I frequently feel that in dealing with life situations I might do just as well if I flipped a coin.

12. Generally speaking, there really is no such thing as luck.

13. Without the right breaks one cannot become effective as a manager.

14. Usually, individuals have misfortunes due to their own mistakes.

## PERSONAL ATTRIBUTES

### Instructions

The next set of questions is concerned with your personal attributes. Each item consists of five alternatives. Select the alternative that is the most descriptive of you as an individual. Please record your answer on the answer sheet.

15. 1 Winning is everything; my satisfaction comes from winning.
    2 I like winning any game or event, and am very disappointed when I lose.
    3 I like winning any game or event, and am somewhat disappointed when I lose.
    4 I like winning any game or event, but I equally enjoy the social interaction and participation.
    5 I enjoy the social interaction and participation that comes with a game or event, and losing does not bother me at all.

16. 1 I do my very best when I'm fighting a tight deadline.
    2 I seem to do my best work when I have a reasonable deadline to meet.
    3 I work equally well whether I have a deadline to meet or not.
    4 Although I perform adequately with a deadline to meet, I prefer to not meet a deadline.
    5 I do not like deadlines; I do my best work when I'm not hurried in any manner.

17. 1 I hate to wait on anything or anybody.
    2 I do not enjoy waiting but I will if I absolutely have to.
    3 Although I don't really enjoy waiting, I don't mind it if I don't have to wait too long.
    4 I don't mind waiting; there are many situations where one must wait.
    5 Waiting on something or someone is a pleasant opportunity to relax.

18. 1 I am always in a rush, even when I don't have to be.
    2 Most of the time I'm in a hurry, even when I don't have to be.
    3 I occasionally find myself in a hurry, even though most of the time I don't have to.
    4 I seldom hurry myself; only when I have to.
    5 I will not hurry myself, even when I know I'm late.

19. 1 I always try to do too much, as a result I always feel tired.
    2 I frequently try to do too much, and as a result I feel tired most of the time.
    3 On rare occasions I find myself trying to do too much; when these occasions arise, I slow down.
    4 I pace myself in accomplishing tasks so that they are all accomplished with the minimum amount of fatigue.
    5 I will not overextend myself, even if it means not getting something done.

20. 1 I set very high work standards for myself, and get very upset when I don't meet them.
    2 I set high work standards for myself, and get upset when I don't meet them.
    3 I set my own work standards, and it bothers me somewhat if I don't meet them.
    4 I set work standards for myself, and it bothers me to a little extent if I don't meet them.
    5 I maintain work standards that I can make without overextending myself, and I do not get upset if I occasionally fail.

## PART II

### Instructions

Indicate your agreement with the statement by selecting the response option which best represents your attitude concerning your personal attributes.

| | |
|---|---|
| NA = Not Applicable | 4 = Neither Agree nor Disagree |
| 1 = Strongly Disagree | 5 = Slightly Agree |
| 2 = Moderately Disagree | 6 = Moderately Agree |
| 3 = Slightly Disagree | 7 = Strongly Agree |

21. I like winning any game or event, and I am very disappointed if I lose.

22. I hate to wait on anything or anybody.

23. I am frequently in a hurry, even when I don't have to be.

24. I frequently get upset and angry with people, but I usually do not show it.

25. I set high work standards for myself, and get upset when I don't meet them.

26. I frequently try to do too much, and as a result I feel tired most of the time.

NA = Not Applicable
1 = Strongly Disagree
2 = Moderately Disagree
3 = Slightly Disagree
4 = Neither Agree nor Disagree
5 = Slightly Agree
6 = Moderately Agree
7 = Strongly Agree

27. I eat fast, because sometimes I feel that I could put the time I spend eating to better use.

28. I frequently get irritated when a person takes too long in making his/her point in a normal conversation.

29. I get agitated when someone is late in meeting with me.

## PERCEIVED PRODUCTIVITY

### Introduction

The statements below deal with the output of your group. For some jobs certain statements may not be applicable. Should this be the case for your work group, then you should select the not applicable statement coded "NA" below. Indicate your agreement with the statement by selecting the answer which best represents your attitude concerning your work group.

NA = Not Applicable
1 = Strongly Disagree
2 = Moderately Disagree
3 = Slightly Disagree
4 = Neither Agree nor Disagree
5 = Slightly Agree
6 = Moderately Agree
7 = Strongly Agree

30. The quality of output of your work group is very high.

31. When high priority work arises, such as short suspenses, crash programs, and schedule changes, the people in my work group do an outstanding job in handling these situations.

32. Your work group's performance in comparison to similar work groups is very high.

33. The quantity of output of your work group is very high.

## JOB INVENTORY

### Instructions

Below are items which relate to your job. Read each statement carefully and then decide to what extent the statement is true of your job. Indicate the extent that the statement is true for your job by choosing the statement below which best represents your job.

1 = Not at all
2 = To a very little extent
3 = To a little extent
4 = To a moderate extent
5 = To a fairly large extent
6 = To a great extent
7 = To a very great extent

Select the corresponding number for each question and enter it on the separate answer sheet.

34. To what extent does your job provide a great deal of freedom and independence in scheduling your work and selecting your own procedures to accomplish it?

35. To what extent does your job give you freedom to do your work as you see fit?

36. To what extent do you use your time for weekly or monthly planning?

37. To what extent do you use your time for daily planning?

38. To what extent is your work group involved in establishing goals?

39. To what extent is there conflict between your work group and another work group in your organization?

40. To what extent is there conflict between your organization and another organization with which you have some work-related dealings?

41. To what extent are your job performance goals realistic?

42. To what extent are you proud of your job?

43. To what extent does your job give you a feeling of pride and self-worth?

44. To what extent does doing your job well affect a lot of people?

45. To what extent is your job significant, in that it affects others in some important way?

46. To what extent is your work group involved in establishing goals?

47. To what extent are your job performance goals clear and specific?

48. To what extent do you know exactly what is expected of you in performing your job?

49. To what extent would you like to have the opportunity for personal growth in your job?

50. To what extent would you like to have the opportunity to use your skills in your job?

51. To what extent would you like to have the opportunity to perform a variety of tasks in your job?

1 = Not at all
2 = To a very little extent
3 = To a little extent
4 = To a moderate extent
5 = To a fairly large extent
6 = To a great extent
7 = To a very great extent

52. To what extent are the requirements placed on you in your job in line with your interests and values?

53. To what extent does your present job fulfill your expectations of what a good job involves?

54. To what extent does your job require communication between workers?

55. To what extent are group meetings used to solve problems and establish goals and objectives within your work group?

56. To what extent does your job provide you with the opportunity to accomplish something worthwhile?

57. To what extent does your job enable you to use your natural talents?

58. To what extent does your job utilize your training for that job?

59. To what extent are you allowed to provide ideas for solving job related problems?

60. To what extent are your ideas utilized in solving job related problems?

61. To what extent does your job provide you with the chance to finish completely the piece of work you have begun?

62. To what extent does your job require you to do many different things, using a variety of your talents and skills?

63. To what extent does your job provide the chance to know for yourself when you do a good job, and to be responsible for your own work?

## SUPERVISOR INVENTORY

### Instructions

The statements below describe characteristics of managers or supervisors. Indicate your agreement by choosing the statement below which best represents your attitude concerning your supervisor.

NA = Not Applicable
1 = Strongly Disagree
2 = Moderately Disagree
3 = Slightly Disagree
4 = Neither Agree nor Disagree
5 = Slightly Agree
6 = Moderately Agree
7 = Strongly Agree

Select the corresponding number and mark your answer on the separate answer sheet.

64. My supervisor is a good planner.

65. My supervisor represents the group at all times.

66. My supervisor establishes good work procedures.

67. My supervisor has made his/her responsibilities clear to the group.

68. My supervisor performs well under pressure.

69. My supervisor always helps me improve my performance.

70. My job performance has improved due to feedback received from my supervisor.

71. My supervisor frequently gives me feedback on how well I am doing my job.

72. My relationship with my supervisor is a good one.

73. My supervisor is cooperative.

74. My supervisor is supportive of the people who work for him/her.

75. My supervisor provides close control and firm direction.

76. My supervisor sets procedures and work to be done.

77. My supervisor spends too much time in minor details.

78. My supervisor requires paperwork that is not needed for the job.

## ORGANIZATION CLIMATE INVENTORY

### Instructions

Below are items which describe characteristics of your organization. Indicate your agreement by choosing the statement below which best represents your opinion concerning your organization.

NA = Not Applicable
1 = Strongly Disagree
2 = Moderately Disagree
3 = Slightly Disagree
4 = Neither Agree nor Disagree
5 = Slightly Agree
6 = Moderately Agree
7 = Strongly Agree

79. Your organization is very interested in the attitudes of the group members toward their jobs.

80. Your organization has a very strong interest in the welfare of its people.

81. I am very proud to work for this organization.

82. I could produce a higher quality product, if I only had more time.

83. This organization rewards individuals based on performance.

84. I am uncertain I will still have a job with this organization in the future.

85. People equal to or above my supervisor's position give me tasks without going through my supervisor.

86. There are far too many policies and regulations constricting my effective job performance.

87. I could do my job better if the organization had fewer rules.

88. My relationship with my peers is a good one.

89. There are very few disagreements or conflicts between myself and my co-workers.

90. I have to do things that should be done differently.

91. I work on unnecessary things.

92. I receive an assignment without adequate resources and materials to execute it.

93. I am consulted on decisions that affect my general work area.

94. I am just a pawn, subject to the whims of personnel above me.

95. I do not really have to worry about my output, it would be almost impossible for me to lose my job even if I only put in minimal effort.

## JOB SATISFACTION QUESTIONNAIRE

### Instructions

The items below relate to your job or the Air Force as a profession. Indicate how satisfied or dissatisfied you are with each item. Choose the statement below which best describes your degree of satisfaction or dissatisfaction.

NA = Not Applicable
1 = Extremely dissatisfied
2 = Moderately dissatisfied
3 = Slightly dissatisfied
4 = Neither satisfied nor dissatisfied
5 = Slightly satisfied
6 = Moderately satisfied
7 = Extremely satisfied

96. Progression Opportunities: The chance to rise up the ladder to upper level management positions.

97. Feeling of Helpfulness: The chance to help people and improve their welfare through the performance of your job.

98. Family Attitude Toward Job: The recognition and the pride your family has in the work you do.

99. Work Itself: The challenge, interest, importance, variety, and feelings of accomplishment you receive from your work.

100. Job Security

101. Acquired Valuable Skills: The chance to acquire valuable skills in your job which prepare you for future opportunities.

102. Your Job as a Whole

## ASSERTIVENESS INVENTORY

### Instructions

The following questions will attempt to measure your level of assertiveness. Indicate your agreement with the statement by selecting the answer which best represents your opinion.

1 = Not at all
2 = To a very little extent
3 = To a little extent
4 = To a moderate extent
5 = To a fairly large extent
6 = To a great extent
7 = To a very great extent

103. To what extent do you call it to his/her attention when a person is highly unfair?

104. To what extent do you speak out or protest when someone takes your place in line?

1 = Not at all
2 = To a very little extent
3 = To a little extent
4 = To a moderate extent
5 = To a fairly large extent
6 = To a great extent
7 = To a very great extent

105. To what extent do you call attention to the situation in which a latecomer is waited on before you?

106. To what extent do you insist that your landlord (mechanic, repairman, etc) make repairs that are his/her responsibility to make?

107. To what extent are you able to speak up for your viewpoint when you differ with a person you respect?

## SOCIAL ENVIRONMENT INVENTORY

### Instructions

The items below relate to your social life away from your job. Indicate how much you agree/disagree with each item. Choose the statement below which best describes your degree of agreement.

NA = Not Applicable
1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

108. I am extremely well known in my community, and am well respected for my contributions.

109. I am extremely involved in social activities outside my job.

110. I am frequently asked to contribute time and effort in community projects.

111. I have several hobbies and/or interests apart from work.

112. I lead an active fulfilling social life.

113. I find satisfaction in doing something I enjoy.

114. I often find that my involvement in community affairs interferes with time I would be better off spending on my job.

115. I feel guilty when I'm not working on furthering my career.

## PERCEIVED STRESS

This portion of the questionnaire relates primarily to the extent to which you perceive yourself as under stress and to what you consider the prime contributor.

Using the scale below indicate the extent to which you agree with the statement.

NA = Not Applicable
1 = Strongly Disagree
2 = Moderately Disagree
3 = Slightly Disagree
4 = Neither Agree nor Disagree
5 = Slightly Agree
6 = Moderately Agree
7 = Strongly Agree

116. I am extremely frustrated by my fight for social acceptance away from the job.

117. I feel highly tense because I can't seem to progress in my job.

118. I feel a great deal of stress and anxiety in the performance of my job.

119. My unfulfilled homelife greatly adds to my frustration.

120. My lifestyle away from my job is extremely tense and stressful.

121. I must admit that it makes me angry when other people interfere with my daily activity.

122. I find that a well-ordered mode of life with regular hours is congenial to my temperament.

123. It bothers me when something unexpected interrupts my daily routine.

124. I don't like to undertake any project unless I have a pretty good idea as to how it will turn out.

125. I find it hard to set aside a task that I have undertaken, even for a short time.

## FAMILY INVENTORY

### Instructions

Indicate your agreement with the statement by selecting the answer which best represents your opinion.

1 = Not at all
2 = To a very little extent
3 = To a little extent
4 = To a moderate extent
5 = To a fairly large extent
6 = To a great extent
7 = To a very great extent

126. To what extent are things going well between you and your wife/husband?

127. To what extent are there negative feelings between you and your wife/husband when you are together?

1 = Not at all
2 = To a very little extent
3 = To a little extent
4 = To a moderate extent
5 = To a fairly large extent
6 = To a great extent
7 = To a very great extent

128. To what extent are you satisfied with your family life?

129. To what extent is your relationship with your spouse a good one?

130. To what extent do you and your wife/husband enjoy your time together?

## FOOD CONSUMPTION INVENTORY

### Instructions

Use the scale below to answer the questions for this section.

NA = Never consume (eat or drink) the item(s).
1 = 2-3 times each month (or less).
2 = Once each week.
3 = 2-3 times each week.
4 = 4-5 times each week.
5. 6-8 times each week.
6. 9-11 times each week.
7. 12 or more times each week.

How many times do you consume the following food items?

131. Eggs

132. Dairy products (whole milk, ice cream, cheese, etc. - skim milk does not count).

133. Beef and Pork (steak, hamburger, sausage, spare ribs, etc.)

134. Fried foods (chicken, french fries, potato chips, etc.)

135. Butter (not margarine) and/or sour cream.

## BACKGROUND INFORMATION

### Instructions

The last section of this survey concerns your background. Please darken the space on the optical scan form which corresponds with your response to each question.

136. Total months in this organization is:

1 Less than 1 month.
2 More than 1 month, less than 6 months.
3 More than 6 months, less than 12 months.
4 More than 12 months, less than 18 months.
5 More than 18 months, less than 24 months.
6 More than 24 months, less than 36 months.
7 More than 36 months

137. Total months experience in present job is:

1 Less than 1 month.
2 More than 1 month, less than 6 months.
3 More than 6 months, less than 12 months.
4 More than 12 months, less than 18 months.
5 More than 18 months, less than 24 months.
6 More than 24 months, less than 36 months.
7 More than 36 months.

138. Your race is:

1 American Indian or Alaskan Native
2 Asian or Pacific Islander
3 Black, not of Hispanic Origin
4 Hispanic
5 White, not of Hispanic Origin
6 Other

139. Your sex is:

1 Male
2 Female

140. Your highest educational level obtained was:

1 Non-high school graduate
2 High school graduate or GED
3 Some college work
4 Bachelor's degree
5 Some graduate work
6 Master's degree
7 Doctoral degree

141. How many people do you directly supervise (i.e., those for which you write performance reports)?

1 None
2 1 to 2
3 3 to 5
4 6 to 8
5 9 to 12
6 13 or 20
7 21 or more

142. Does your supervisor actually write your performance report?

1 Yes
2 No

143. Your work requires you to work primarily:

1 Alone
2 With one or two people
3 As a small group team member (3-5 people)
4 As a large group team member (6 or more people)
5 Other

144. How stable are your work hours?

1 Highly Stable--Routine 8 hours a day.
2 Very Stable--Nearly routine 8 hour day.
3 Moderately Stable--Shift work which periodically changes.
4 Slightly Unstable--Irregular working hours.
5 Highly Unstable--Frequent business trip or away from office.

145. How stable is your work location?

1 Highly Stable--Six to eight hours per day at one central location, office or desk.
2 Very Stable--At least half the day at office or desk.
3 Slightly Unstable--Work predominately away from desk.
4 Highly Unstable--Constantly on the road (i.e., traveling salesman).
5 Periodically Unstable--Work at one location for a short period of time then another location for a short period of time (i.e., oil well driller, consultant, doctor--working hospital and office, etc.).

146. Your work schedule is basically:

1 Shift work, usually days.
2 Shift work, usually swing shift.
3 Shift work, usually nights.
4 Shift work, usually days and nights.
5 Daily work only.
6 Crew schedule.
7 Other.

147. Have you been diagnosed as having coronary artery disease or coronary heart disease?

1 Yes
2 No

148. Have you been diagnosed as having an ulcer?

1 Yes
2 No

149. Do you have a problem with your blood pressure?

NA = Don't Know
1 Yes, high blood pressure
2 Yes, Low blood pressure
3 No

150. Do you have frequent or severe headaches?

1 Yes
2 No

151. If you are a jogger, the average number of miles you jog per day is:

1 I do not jog.
2 1 mile.
3 2 miles.
4 3 miles.
5 4 miles.
6 5 miles.
7 More than 5 miles.

152. If you smoke cigarettes, you smoke the following number of cigarettes:

1 I do not smoke cigarettes.
2 Less than 5 per day.
3 6-10 per day.
4 11-20 per day.
5 21-30 per day.
6 31-40 per day.
7 More than 40 per day.

153. If you smoke a pipe or cigar, you smoke the following number of pipe bowls or cigars:

1 I do not smoke a pipe or cigar.
2 Less than 2 bowls or cigars per day.
3 2-4 bowls or cigars per day.
4 5-6 bowls or cigars per day.
5 7-8 bowls or cigars per day.
6 9-10 bowls or cigars per day.
7 More than 10 bowls or cigars per day.

154. Consult the chart on the next page to answer the following question. Your weight category (according to height) is:

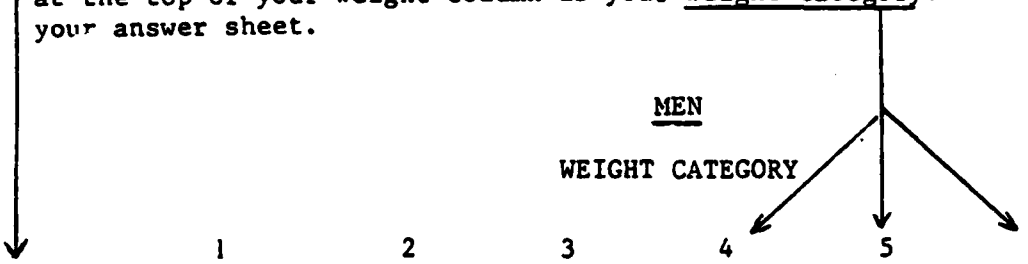
155. Which statement most accurately describes your exercise program?

1 I do not participate in any exercise program as I get sufficient exercise through the exertions of my job.
2 I do not exercise regularly.
3 I participate in a light exercise program (hiking, bowling, golf).
4 I participate in moderate exercise program (tennis, baseball, ping pong).
5 I participate in a strenuous exercise program (jogging, football, swimming).

156. I participate in an exercise program:

NA = I do not participate in an exercise program.
1 At least once a week.
2 At least twice a week.
3 At least three times a week.
4 At least four times a week.
5 At least five times a week.
6 More than five times a week.

NOTE: Men - use top table; women use bottom table.
Locate your height; move across the row until you find your weight. The number at the top of your weight column is your weight category. Mark this number on your answer sheet.



MEN

WEIGHT CATEGORY

| Height | 1 This Weight and Under | 2 | 3 | 4 | 5 | 6 | 7 This Weight or Greater |
|---|---|---|---|---|---|---|---|
| 6' 4" | 138 | 139-155 | 156-171 | 172-190 | 191-208 | 209-227 | 228 |
| 6' 3" | 134 | 135-150 | 151-166 | 167-185 | 186-203 | 204-221 | 222 |
| 6' 2" | 130 | 131-146 | 147-161 | 162-180 | 181-197 | 198-215 | 216 |
| 6' 1" | 126 | 127-142 | 143-157 | 158-175 | 176-192 | 193-209 | 210 |
| 6' 0" | 123 | 124-139 | 140-153 | 154-170 | 171-186 | 187-203 | 204 |
| 5'11" | 120 | 121-135 | 136-149 | 150-165 | 166-181 | 182-197 | 198 |
| 5'10" | 117 | 118-131 | 132-146 | 147-160 | 161-175 | 176-191 | 192 |
| 5' 9" | 114 | 115-128 | 129-141 | 142-156 | 157-171 | 172-186 | 187 |
| 5' 8" | 110 | 111-124 | 125-137 | 138-152 | 153-166 | 167-181 | 182 |
| 5' 7" | 107 | 108-121 | 122-133 | 134-147 | 148-161 | 162-175 | 176 |
| 5" 6" | 104 | 105-117 | 118-129 | 130-143 | 144-156 | 157-171 | 172 |
| 5' 5" | 102 | 103-114 | 115-126 | 127-139 | 140-152 | 153-166 | 167 |
| 5' 4" | 99 | 100-112 | 113-123 | 124-136 | 137-149 | 150-162 | 163 |
| 5' 3" | 97 | 98-109 | 110-120 | 121-133 | 134-145 | 146-159 | 160 |
| 5' 2" | 94 | 95-106 | 107-117 | 118-129 | 130-141 | 142-154 | 155 |

WOMEN

WEIGHT CATEGORY

| Height | 1 This Weight and Under | 2 | 3 | 4 | 5 | 6 | 7 This Weight or Greater |
|---|---|---|---|---|---|---|---|
| 6' 0" | 115 | 116-130 | 131-143 | 144-159 | 160-174 | 176-190 | 191 |
| 5'11" | 112 | 113-126 | 127-139 | 140-155 | 156-170 | 171-185 | 186 |
| 5'10" | 109 | 110-122 | 123-135 | 136-151 | 152-165 | 166-180 | 181 |
| 5' 9" | 106 | 107-119 | 120-131 | 132-147 | 148-161 | 162-175 | 176 |
| 5' 8" | 102 | 103-115 | 116-127 | 128-143 | 144-156 | 157-171 | 172 |
| 5' 7" | 99 | 100-112 | 113-123 | 124-139 | 140-152 | 153-166 | 167 |
| 5' 6" | 96 | 97-108 | 109-119 | 120-135 | 136-150 | 149-161 | 162 |
| 5' 5" | 93 | 94-104 | 105-115 | 116-130 | 131-142 | 143-155 | 156 |
| 5' 4" | 90 | 91-102 | 103-112 | 113-126 | 127-138 | 139-150 | 151 |
| 5' 3" | 83 | 89- 99 | 100-109 | 110-122 | 123-133 | 134-145 | 146 |
| 5' 2" | 86 | 87- 96 | 97-106 | 107-119 | 120-130 | 131-142 | 143 |
| 5' 1" | 83 | 84- 94 | 95-103 | 104-116 | 117-127 | 128-138 | 139 |
| 5' 0" | 81 | 82- 91 | 92-100 | 101-113 | 114-123 | 124-135 | 136 |
| 4'11" | 78 | 79- 88 | 89- 97 | 98-110 | 111-120 | 121-131 | 132 |
| 4"10" | 77 | 78- 86 | 87- 95 | 96-107 | 108-117 | 118-127 | 128 |

157. Which of the following statements best describe your marital status?

NA Not married - No children
1 Married - Spouse is employed outside home.
2 Married - Separated due to employment.
3 Married - Separated by choice.
4 Married - Spouse is not employed.
5 Married - Spouse is not employed - separated due to employment.
6 Divorced - Do not have custody of children.
7 Single parent.

158. If I have my own way, I will not be working for my present organization a year from now.

1 Strongly Disagree
2 Slightly Disagree
3 Neither Agree nor Disagree
4 Slightly Agree
5 Strongly Agree

159. I really think that I will be at this organization a year from now (i.e., US Air Force, Industry, Hospital, etc.).

1 Strongly Disagree
2 Slightly Disagree
3 Neither Agree nor Disagree
4 Slightly Agree
5 Strongly Agree

160. Are you currently (within the last week) taking <u>any</u> prescribed or non-prescribed medication?

1 No.
2 Yes. If yes, then turn to the next page and fill in your <u>identification number</u> (the one on the <u>upper right</u> corner of your optical scan form) and complete the page.

PLACE I.D. NUMBER HERE

_____

_____

1. Medication Name:

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

2. Use (if known):

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

3. Dosage (if known):

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

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