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Investigations Of The Construct Validity Of A New Measure Of The Type A Behaviour Pattern: The Survey Of Work Styles

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INVESTIGATIONS OF THE CONSTRUCT VALIDITY OF A NEW MEASURE OF

THE TYPE A BEHAVIOUR PATTERN: THE SURVEY OF WORK STYLES

by

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ABSTRACT

Previous measures of the Type A behaviour pattern (TABP) fail to assess the multidimensionality of the TABP. This dissertation evaluates the construct validity of the Survey of Work Styles (SWS), a multidimensional self-report measure of the TABP.

In Study 1, the SWS demonstrated (1) moderate to high internal consistency, (2) moderate correlations with the Jenkins Activity Survey and the Framingham Type A Scale, and (3) a significantly higher T?BP classification agreement than other self-report measures with the Structured Interview in a sample of 163 middle-aged male business managers. Three bipolar modal profiles were identified and labelled as the Anger/Impatience, Job Dissatisfaction, and Anger/Work Involvement profiles. The three SWS modal profiles were predictive of mean systolic blood pressure during the Structured Interview, and the Anger/Work Involvement modal profile was predictive of diastolic blood pressure.

The results of Study 2 demonstrated that in a sample of 252 middle-aged men the SWS was (1) essentially uncorrelated with traditional coronary risk factors, and (2) incrementally predictive of CHD. Eight-eight percent of men with coronary heart disease scored high on either the SWS Anger/Impatience or the Job Dissatisfaction modal profile.

Study 3, an examination of the psychopathological correlates of the SWS in a sample of 33 male and 76 female employed adults found that the Anger/Impatience profile was related to interpersonal problems. The Job Dissatisfaction profile was negatively related to interpersonal problems. Hypochondriasis, interpersonal problems, persecutory ideas, and anxiety were associated with the Anger/Work Involvement profile. These results indicate that the Anger/Impatience profile, the Job Dissatisfaction profile, and the Anger/Work Involvement profile resemble the angry state, the depressed state, and the "Superwoman/Superman" state, respectively. These are three Type A states posited by Price (1982).

These results support the reconceptualization of the TABP as a multidimensional construct. Important individual differences were identified in the expression of the Type A components. Differences were also noted in the associations of the SWS profiles with physiological reactivity, prevalence of CHD, and psychopathology.

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LIST OF ABBREVIATIONS

Abbreviation	Description
BPI	Basic Personality Inventory
CHD	Coronary Heart Disease
JAS	Jenkins Activity Survey
kcal	kilocalories
kg/m^2	kilograms per square metre
mg/dl	milligrams per decilitre
mmHG	millimetres of mercury
SWS	Survey of Work Styles
TABP	Type A Behaviour Pattern

Chapter I

Introduction

<u>Overview</u>

In the past, there has been an increasing interest in improvements in the assessment of the Type A behaviour pattern (TABP). The TABP, characterized by vigorous verbal and psychomotor mannerisms, a chronic sense of time urgency, easily aroused anger and hostility, enhanced competitiveness, extreme impatience, and aggressive achievement striving (Jenkins, Zyzanski, & Rosenman, 1978) has predominantly been assessed using the Structured Interview (Rosenman et al., 1975), the Jenkins Activity Survey (JAS; Jenkins, Rosenman, & Zyzanski, 1974) and the Framingham Type A Scale (Haynes, Feinleib, & Kannel, 1980). Recent critical attention in Type A research has focussed on the current methods of Type A measurement. The purpose of this dissertation is to evaluate the construct validity of the Survey of Work Styles (SWS), a newly developed multidimensional self-report measure of the TABP. Specifically, Study 1 will examine the relation of the SWS with several existing Type A measures. This study will also examine the ability of the SWS to predict physiological arousal to a social stressor. Study 2 will examine the relation of the SWS to the prevalence of coronary heart disease. The final study will assess the relation between the SWS and psychopathological dimensions.

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This dissertation is organized into six chapters. Chapter I provides a review of the literature concerning the development of the SWS, the historical background of the relation between psychosocial factors and coronary heart disease, the definition and assessment of the TABP, mechanisms involved in CHD, the hypothesized consequences of the TABP and its components (including physiological reactivity, atherosclerosis, and CHD), cognitive social learning model of the TABP, and the psychopathological correlates of the TABP. Chapter II is an overview of the three empirical studies presented in this dissertation. The examination of the relation between the SWS and existing Type A measures, as well as its relation to physiological reactivity that comprises the first study is presented in Chapter III. Study 2, an evaluation of the relation of the SWS with CHD and traditional coronary risk factors is presented in Chapter IV. The investigation of the psychopathological correlates of the SWS that forms Study 3 is presented in Chapter V. The final chapter, Chapter VI, is a general discussion of the results of the three studies.

Introduction to the Survey of Work Styles

The SWS is a 96-item multidimensional self-report measure of work-related attitudes and beliefs comprising the TABP. It was developed using the construct approach to test construction (Jackson, 1971; Wiggins, 1973). The strategy used for scale development followed the principles outlined by Jackson (1971, 1984), and Jackson and Paunonen (1985).

The major steps in the development of the SWS were: (1)
identification of relevant TABP components through an
extensive review of the literature; (2) development of
mutually exclusive, explicit definitions of each construct
identified as important to the TABP; (3) creation and
edition of items with special attention to positive and
negative exemplars of the construct, incorporating a
universe of situations in which the construct would be
manifested, and the various modes of possible expression,
and (4) selection of items based on item analysis.

Items on the SWS were rewritten and readministered
until 16 items (8 items keyed positively, 8 items keyed
negatively) for each scale met the criteria for inclusion on
the SWS. These item criteria were: (1) evidence of
convergent and discriminant item properties (a substantially
higher correlation with its own content scale than with any
other scale); (2) evidence of discrimination ability (a
variance of endorsement of at least .85); (3) evidence of
content saturation (item-total scale correlation of at least
.35); and (4) low susceptibility to desirability response
bias (a correlation of no greater than .40 with social
desirability scale). Items' content saturation was also
evaluated using the Differential Reliability Index developed
by Jackson (1970), such that an item was excluded if its
Differential Reliability Index was less than .30. This
yields scales low in social desirability, but high in
internal consistency. The Differential Reliability Index is

calculated as the square root of the item's squared correlation with its own scale from which its squared correlation with the Desirability scale is removed. Lastly, the discriminant ability of each items was evaluated using the Item Efficiency Index, that is the item's squared correlation with its own scale, from which a weighted quantity of the item's-squared correlation with the other scales is removed (Neill & Jackson, 1976). An item was discarded if the Item Efficiency Index was lower than .30, yielding scales with low scale intercorrelations and high internal consistency reliability. Once items were selected empirically, they were examined to ensure the representativeness and generalizability of the scale content.

The SWS consists of six content subscales (Anger, Impatience, Job Dissatisfaction, Work Involvement, Competitiveness, and Time Urgency). In order to keep the SWS brief, only six constructs identified by the review of the literature as important components of the TABP were included as subscales. Mutually exclusive definitions of each subscale construct can be found in Table 1.

All subscales have a reliability of at least .85 in a sample of male business managers. In this sample, the SWS was shown to correlate .76 with the Framingham Type A Scale (Mavrogiannis, Majid, Chan, & Jackson, 1986). Scoring of the SWS yields scores on each of the six content subscales and an overall score that is the sum of all 96 item

Table 1

Survey of Work Styles Subscale Definitions

Scale name	Definition
Impatience	intolerance of time delays, or anything that hinders one's desired progress
Anger	one's propensity to become antagonized, resulting in an emotional excitement characterized by an evident display of feelings (flushed cheeks, accelerated heart rate), and a desire or intent to punish or seek revenge
Time Urgency	preoccupation with vocational deadlines and similar pressures, resulting in hurried, abrupt motor mannerisms and style
Work Involvement	preoccupation with one's job, to the exclusion of recreational or social activities
Job Dissatisfaction	absence of a positive emotional state resulting from the appraisal of one's job on the following dimensions: coworker friendliness and competence, supervisory styles, working conditions, recognition, opportunities for promotion, and work difficulty and control of work activities
Competitiveness	tendency to struggle to win over others in order to achieve recognition, or obtain a "prize", even in noncompetitive situations

responses. In addition, the SWS utilizes an ordination approach to classification where relations among individuals are represented as points in a parsimonious multidimensional space (Skinner, 1977). This contrasts the clustering approach used by the Structured Interview where individuals are directly allocated into mutually distinct types.

Modal profile analysis has been used to multidimensionally score the SWS. This procedure can be conceptualized as a factor analysis of persons rather than of tests. This approach yields a set of modal profiles, each of which is a hypothetical pattern of SWS components that is characteristic of a subgroup of persons in the population. A person's profile of SWS subscale scores may be represented as a weighted mixture of several modal profiles. Each individual receives a score for each modal profile, representing his/her similarity (on the basis of profile shape) to that profile.

The three profile scores are simply the correlation between the individual's pattern of "ups" and "downs" across the SWS subscales. Elevation (the mean level of SWS scale scores) and scatter (the dispersion of SWS scale scores about the mean) are not considered in the scoring of the modal profiles because it is hypothesized that the shape of an individual's SWS profile yields indices of one's stable personality trait, whereas elevation and scatter reflect a temporary state. It must be emphasized that these modal profiles are bipolar, and individuals may receive a profile

score ranging from -1 to +1. A score of -1 would indicate that this individual displayed a pattern of SWS scores exactly opposite to that represented by the modal profile.

In a sample of male and female university students (Gray & Jackson, in press), modal profile analysis yielded three orthogonal bipolar profiles. One bipolar modal profile was characterized by individuals scoring high on the Anger and Impatience subscales, and low on the Work Involvement and Time Urgency subscales. The second SWS modal profile was represented by individuals scoring high on the Job Dissatisfaction and Anger scales, but low on the Competitiveness scale. The final modal profile was identified by individuals high on the SWS Anger and Time Urgency scales, and low on the Work Involvement and Impatience scales.

In this sample, the SWS was shown to predict physiological measures of blood pressure and heart rate in male and female university students. Further research, though, is needed to establish the criterion and construct validity, internal consistency, and utility of the SWS as a measure of the TABP.

Historical Background of the Role of Psychosocial Factors in the Etiology of Coronary Heart Disease

The role of psychosocial factors in the pathogenesis of CHD had been recognized as early as the 17th century. In 1628, William Harvey wrote that "Every affection of the mind that is attended with either pain or pleasure, hope or fear,

is the cause of an agitation whose influence extends to the heart" (cited in Jenkins, 1978, p. 543). About 150 years later John Hunter noted the relation between his own experience with angina pectoris and emotions: "My life is in the hands of any rascal who chooses to annoy me..." (cited in Jenkins, 1978, p. 544). The observation that emotional factors play a role in the symptomatology of cardiovascular disorders led Canadian Sir William Osler to state that "it is not the delicate neurotic person who is prone to angina, but the robust, the vigorous in mind and body, the keen and ambitious man, the indicator of whose engines is (sic) always at 'full speed ahead'" (Osler, 1910, p. 839). Osler also felt that the overt behaviour exhibited by his coronary patients was so characteristic that he could diagnose CHD in new patients simply by examining the external behaviour of the patients as they entered the room.

The idea that coronary patients could be identified by their external behavioural mannerisms was neglected until the American psychiatrists, the Menningers (1936), noticed that cardiovascular disorders were sometimes related to strong aggressive tendencies that were totally repressed. Kemple (1945) also observed this pattern of aggressiveness and hostility in patients with hypertensive cardiovascular disease and patients with coronary occlusion. In addition, Kemple reported that the coronary patients were highly ambitious, competitive, and compulsive in their striving to achieve goals.

It was not until the work of cardiologists Rosenman and Friedman in mid-1950 on TABP that the role of personality and/or behavioural factors in the development of CHD began gaining scientific attention. They began by examining a large number of cardiac patients, noticing a recurrent pattern of speech and behavioural characteristics that typified the group. They labelled these characteristics "Type A" and the absence of them "Type B." The assessment of this behaviour pattern was accomplished by using the Structured Interview.

The Structured Interview has been recognized as the most valid and reliable instrument for the assessment of the TABP (Byrne, Rosenman, Schiller, & Chesney, 1985), but because of limitations and difficulties with the Structured Interview that will be discussed later, several alternative paper-and-pencil measures of the TABP have been developed.

The JAS, a 52-item self-report questionnaire that includes four scales, a continuous Type A/B scale and three subscales, (1) Hard-Driving, (2) Speed-Impatience, and (3) Job Involvement, and the Framingham Type A Scale, consisting of ten self-report items were designed to mimic the content of the Structured Interview. Although these instruments met the need for an inexpensive, objective, easily group-administered instrument, they had weak psychometric properties, such as modest reliability and validity, and inadequate coverage of the Type A construct.

Definition of the Type A Behaviour Pattern

TABP was initially defined as an action-emotion complex exhibited by individuals in appropriate situations (Friedman, 1969; Rosenman & Chesney, 1980). Type A persons are typically "engaged in a relatively chronic struggle to obtain an unlimited number of poorly-defined things from their environment in the shortest period of time, and if necessary, against the opposing efforts of other things or persons in the same environment" (Friedman, 1969, p. 269). In order to achieve these goals Type As exhibit extremes of competitiveness, aggression, impatience, anger, work involvement, and time urgency. The TABP appears to be encouraged because it often results in special rewards, and opportunities (Abbott & Peters, 1988). Glass and Carver (1980) found that the TABP is a "characteristic style of responding to environmental stressors that threaten the individual's sense of control." Thus, the TABP may be perceived as an outcome of an interaction between predispositions and stressful or challenging situations (Matthews & Haynes, 1986).

The definition of the TABP has evolved over the years, and since Rosenman and Friedman's first observations, at least 31 different components have been included in the description of the TABP (Abbott & Peters, 1988; Price, 1982). Recently Friedman decided that his initial description of the TABP as an emotional complex was incorrect. Instead, he argued that the TABP is a medical

disorder (Friedman, 1988), and could only be assessed using the Videotaped Clinical Interview. No evidence, however, was provided to support this claim. Further, Friedman claimed that the detection of the TABP required a researcher to be an expert in clinical diagnostic methodology - in other words, a physician. As noted by Steptoe (1984) the medicalization of behaviour is undesirable. Further, Steptoe drew the analogy between the TABP and CHD to homosexuality and AIDS. Homosexuality has been found to be related to the development of AIDS and is a strong predictor of this disease. The TABP is related to the development of CHD and is a strong predictor of this disease. Just as some heterosexuals develop AIDS, some Type Bs develop CHD. Similarly, only some homosexuals develop AIDS, just as only some Type As develop CHD. This relation to AIDS does not make homosexuality a medical disorder in need of medical intervention, just as the TABP is not a medical disorder in need of treatment. Instead, homosexuals need to be informed of the consequences of their actions and guidelines on how to reduce their risk of AIDS, just as Type As need to learn the consequences of their actions and given assistance to reduce their coronary risk.

In contrast to Friedman, Rosenman, who jointly with Friedman coined the term "Type A behaviour" recognizes that "the TABP is based on an underlying set of values, thoughts, and approaches to interpersonal relationships; in turn these are manifested by characteristic gestures, facial

expressions, respiratory pattern, motor activity and pace, and speech stylistics" (Rosenman, Swan, & Carmelli, 1988, p. 9). Clearly, as will be discussed later using the cognitive social learning theory, the TABP is a behavioural-cognitive factor (thus in the domain of psychology) that predicts CHD (Linden, 1987).

Assessment of Type A Behaviour

Some critics have argued that Type A researchers should use the Structured Interview (e.g., Davis & Cowles, 1985; Friedman, 1988; O'Looney, Harding, & Eisler, 1985). As noted by Yarnold and Bryant (1988), however, using only one measure to assess the TABP represents a "mono-operation bias," thus restricting the construct validity of primary research (Cook & Campbell, 1979). Examples of this problem include the early exclusive use of the Rotter's Internal-External scale (Rotter, 1966) and Bem's psychological androgyny scale (1974). Subsequent work using new measures of locus of control revealed that control is multidimensional (Gregory, 1981) not unidimensional as initially defined. Similarly, the concept of androgyny has been both theoretically and empirically modified (Bem, 1977; Spence, Helmreich, & Stapp, 1975). If only one measure is used to define the TABP, then it is uncertain how much of what is measured by the Structured Interview is related to TABP, and how much is related to the interview method of assessment. The use of multiple measures to define the TABP would allow researchers to determine that Type A measures

assess the TABP as intended, and not something unique to one particular operational definition (Yarnold & Bryant, 1988). Reliance on the Structured Interview reduces the ability to describe the TABP theoretically, especially in light of the fact that the TABP is multidimensional, having behavioural, cognitive, and emotional dimensions. As noted by Williams (1984) "it is an essential aspect of scientific progress that theories and concepts are not immutably cast in concrete, but are continually subject to updating, modification, and refinement as new data become available" (p. 131).

Williams (1984) has also responded to Friedman's conviction that the TABP is a medical disorder, and can only be assessed by an interview. Williams believed Friedman's criticism of questionnaires to assess the TABP was analogous to

> the astute clinician who discovered the sweet taste of the urine from diabetic patients, taking issue with the biochemists who come on the heels of his discovery and attempt to measure the chemical constitutes of urine to determine what is responsible for the taste. Once such measures are available, it may no longer be necessary to taste the urine (p. 130).

The validity of different methods of assessing the TABP is a controversial issue (Boyd & Begley, 1987; Yarnold & Bryant, 1988). Although at least 15 different methods (e.g., Bortner & Rosenman, 1967; Eysenck & Fulker, 1983;

Matthews & Angulo, 1980; Vickers, Hervig, Rahe, & Rosenman, 1981) of assessing the TABP have been published (Yarnold & Bryant, 1988), most published research uses either the Structured Interview, the Jenkins Activity Survey or the Framingham Type A Scale. The limitations and problems of these measures (such as low internal consistency, susceptibility to response bias, inadequate coverage of the Type A domain) have resulted in efforts to develop a new measure of Type A behaviour.

The Structured Interview. The Structured Interview is considered to be the "best" measure of the TABP because it has demonstrated the strongest relation with CHD (Booth-Kewley & Friedman, 1987; Matthews, 1988), and with cardiovascular reactivity in response to stress (Harbin, 1989). The Structured Interview consists of a structured set of 25 questions traditionally administered in a provocative manner. This style involves interrupting the participant to elicit frustration and anger. Some questions are deliberately asked very slowly, giving impatient individuals the opportunity to finish the interviewer's question. An example of this type of question is "Most people who work have to get up fairly early in the morning—in your particular case, uh-what-time-uh-do-you-uh, ordinarily uh-uh-uh-uh-uh-get-up?". Other questions are intentionally asked in a challenging manner. An example of this type of question is "Do you have any children? When they were around the ages of six and eight, did you ever

play competitive games with them, like cards, checkers, Monopoly? Did you always allow them to win on purpose? Why (or why not)?"

Controversy has recently emerged over whether or not the interview should be conducted in a challenging manner. According to Scherwitz (1988), Type A classifications based on a facilitative interview are more predictive of CHD than those based on a challenging interview. The Structured Interview is an expensive and time consuming individual form of Type A assessment, with respect to its administration and scoring. It takes approximately 30 to 40 minutes to administer and score each individual interview, thus making it an impractical method of Type A assessment in large studies. Furthermore, it is necessary for the purposes of standardization to be trained in the Structured Interview assessment by Rosenman and Friedman. This results in considerable expense in terms of registration fees, travel, and time. Frequent retraining is required for calibration.

Traditionally, the Structured Interview has been scored to yield only a global categorization of the TABP, giving little diagnostic information about observable behaviours, information that is essential for intervention (Matthews, 1982). The global categorization of the TABP results in the loss of theoretically important information relevant to the understanding of psychological and physiological processes of the TABP (Hinton, 1988). Subjects are classified as A1 (fully developed Type A), A2 (many Type A characteristics,

but not full pattern), X (equal representation of Type A and Type B characteristics), and B (the absence of Type A characteristics). Up to 67 percent of the variance in achieving the final Type A rating are accounted for by speech characteristics (Blumenthal, O'Toole, & Haney, 1984; Matthews, Krantz, Dembroski, & MacDougall, 1982; Schucker & Jacobs, 1977). Interrater reliability varies from 68 percent to about 80 percent, but is lower if four categories of classification are used (Blumenthal et al., 1984; Dielman et al., 1987; Jenkins, Rosenman, & Friedman, 1968).

Although a number of component scoring systems have been developed over the last several years (Dembroski, MacDougall, Williams, Haney, & Blumenthal, 1985; Matthews, Glass, Rosenman, & Bortner, 1977; Matthews et al., 1982), the factor structures identified are inconsistent. For example, Matthews et al. (1982) identified a four factor structure (clinical ratings of speech behaviours, and self-reports of pressured drive, anger, and competitiveness). In a sample of adult males, the competitiveness factor did not correlate with the global Structured Interview assessment, whereas in a sample of undergraduate males the anger factor did not correlate with the Structured Interview assessment. In a more recent study, Dembroski et al. (1985) used a component scoring system, consisting of seven clinical dimensions (e.g., Loudness of Speech, Suppression of Displays of Anger), and five self-report dimensions (e.g., Time Pressure and Anger-Impatience). In a sample of male

and female patients, only the Suppression of Displays of Anger clinical factor did not correlate with the overall Structured Interview assessment, but with respect to the self-report dimensions, only the Competitiveness factor correlated with the global Structured Interview assessment. From these studies it is clear that the factors identified and their relation to the Structured interview's global assessment of the TABP depends on the type of sample used and on the interviewer.

Lastly, the Structured Interview is susceptible to a number of biases, such as interviewer's speed of speech (Matarazzo & Wiens, 1972) and other speech characteristics (Howland & Siegman, 1982; Scherwitz, Berton, & Leventhal, 1977), nonverbal cues, the attitude of the interviewer and demographic characteristics of the interviewee (Barnett, 1975), and inconsistent weighting of Type A components (Anderson & Waldron, 1983; Blumenthal et al., 1984; Matthews et al., 1982) in classifying Type A individuals. The lack of agreement about the relative weight of speech behaviours and content in classifying Type A behaviour makes the Structured Interview susceptible to drift (Bennett & Carroll, 1989).

Recently, Friedman has revised the Structured Interview, and now uses a version called the Videotaped Clinical Interview (Friedman & Powell, 1984). A videotape of the interview is evaluated on the basis of the content of answers, motor and speech behaviours, hostile attitudes, and

physiologic indicators, and yields a Time Urgency and Hostility score, which together total the overall Type A score. Scores range from 0 to 3 on each of the 36 indicators (e.g., sighing, rapid dysrhythmic speech, hostile responses, periorbital pigmentation) depending on intensity and/or duration. Test-retest reliability ranged between .59 to .78 in a sample of postmyocardial infarction and postcoronary artery bypass graft patients (Abbott, Peters, & Vogel, 1988). The Videotaped Clinical Interview has an 83.6 percent classification agreement with the Structured Interview, and was found to overclassify subjects as Type A using the Structured Interview as the criterion (Powell et al., 1984). It also correlates .52 with the Framingham Type A Scale and .42 with the JAS.

The Jenkins Activity Survey (JAS). The JAS is the most widely used Type A self-report instrument (Davis & Cowles, 1985; Shipper, Kreitner, Reif, & Lewis, 1986), but the JAS has received considerable criticism in the Type A literature. The 52 items of the JAS were selected via discriminant function analyses of the Structured Interview classifications of subjects in the Western Collaborative Group Study (Jenkins, Zyzanski, & Rosenman, 1971). The JAS has been criticized for modest internal consistency (e.g., Mayes, Sime, & Ganster, 1984; Palladino & Tryon, 1980), construct (e.g., Matthews, 1982) and criterion validity (e.g., Young & Barboriak, 1982), and generalizability (e.g., Smith & Sheridan, 1983). Using the Structured Interview as

the ultimate criterion, the JAS misclassifies from 37 to 69 percent of Type As and 27 to 38 percent of Type Bs (Byrne et al., 1985; Chesney, Black, Chadwick, & Rosenman, 1981; Rosenman, 1978; Zyzanski, 1978). In a recent meta-analysis (Yarnold & Mueser, 1989), the JAS was found to have modest internal consistency (.43 to .55), and a low classification agreement with the Structured Interview (60 percent for Type As, 42 percent for Type Bs and 16 percent for all subjects). It appears then, that the JAS inadequately covers the entire range of behaviours and attributes pertinent to the TABP, and underrepresents some of these components (Matthews, 1982). Specifically, the JAS fails to assess the anger/hostility and dissatisfaction components of the TABP (e.g., Abbott et al., 1988; Glass, Snyder, & Hollis, 1974; Matthews, 1982; Van Egeren, 1979a). As Jenkins (O'Looney et al., 1985) himself admitted "the JAS has captured 'certain corners of the truth' but has missed other large portions of it." (p. 344).

Lastly, there is the problem of the JAS's method of scale construction, a method that has resulted in items with low communalities (Fekken, Jackson, & Holden, 1985; Harding & O'Looney, 1986), which offer scant justification for summing item responses to obtain total scores.

Krantz, Glass, and Snyder (1974) modified the JAS to make it applicable to college students. They substituted references to occupational work with references to course work. The JAS (Form T) consists of 44 items, but only 21

items are actual scored (Glass, 1977). In addition to a Type A/B classification, derived using a median split, scoring of the JAS (Form T) yields scores on two subscales labelled Hard Driving/Competitive, and Speed/Impatience. Reported internal consistency of the JAS (Form T) total score and subscale scores range from .40 to .84 (Bishop, Hailey, and O'Rourke, 1989; Yarnold, Mueser, Grau, & Grimm, 1986). Test-retest reliability range from .66 to .96 depending upon gender, race, and test-retest interval (Bishop et al., 1989; Shipper et al., 1986; Yarnold, Mueser, Grau, & Grimm, 1986). These results indicate that the JAS (Form T) is comparable to the adult version of the JAS.

The Framingham Type A Scale. The Framingham Type A Scale was derived using item and factor analysis from 300 items completed in the Framingham Heart Study (Haynes, Feinleib, Levine, Scotch, & Kannel, 1978). Its ten items assess competitive drive, time urgency, and perception of job pressures (Linden, 1987). Again, classification agreement with the Structured Interview is modest at 60 percent (Chesney et al., 1981). This scale suffers from the same limitations as the JAS with respect to the inadequacy of its coverage of all TABP elements. It has been suggested by Matthews and Haynes (1986) that existing self-report instruments "may be affected by response biases, such as social desirability of Type A qualities" (p. 926). Furnham (1986) demonstrated that the Bortner Type A Scale and the

Eysenck Type A/B Questionnaire were susceptible to socially desirable responding.

Need for a New Measure of the Type A Behaviour Pattern

As noted by others (O'Looney et al., 1985; Review Panel on Coronary-Prone Behavior and Coronary Heart Disease, 1981), there is a need for a TABP measure that is (1) brief, yet comprehensive, (2) multidimensional, (3) economical, in terms of both time and money, (4) convenient, (5) objective, and (6) psychometrically sound when compared with existing measures. One of the greatest impediments to measuring the TABP accurately is the failure to appreciate the multidimensionality of this construct (Matthews, 1983). A global measure of the TABP yields little information about individual differences in the complex patterns of behaviours. These individual differences might include, (a) those components that are exhibited, (b) how frequently they are expressed, (c) how intensely they are expressed, (d) those situations that elicit these components, and (e) how the behaviours are expressed (Price, 1982). For example, two persons may be classified as Type A using the existing TABP instruments, even though one person may be extremely hostile but not competitive, and the other person may be extremely competitive but not hostile. This psychometric imprecision might be corrected by assessing a person's profile of Type A behaviours and characteristics. This profile could then be used to guide intervention strategies, or identify which facets of the behaviour pattern are

associated with a variety of manifestations of coronary disease. Matthews (1982), recognizing that there was no reliable questionnaire available as an alternative to the Structured Interview stated "the time seems ripe for taking a construct approach to Type A behavior" (p. 316). The SWS, the focus of this dissertation, was developed to meet this need.

Mechanisms Involved in Coronary Heart Disease Process

Coronary heart disease. Despite advances in the research and treatment of cardiovascular disease, it remains the leading cause of death in middle aged North American men. Coronary heart disease (CHD) accounts for the majority of deaths from cardiovascular diseases (American Heart Association, 1987). CHD is defined as a clinical disorder caused by lesions of the coronary arteries, a condition known as coronary artery disease, or atherosclerosis (Glass, 1977). The two major manifestations of CHD are angina pectoris (chest pain caused by a decrease in blood supply to the heart) and myocardial infarction (heart attack caused by prolonged decrease in blood supply to the heart, resulting in the necrosis of heart tissue).

Coronary artery disease. Atherosclerosis is the thickening, loss of elasticity, and obstruction of the arteries. Coronary artery disease is characterized by an accumulation of fatty cells in the walls of the coronary arteries resulting in the formation of fibrous tissue in the wall. The diameter of the lumen (central opening of the

artery) decreases as deposits of cholesterol and excess lipids accumulate. Coronary artery diseases can lead to coronary heart disease when over half of the artery is occluded, significantly decreasing blood flow, and when two or three major blood vessels are affected (Glass, 1977; Rapaport, 1980; Walton, Beeson, & Scott, 1986). Coronary atherosclerosis may exist without evidence of coronary heart disease (Wolf, 1977).

Traditional risk factors and coronary heart disease. Several factors have been traditionally identified as risk factors for CHD. In general, it is believed that the following factors are most relevant for atherosclerosis and CHD: (1) increasing age, (2) gender (being male), (3) elevated serum cholesterol level, (4) elevated serum lipoproteins (e.g., low density lipoprotein, triglycerides), (5) elevated systolic and diastolic blood pressure, (6) dietary fat and cholesterol intake, (7) cigarette smoking, (8) physical inactivity, (9) presence of diabetes mellitus, (10) obesity, and (11) left ventricular hypertrophy (e.g., American Heart Association, 1987; Blackburn, 1980; Brand, Rosenman, Sholtz, & Friedman, 1976; Buell & Elliot, 1980; Glass, 1977; Hecker, Chesney, Black, & Frautschi, 1988; Jenkins, Zyzanski, & Rosenman, 1976; Lehninger, 1982; Powell, Thompson, Caspersen, & Kendrick, 1987; Ragland & Brand, 1988a, 1988b; Rosenman et al., 1975; Wielgosz et al., 1988).

The most potent risk factors for CHD are serum concentrations of total cholesterol and low density lipoprotein (Leon, 1988). Cholesterol is a lipid which is not readily soluble in blood. Soluble lipoproteins are formed when cholesterol becomes connected to protein molecules (Van Doornen & Orlebeke, 198: and is transported in the blood on the surface of lipoproteins (Foreman, 1986). There are different types of lipoproteins based on the ratio of proteins to lipids, reflecting density.

Low density lipoprotein is involved in the deposit of cholesterol to form atheromas (plaques) in the endothelium. High density lipoprotein is inversely related to CHD risk (Kannel, 1983). High density lipoprotein removes cholesterol and atheromas from tissues, transporting them in the form of fatty acid esters to the liver (Leon, 1988).

Dietary habits, especially the percent of energy intake from saturated fat, affect plasma total and low density lipoprotein cholesterol levels (Keys et al., 1986). Saturated fat is found in animal fat, but liquid vegetable oils can also be changed to saturated fat (American Heart Association, 1987). The effect of dietary cholesterol is much less potent. Replacing saturated fats with monounsaturated or polyunsaturated fats has a lowering effect on serum cholesterol (Grundy, 1987).

Weight also influences blood lipid levels. Weight gain is associated with increased levels of serum total and low density lipoprotein cholesterol, and decreased high density

lipoprotein cholesterol levels (Leon, 1988). High density lipoprotein cholesterol is also related to the level of physical activity (Cook et al., 1986; Goldberg & Elliot, 1985; Haskell, 1984; Sopko et al., 1985). It is postulated that physical activity increases the level of high density lipoprotein cholesterol by increasing the clearance of very low density lipoprotein and triglycerides from the blood. Indirectly, exercise affects blood lipids through weight loss.

Blood pressure is another major risk factor for CHD (Kaplan, 1983). This is true of systolic and/or diastolic elevation (Kannel & Eaker, 1986). Diastolic and systolic blood pressure differ in that the former is the blood pressure inside the arteries when the heart is relaxed, the latter when it contracts (Walton et al., 1986). There is no discernible critical value, so even mild hypertension, defined as a persistent elevation of blood pressure above the normal range (American Heart Association, 1987), substantially increases the risk of CHD. Excess weight, and a high intake of saturated fat and low polyunsaturated to saturated fat ratio are two factors affecting blood pressure (Cohen, 1984; Puska et al., 1983).

CHD is the most common consequence of diabetes (Kannel & Eaker, 1986). Diabetes is a chronic disorder of carbohydrate metabolism caused by a disturbance of the insulin mechanism (Walton et al., 1986). It damages the myocardium, thus predisposing the individual to cardiac

failure (Kannel, Hjortland, & Castelli, 1974). Although diabetes in an independent predictor of CHD, its effect is strongest in those individuals with coexisting risk factors (Kannel & McGee, 1979).

Cigarette smoking is also an independent risk factor for CHD. Sudden death and myocardial infarction are more strongly associated with cigarette smoking than is angina pectoris (Kannel & Eaker, 1986). Smoking also interacts with the other traditional coronary risk factors by affecting platelet adhesiveness, the arterial wall, and the level of high density lipoproteins (American Heart Association, 1980).

Research has shown that these traditional risk factors are intercorrelated (Brand et al., 1976; Criqui et al., 1980; Reisin et al., 1978), and even when combined they explain or predict about one-half of the new incidence of CHD (Corday & Corday, 1975; Jenkins, 1971; Keys et al., 1972). Interest in the part of the cause of coronary heart disease that is unexplained has spurred research on the effect personality factors may have on the development of CHD.

Physiological mediators of stress and coronary heart disease. It has been hypothesized that stress-induced increases in sympathetic nervous system activity and the release of catecholamines are important mediators of the stress and coronary atherosclerosis relation (Schneiderman, 1987). The release of catecholamines, especially

epinephrine, may lead to "injury" to the smooth muscle of
the arterial wall and/or endothelium (the proposed
initiating event in the development of atherosclerosis) by
either hemodynamic and/or biochemical means (Jones, 1970;
Ross & Glomset, 1976). Once the endothelium is damaged,
catecholamines stimulate the mobilization of lipids and free
fatty acids (Heindel, Orci, & Jeanrenaud, 1975; Rosell &
Belfrage, 1975) that can facilitate platelet aggregation,
smooth muscle proliferation, and the deposit of lipids into
the arterial wall (Henry, 1983; Herd, 1978; Krantz & Manuck,
1984; Lown, Verrier, & Rabinowitz, 1977). This hypothesis
has received support from studies showing that stress
results in: (1) hemodynamic increases in heart rate,
systolic blood pressure (force of blood leaving the
ventricles in the heart) and diastolic blood pressure (the
force of blood returning to the heart (e.g., Eliasson,
Hjemdahl, & Kahan, 1983; Falkner, Kushner, Onesti, &
Angelakos, 1981); (2) increase in the secretion of
norepinephrine and epinephrine (e.g., Eliasson, 1984); (3)
increase in lipid and free fatty acid mobilization (e.g.,
Rahe, Rubin, & Arthur, 1974); and (4) decrease in total
peripheral vascular resistance, but increase in renal
vascular resistance (e.g., Brod, Fencl, Hejl, & Jirka, 1959;
Forsyth & Harris, 1970).

Physiological Consequences of the Type A Behaviour Pattern

Psychophysiological reactivity and the Type A Behaviour Pattern. It is believed that the TABP increases the risk of CHD through frequent, intense, and prolonged sympathetic nervous system arousal in stressful situations. One theory posits that repetitive acute reactivity could lead to atherosclerosis by initiating and/or promoting endothelial injury resulting in an atherosclerotic plaque (Ivancevich & Matteson, 1988; Shepherd et al., 1987). Repeated and prolonged elevations in blood pressure and heart rate are believed to damage the intimal endothelium of the coronary arteries. This hypothesis has received support from a number of studies that show that Type A individuals respond to stress with greater physiological changes than Type B individuals (e.g., Dembroski, MacDougall, Herd, & Shields, 1979; Gastorf, 1981; Lambert, MacEnvoy, Klackenberg-Larsson, Karlberg, & Karlberg, 1987; Manuck & Garland, 1979), but Type As do not respond to all situations with increased cardiovascular arousal (e.g., Diamond & Carver, 1980; Jennings, 1984; Lawler, Schmied, Mitchell, & Rixse, 1984). In a meta-analytic review of the 71 studies in the literature, Harbin (1989) demonstrated that Type As respond to cognitive and psychomotor stress with greater heart rate and systolic blood pressure responses, but the relation is stronger for some tasks than for others. The relation is stronger if the Structured Interview was the Type A instrument used to classify individuals. These studies have

used either: (1) a continuous approach to Type A
assessment, where each score represents the person's
relative position with respect to the Type A/B continuum
such that higher scores increasingly reflect the strength of
the TABP; or (2) a typological approach to Type A
measurement, where the TABP is treated as a categorical
variable sometimes obtained by a median split of subjects.

A multidimensional approach to Type A assessment, such
as that used by the Survey of Work Styles (characterized by
assessing individual characteristics and behaviours to yield
a profile of Type A components expressed by an individual)
has been recently shown to predict physiological arousal to
cognitive stress in university students (Gray & Jackson, in
press). It was found that in males, scores for each SWS
profile were uniquely related to a measure of cardiovascular
arousal. The Anger/Impatience profile was related to mean
systolic blood pressure during a serial subtraction task.
The Job Dissatisfaction profile was related to mean
diastolic blood pressure, and the Anger/Work Involvement
profile was related to mean heart rate. Therefore,
different profiles of Type A components can be associated
with distinct cardiovascular response patterns.

Past research has failed to recognize that individual
differences in the expression of the TABP may affect a
person's response to stress and the person's risk of CHD.
Although researchers recognize separate Type A components,
previous analyses often involve one isolated dimension

(e.g., a correlation between anger and systolic blood pressure). This approach ignores the pattern of Type A components, and the interaction that may occur between these components. Individuals should be classified on the basis of their total similarity on several Type A components (not just on one) or worse, on their total scores. It is possible that individuals who differ with respect to which Type A components are expressed, and the strength of this expression may also differ in their cardiovascular responses to stress. This physiological response may underlie the association between personality and CHD.

Coronary atherosclerosis and the Type A Behaviour Pattern. Angiographic studies have found that the TABP is associated with coronary atherosclerosis (Blumenthal et al., 1987; Frank, Heller, Kornfeld, Sporn, & Weiss, 1978; Seeman & Syme, 1987; Tennant & Langeluddecke, 1985; Williams, Haney, & Lee, 1980; Williams et al., 1988; Zyzanski, Jenkins, Ryan, Flessas, & Everist, 1976). Other studies, published in the 1970s and 1980s have failed to find associations between Type A and coronary atherosclerosis (Arrowood, Uhrich, Gomillion, Popio, & Raft, 1982; Bass & Wade, 1982; Blumenthal et al., 1985; Dembroski et al., 1985; Dimsdale, Hackett, Block, & Hutter, 1978b; Dimsdale et al., 1979; Krantz, Sanmarco, Selvester, & Matthews, 1979; Kornitzer et al., 1982; Krantz et al., 1981; Langeluddecke, Fulcher, Jones, & Tennant, 1988; MacDougall, Dembroski, Dimsdale, & Hackett, 1985; Scherwitz et al., 1983; Siegman,

Feldstein, Tomasso, Ringel, & Lating, 1987; Young, Anderson, Barboriak, & Hoffman, 1984). These latter studies have been criticized on several methodological grounds. First, samples are extremely heterogeneous (e.g., subjects may differ in age by as much as 50 years). Williams et al. (1988) found that the TABP was related to severity of atherosclerosis in patients aged 45 years or younger. No relation was found for patients aged 46 to 54 years, and a negative relation was found between the TABP and atherosclerosis among patients 55 years and older. Second, 60 to 70 percent of subjects are classified as Type A by the Structured Interview, suggesting the possibility of selection and referral bias. Miller, Turner, Tindale, and Posavac (1988) have shown that disease based spectrum bias, present when subjects are included in or excluded from a sample according to disease status, reduces the statistical association between the TABP and coronary artery disease. This happens because of range restriction; in this case, because the range of coronary artery disease is less than that in a representative sample. Reanalysis of these studies suggests that Type As are at three to four times greater risk than Type Bs of developing atherosclerosis. Third, sample characteristics such as prior medical history vary among studies. Last, sample sizes are small with a median sample size of 117 subjects, having only marginal statistical power to detect a Type A-atherosclerosis relation (Manuck, Kaplan, & Matthews, 1986).

<u>Coronary heart disease and the Type A Behaviour</u>
<u>Pattern.</u> The TABP gained attention and scientific
credibility as investigators found associations between TABP
and the prevalence, incidence, and recurrence of CHD in
retrospective studies (e.g., Kenigsberg, Zyzanski, Jenkins,
Wardwell, & Licciardello, 1974; Orth-Gomer, Ahlbom, &
Theorell, 1980; Thiel, Parker, & Bruce, 1973; Wardwell &
Bahnson, 1973), and in cross-sectional studies (e.g., Brand
et al., 1976; Caffrey, 1969; Cohen, Syme, Jenkins, Kagan, &
Zyzanski, 1979; Haynes, Feinleib, Levine, Scotch, & Kannel,
1978; Heller, 1979; Rosenman & Friedman, 1974). The finding
that the TABP was associated with the incidence of CHD in a
prospective study (the Western Collaborative Group Study;
Rosenman et al., 1975) led to a conference on coronary-prone
behaviour. The conclusion of these scientists was that the
TABP was independently associated with an increased risk for
CHD in middle-aged employed American citizens (Review Panel,
1981). Moreover, the TABP effect of the relative coronary
risk was of the same order of magnitude as the relative risk
of traditional factors. This conclusion has since been
supported by numerous prospective population-based studies
(De Backer, Dramaix, Kittel, & Kornitzer, 1983; Haynes et
al., 1980; Haynes & Feinleib, 1982; French-Belgian
Collaborative Study, 1982), and prospective studies of high
risk persons (Jenkins et al., 1976; Kittel, Dramaix,
Kornitzer, & De Backer, 1985).

Controversy over the relation between the TABP and CHD surfaced in the late 1970s and 1980s when studies failed to find a relation between the TABP and CHD (Appels et al., 1987; Cohen & Reed, 1985; Gallacher, Yarnell, & Butland, 1988; Johnston, Cook, & Shaper, 1987). Also several studies, including the Multiple Risk Factor Intervention Trial , the Multicenter Post-Infarction Program, and the Aspirin Myocardial Infarction Study of high-risk persons (such as coronary patients) reported no relation between Type A and mortality or recurrent events (Case et al., 1985; Mann & Brennan, 1987; Shekelle, Gale, & Norusis, 1985; Shekelle, Billings et al., 1985), and two studies showed a negative relation between CHD and Type A behaviour (Dimsdale, Block, Gilbert, Hackett, & Hutter, 1981; Ragland & Brand, 1988b). The Multiple Risk Factor Intervention Trial study is the only prospective study that has failed to find a relation between TABP and the initial occurrence of CHD. This study, though has received severe criticism. Included in these criticisms are that (1) all the subjects were at high coronary risk, (2) the length of interviewer training was too short, and (3) a challenging rather than facilitative interviewing styles was used (Friedman, 1988; Helgeson, 1989). Rosenman reportedly said that the interviewing in the Multiple Risk Factor Intervention Trial was "sadly deficient" (cited in Fischman, 1987, p.46) because he did not select the interviewers and even refused to train some of them because they were so incompetent.

Further, after a careful examination of the study Scherwitz (cited in Friedman, 1988, p. 932) concluded that "because there is substantial circumstantial evidence indicating that measurement errors occurred, the [Multiple Risk Factor Intervention Trial] type A findings should be interpreted with extreme caution". Thus, there is substantial prospective evidence that the TABP is related to CHD.

One possible explanation for the results of some of these studies is the use of the JAS, a scale that is a less reliable and valid measure of the TABP than the Structured Interview. A second possible explanation may be changes in health behaviours and treatment that could affect the risk associated with the TABP (Haynes & Matthews, 1988). For example, a decline in cigarette smoking, increase in exercise, reduction in stress levels, and the use of medical facilities have interacted with the TABP so that in more recent studies changes in these health behaviours have altered the risk to Type As. A third explanation is related to the assessment of the TABP. It appears that the relations among the Structured Interview, the JAS, and the Framingham Type A Scale are changing (Matthews, Dembroski, Krantz, & MacDougall, 1982). This suggests that the Structured Interview is vulnerable to subjective bias and drift over time in the diagnostic criteria used in making the Structured Interview assessment of Type A behaviour.

Component Analysis of the Type A Behaviour Pattern

The most recent trend in Type A behaviour research is the dissection of the TABP to discover its "toxic" components. Anger and hostility appears to be more directly related to clinical coronary heart disease, the severity of coronary artery disease, and increased physiological arousal than other components of the TABP, and sometimes more than the global Type A classification. Evidence suggests that only those aspects of the TABP concerned with hostility and anger are pathogenic (Williams, 1987). High scores on anger/hostility seem to be related to CHD incidence (Barefoot, Dahlstrom, & Williams, 1983; Dembroski, MacDougall, Costa, & Grandits, 1989; Hecker et al., 1988; Matthews et al., 1977; Rosenman et al., 1970; Shekelle, Gale, Ostfeld, & Paul, 1983), recurrence of CHD (Koskenvuo et al., 1988; Thoresen, Friedman, Gill, & Ulmer, 1982) severity of coronary artery disease (Arrowood et al., 1982; Dembroski et al., 1985; MacDougall et al., 1985; Williams et al., 1980), and cardiovascular reactivity to stress (Dembroski, MacDougall, Shields, Petitto, & Lushene, 1978; Hardy & Smith, 1988; Katz & Toben, 1986; Weidner, Friend, Ficarrotto, & Mendell, 1989). Not all studies have found a relation of hostility with coronary artery and heart disease and physiological reactivity (Hearn, Murray, & Luepker, 1989; Houston, Smith, & Cates, 1989; Leon, Finn, Murray, & Bailey, 1988; McCranie, Watkins, Brandsma, & Sisson, 1986; Sallis, Johnson, Trevorrow, Kaplan, & Hovell, 1987; Smith &

Houston, 1987). One possible reason is that a variety of measures have been used to assess anger/hostility including the Spielberger Anger Expression Scale (Spielberger, Jacobs, Russell, & Crane, 1983) and the Cook-Medley Hostility Scale (Cook & Medley, 1954). The Cook-Medley hostility scale appears to measure resentment and suspicion rather than overt aggressive tendencies (Smith & Frohm, 1985) whereas the State-Trait Anger Scale tends to measure the tendency to perceive many situations as anger provoking (Spielberger et al., 1983). These scales and other measures of anger/hostility appear to be only modestly correlated (Dembroski et al., 1985), indicating that anger may be as multidimensional as the TABP (Dembroski & Costa, 1987; Siegman, Dembroski, & Ringel, 1987). Inconsistencies in the findings from the reactivity studies may be also be due to differences in the stressors used to elicit reactivity.

The danger in isolating one dimension of the TABP is that again researchers fail to recognize the complexity and multidimensionality of the TABP. For example, Siegman et al. (1987) found that items indicating neurotic hostility were inversely associated with the severity of coronary artery disease, whereas nonneurotic hostility items were positively related to extent of disease. This approach ignores the interaction anger may have with the other components of the TABP.

Cognitive Social Learning Model of the Type A Behaviour
Pattern

Although there are at least four main theories
specifying the cause of the TABP (Helgeson, 1989), the
cognitive social learning model of the TABP proposed by
Price (1982) attempts to integrate the antecedents of the
TABP, the personal beliefs/fears, characteristics, and
behaviours of the TABP and the consequences of the TABP.
This model of Type A asserts that cognitions and personal
beliefs form the core of the TABP. The personal beliefs
that constitute the TABP foster a variety of fears or
anxieties that promote and sustain the TABP. These
cognitive factors are thought to result from the
communication of socio-cultural values from the media, the
educational system, and the family to the child. According
to the cognitive social learning model, there are three Type
A beliefs and accompanying fears. The first belief is the
belief that one must constantly prove by accomplishments
that one is successful. The hypothesized accompanying fear
is that of insufficient worth. The second belief is that
there is no predictable relation between intentionality and
consequences, i.e., no universal moral principles. The
believed accompanying fears are that good may not prevail
(i.e., nice guys finish last), and that universal justice
may not prevail. The third belief is that resources needed
to achieve recognition are scarce. The hypothesized
accompanying fear is that of insufficient supply of

necessities, and that one may not get a share of things worth having. This theory has received some support from research by Burke (1984) on 220 employees of the police force that found the Speed-Impatience factor of the JAS to be significantly correlated with these seven proposed beliefs and fears. The overall Type A Scale only correlated with the belief that self-worth is a function of one's accomplishments. In a study of 137 business administration university students, Burke (1985) found that hostility was positively related to the fear of being worthless, the fear that justice will not prevail and the belief that things worth having are in scarce supply. Time urgency was significantly related to all fears and beliefs except for the belief that no universal moral principles exist. In another study of business administration students, Burke and Deszca (1984) found that the belief that self-worth is a function of one's accomplishments was positively related to the JAS Type A and Speed-Impatience and Hard-driving scales, while the belief that no universal moral principles exist was positively related to overall Type A behaviour only. The belief in revenge was positively related to overall Type A behaviour and the Speed-Impatience scale.

Further research on the relation between the TABP and dysfunctional attitudes has shown positive relations between the TABP and irrational beliefs as measured by the Irrational Beliefs Test (Hamberger & Hastings, 1986; Smith & Brehm, 1981; Smith, Houston & Zurawski, 1983; Thurman,

1983), the Personal Beliefs Inventory (Weber, 1983), and the Dysfunctional Attitude Scale (Martin, Kuiper, & Westra, 1989). From the results of these studies, it appears the TABP is significantly related to irrational beliefs concerning high self-expectations of achievement, anxious overconcern about the future, perfectionism, low problem-avoidance, over-reactivity to frustration, and blame proneness.

Type A behaviour as assessed by the Thurstone Temperament Schedule has also been used to examine Price's hypothesized relation between beliefs and fears and the TABP (Matteson, Ivancevich, & Gamble, 1987). In 423 business administration students Type A behaviour was significantly related to all the Type A beliefs and fears proposed by Price. Moreover, this study found a significant positive relation between parental behaviours and the respondent's Type A beliefs and fears, lending support to the belief that Type A behaviour is learned, in part, from the family.

It has been suggested by Price (1982) that the behaviour of Type As is the result of their search for social recognition of their success. This acknowledgement is believed to include the admiration and respect of others, the attainment of high status, and the accumulation of material goods. Ambition, one aspect of the TABP, may represent a need to "prove oneself", by attaining success. This success seems necessary to achieve a sense of high self-worth. To realize this ambition, a person may set

extremely high performance standards. By meeting standards that are higher than those that would have been set for the individual, a person can gain recognition for his/her performance. The ability to achieve more requires hard-driving behavior. This is thought to occur because a Type A individual may believe that self-worth depends on accomplishments, and accomplishments depend on effort (Price, 1982). Research for this part of Price's theory has found that Type As do set excessively high performance standards (Burnam, Pennebaker, & Glass, 1975; Jenkins, 1975; Snow, 1978; Ward & Eisler, 1987a, 1987bb), and they are higher in the need for achievement (Chusmir & Hood, 1986; Langeluddecke & Tennant, 1986).

Fear of insufficient supply of resources is hypothesized to enhance competitiveness. In order to compete in western society, it is believed that Type As may become aggressive, or they may try to do more in a shorter period of time. This may result in a chronic sense of time urgency, and excessive work involvement, to the exclusion of relaxation. Competitive, rushed, and aggressive achievement striving is hypothesized to arouse impatience, frustration, and irritation if a Type A perceive his/her progress being stalled (Price, 1982).

Because a Type A's sense of self-evaluation is thought to be highly contingent upon his/her achievements, he/she may be prone to psychopathology. These fears, for example, may make a Type A person prone to anxiety. Price

hypothesized that when a person's self-worth is tied to
something that fluctuates, such as the number and quality of
achievements, he/she may feel that his/her self-esteem is in
jeopardy (Price, 1982). Thus, a Type A person may fear a
loss of social recognition. Research has shown that Type As
have significantly lower self-esteem scores than Type Bs
(Tramill, Kleinhammer-Tramill, Davis, & Parks, 1985).
Another example is the setting of excessively high standards
of performance on tasks by Type As (Burnam et al., 1975;
Grimm & Yarnold, 1984; Jenkins, 1975; Snow, 1978; Ward &
Eisler, 1987a,b). Even when Type As fail to meet their
self-set standards, they raise their standards instead of
lowering them as do Type Bs (Glass, 1977). This can create a
problem because it is hypothesized that meeting these
standards is a major source of self-worth. Ward and Eisler
(1987b) found that Type As are likely to fail to achieve
their personal goals more frequently than Type Bs. The
setting of high standards and an initial failure to achieve
a goal can motivate subsequent efforts (Bandura & Cervone,
1983; Locke, Shaw, Saari, & Latham, 1981). However, it is
generally assumed that repeated failures can result in
feelings of worthlessness, and depression (Bandura, 1977),
especially since it has been found that Type As tend to
attribute their failure of undesirable/negative events to
lack of ability more than do Type Bs (Brunson & Matthews,
1981; Musante, MacDougall, & Dembroski, 1984; Weidner &
Andrews, 1983).

Kuiper and Martin (1988) have proposed a self-worth contingency approach to the TABP. It is proposed that Type As endorse dysfunctional attitudes related to self-evaluation. Adherence to these excessively rigid and inappropriate rules for performance evaluation may have contributed to the development of low self-esteem and negative affect when these unrealistic performance standards are not met. Thus the TABP can be viewed as "part of a maladaptive coping styles employed to minimize negative self-evaluations" (Martin et al., 1989, p. 773).

Another negative consequence of the TABP may result from the easily aroused hostility and anger component of the TABP. If Type As behave in a more hostile way than Type Bs, Type As may expose themselves to more hostile behaviour from others. Consequently, the Type A may become suspicious of others and believe that society is hostile. Thus, the TABP may predispose an individual to persecutory ideas and interpersonal problems. Also, the belief that one's worth is greater than that of others can lead to Type As treating others poorly. This can lead to a variety of interpersonal problems. Type As may have difficulty developing and maintaining close interpersonal relationships because of their aggressive, competitive, impatient, hostile behaviour. Furthermore, it is believed that Type As value activities that produce tangible and measurable results. If this is true, this may lead to social isolation because family and friends are not seen as contributing directly to one's

success, resulting in Type As having few close relationships.

Alienation, the display of unethical behaviour, may be more frequent among Type As because the fear that nice guys may finish last. In the absence of a universal moral principle, Type As may take it upon themselves to ensure personal justice. If Type As have this belief, it may lead to socially irresponsible actions.

Psychopathological Correlates of the Type A Behaviour Pattern

Although the association between the TABP and both CHD and cardiovascular reactivity has been extensively studied, relatively little research has been conducted to determine the psychological consequences of adopting Type A beliefs and fears. Studies have repeatedly found neuroticism to be related to the TABP (e.g., Bass, 1984b; Byrne & Rosenman, 1986; De Flores, Llorente, Valdes, Torrubia, & Bernardo, 1985; Irvine, Lyle, & Allon, 1982; Kittel, Kornitzer, De Backer, & Dramaix, 1982; Langeluddecke & Te nant, 1986; Llorente, 1986; Lobel, 1988; Smith, 1984). May & Kline (1987) found that neuroticism was related positively with the speed-impatience scale, a finding supported by other researchers (De Flores et al., 1985; Irvine et al., 1982; Llorente, 1986) and negatively with the hard-driving competitiveness scale. In another study, neuroticism was found to correlate most strongly with those Bortner items assessing speed and impatience (Bass, 1984a). Similarly,

Eysenck & Fulker (1983) found that "tenseness" was correlated positively to neuroticism. In fact the JAS Speed-Impatience factor correlates higher with neuroticism than it does with the Structured Interview (Chesney et al., 1981) suggesting that this factor is independent of the TABP assessed by the Structured Interview. On the other hand Wadden and his associates (1983) did not find any significant correlations between the JAS Type A scale and MMPI measures of neuroticism. Using several Type A measures to assess Type A, Chesney et al. (1981) found correlations between Type A behaviour as assessed by either the JAS or Framingham Type A Scale and neuroticism. In this study the Structured Interview was not related to neuroticism.

Unlike neuroticism, extraversion has been unrelated or only weakly related to the TABP (Bass, 1984a, 1984b; Furnham, 1984; Irvine et al., 1982; Lovallo & Pishkin, 1980; Ray & Bozek, 1980). In a sample of over 1600 college students, however, extraversion was positively related to both the JAS Type A scale and the Speed-Impatience factor (Llorente, 1986). Others (De Flores et al., 1985; Lobel, 1988) have also found a positive relation between the JAS Type A scale and extraversion in samples of college students. The Hard-Driving/Competitiveness factor was found to be related to extraversion in male military personnel (May & Kline, 1987).

The Speed-Impatience scale of the JAS has also been found to be related to anxiety (Chesney et al., 1981; Irvine

et al., 1982; Wadden et al., 1983). Some researchers have found that the JAS Type A Scale was related to anxiety (Hansson, Hogan, Johnson, & Schroeder, 1983; Langeluddecke & Tennant, 1986; Tramill, Kleinhammer-Tramill, Davis, Parks, & Alexander, 1984), but this has not been confirmed in all studies (Chesney et al., 1981; Essau & Coates, 1988; Lobel, 1988). Several studies (Chesney et al., 1981; Langeluddecke & Tennant, 1986; Smith et al., 1983) have found that the Framingham Type A Scale was positively related to anxiety. Framingham items concerning time urgency and impatience have been shown (Houston, Smith, & Zurawski, 1986) to be positively related to anxiety, but items concerning achievement and competitive-striving appear to be unrelated to anxiety. In males with anxiety disorders, the JAS Type A and Hard-Driving/Competitiveness scales were related to level of anxiety (Lee & Cameron, 1986). The inconsistency of these findings may be due to the different measures of the TABP and anxiety. Byrne & Rosenman (1986) found that anxiety as assessed by the Spielberger State-Trait Anxiety Inventory was unrelated to all measures of the TABP. The Structured Interview and self-report measures of the TABP were positively related to anxiety as assessed by the Hopkins Check List (SCL-90).

A positive relation between the TABP and increased negative affect in response to failure of a stressful circumstance (Brunson & Matthews, 1981; Dimsdale, Hackett, Block, & Hutter, 1978a; Francis, 1981; Martin et al., 1989)

has also been found. In addition, the TABP and depression have been found to be significantly related in survey design studies (Martin et al., 1989). Other studies, though, have failed to confirm this relation (Chesney et al., 1981; Furnham, Hillard, & Brewin, 1985; Wadden et al., 1983; Ward & Eisler, 1987b). The relation of the TABP to depression may also be affected by the TABP measure used. Byrne and Rosenman (1986) found that depression was not related to the Structured Interview, but was positively related to the JAS. The relation of the JAS with depression, though, was confounded by its relation with neuroticism. When neuroticism was controlled, the partial correlation of the TABP with depression was .05. Smith and O'Keiffe (1985) found that the TABP as assessed by the JAS was not significantly related to depression (r=.05), but was related to the Framingham Type A Scale (r=.28). This finding is consistent with that of Martin et al. (1989) who found that depression was related to the SWS and the Framingham Type A Scale, but not to the JAS. Langeluddecke and Tennant (1986) also found that depression was related to the Framingham Type A Scale but not to the JAS Type A Scale.

Type As tend to express stress and anxiety through bodily symptoms (Price, 1982). This has not been supported in several studies. In obese and/or hypertensive patients, no relation was found between the JAS and the MMPI hypochondriasis scale (Wadden, Anderton, Foster, & Love, 1983). Although the relation between hypochondriasis and

the TABP has not to the author's knowledge been directly examined in nonclinical samples in the past, studies have found that Type As tend to underreport the frequency of symptoms and illness (Carver, Coleman, & Glass, 1976; Hart, 1983; Matthews, Siegel, Kuller, Thompson, & Varat, 1983; Pfost, Peters, & Stevens, 1985; Schlegel, Wellwood, Coops, Gruchov, & Sharratt, 1980; Weidner & Matthews, 1978), especially in challenging circumstances. Type As are also more likely to reject the sick role (Flynn & Zyzanski, 1987). However, studies have found that Type As reported having respiratory infections, allergies and headaches more frequently than Type Bs (Barton, Brautigam, Fogle, Frietas, & Hicks, 1982; Flynn & Zyzanski, 1987; Hicks & Campbell, 1983; Stout & Bloom, 1982; Woods, Morgan, Daly, Jefferson, & Harris, 1984). In a study of 150 Japanese men, Nakano (1990) found a positive relation between the JAS and a variety of physical symptoms, including indigestion, stiffness, and headaches. It appears that Type As may only suppress symptoms during a task, believing that an illness may interfere with task completion (Matthews & Haynes, 1986).

Schiraldi and Beck (1988) have reported that the JAS was positively related to misanthropy as assessed by Rosenberg's Faith in People Scale in a sample of college students. A hostile and mistrusting view of others is one of the three parts thought to comprise the hostile component of the TABP (Raymond, 1989). Factor analyses of the MMPI

and the Cook-Medley Hostility Scale (Costa, Zonderman, McCrae, & Williams, 1985; 1986; Johnson, Butcher, Null, & Johnson, 1983) reveal that most items on the latter scale reflect cynicism or the mistrust of others and their motives. In two samples of university students, a high correlation was found between the Cook-Medley Hostility scale and the SWS ($r \geq 0.50$) (Yuen, 1989). This finding is consistent with that predicted by Price's cognitive social learning model of the TABP. She predicts that the hostile action of Type As may lead to hostile action of others, resulting in Type As becoming more suspicious of others and perceiving the social environment as hostile.

Previous research has generally supported a positive relation between impulsiveness and the TABP (Blumenthal, McKee, Williams, & Harvey, 1981; Chesney et al., 1981; Heaven, 1989; Innes, 1980; Lundberg, 1980), but this relation has not been well studied. No relation has been found between the TABP and psychoticism (Bass, 1984a; De Flores et al., 1985; Furnham, 1984), although one study reported a positive relation between the JAS and the Framingham with psychoticism in coronary angiographic patients (Langeluddecke & Tennant, 1986). In contrast, a negative relation of the TABP with the MMPI psychopathic deviate scale was reported in a sample of men (Wadden et al., 1983). Heaven (1989) found that psychoticism was positively related to the TABP in female adolescents but not in male adolescents.

In general, self-esteem has been found to be lower in Type As (Houston & Kelly, 1987; Tramill et al., 1985). In contrast, Schiraldi and Beck (1988), and Friedman and Booth-Kewley (1987) found that self-esteem did not differ between Type As and Bs. Yarnold and Bryant (1987) and Martin et al. (1989) found that Type As are more secure about their abilities and have higher self-esteem. Perhaps the lower self-esteem and increased feelings of worthlessness resulting from failure reflect a temporary state rather than stable trait. Another possible explanation for the discrepant findings is the difference in sample characteristics. These findings question the validity of Friedman's assertion that the "true 'toxic' factor in type A behavior is the inadequate security and self-esteem that initiates and fuels the emergence of impatience and hostility" (Friedman, 1988, p. 934).

Discrepancies in past research may be due to several factors. First, the psychopathological scales used have questionable reliability and validity, and are susceptible to response biases such as social desirability (Nunnally, 1978). Second, a global or continuous approach to Type A assessment has been used that may conceal individual differences of the pattern of Type A components. It is possible that an individual high in Work Involvement and Time Urgency but low in Anger and Impatience (scoring negatively on the Anger/Impatience SWS profile) may be high in neuroticism but low in interpersonal conflicts. Third,

the extent of associations may depend on population characteristics. For example, the JAS is correlated with measures of psychological distress in cardiac patients (Dimsdale, Hackett, Block, & Hutter, 1978a), but is not related to psychopathology in hypertensive and obese out-patients (Wadden et al., 1983).

Overview of Research Goals

In general the hypotheses under consideration in this dissertation concern three areas of Type A research: (1) measurement of the TABP, (2) physiological correlates of the TABP, and (3) psychophysiological correlates of the TABP. In order to develop confidence in a questionnaire, one must be assured that the questionnaire is both reliable and valid. Internal consistency reliability is a measure of scale homogeneity, and indicates the degree to which the questionnaire or scale is a pure measure of a single construct (Schoenfeldt, 1984). In each of the three studies, the internal consistency reliability of the SWS will be assessed, and in the first study the internal consistency of the SWS will be compared to that of the JAS and the Framingham Type A Scale. It is hypothesized that the SWS will have moderate to high internal consistency, and this consistency will be higher than that of the JAS and/or Framingham Type A Scale.

Criterion validity indicates the extent to which a questionnaire measures what it purports to measure. Typically the responses on the questionnaire are correlated

with an external criterion, or "gold standard" (Anastasi, 1982; Del Greco, Walop, & McCarthy, 1987). As previously indicated, the Structured Interview is considered the gold standard of Type A assessment. In the first study, the classifications made by the SWS will be compared to those of the Structured Interview. It is hypothesized that the classification agreement between the SWS and the Structured Interview will be significantly higher than that between the Structured Interview and the JAS and/or Framingham Type A Scale.

One important aspect of construct validity refers to the extent to which a measure correlates with variables with which it should theoretically correlate (convergent validity), and does not correlate with variables with which it should not theoretically correlate (discriminant validity) (Campbell & Fiske, 1959). This will be examined in the area of physiological and psychopathological correlates of the SWS. In Study 1, it is hypothesized that the SWS will significantly predict physiological arousal to a stressful situation, the Structured Interview. It is hoped that the relation between the SWS and physiological arousal will be stronger than that between physiological arousal and the JAS, Framingham Type A Scale, and the Structured Interview.

In Study 2, it is hypothesized that the SWS will significantly discriminate between those men with coronary heart disease and those without coronary heart disease. It

is also hypothesized that this relation with coronar; heart disease will be independent of that found between traditional risk factors and coronary heart disease. It is expected that the SWS scales will show low correlations with traditional coronary risk factors, and the best prediction model for coronary heart disease will be a combination of SWS scores and traditional risk factors.

In Study 3, the SWS is hypothesized to predict certain dimensions of psychopathology, however, it is expected that the profiles and subscales of the SWS will be differentially related to the dimensions of psychopathology. It is hypothesized that certain profiles and subscales of SWS will be positively related to interpersonal problems, anxiety, depression, alienation, and persecutory ideas, and negatively related to social introversion.

Chapter II

Overview of Three Empirical Investigations

<u>Study 1</u>

The first study will evaluate the construct validity of
the SWS by correlating the SWS with the most prominent
existing measures of the TABP, and by comparing the
classification agreement of these instruments using the
Structured Interview as the ultimate criterion. The
convergent validity of the SWS will be evaluated through
correlations with the JAS and the Framingham Type A Scale,
and by comparing the classification agreement of the Type A
ratings made by the SWS, JAS, and Framingham Type A Scale
with the Structured Interview in a sample of business
managers. The internal consistency of the self-report Type
A measures will also be compared.

The second part of this study compares the ability of
Type A instruments to predict cardiovascular responses to a
social stressor. This study will directly examine the
relation of Type A behaviour and SWS profiles to blood
pressure and heart rate responses to stress, the underlying
physiological mechanism thought by some researchers to lead
to CHD. The identification of the physiological mechanisms
underlying the TABP and CHD relation is important for
scientific credibility and intervention (Roskies, 1987).
Evidence of a causal relation between the TABP and CHD
requires the identification of a biochemical and/or
physiological relation. In intervention these physiological

indicators can be used to evaluate the effectiveness of an intervention program.

Specifically, this study will compare physiological responses of male business managers exhibiting different SWS profiles of the TABP before, during, and after the Structured Interview. The administration of the Structured Interview has been shown to increase significantly systolic and diastolic blood pressure (Battig & Pfiffner, 1985; Pfiffner, Lanfranconi, Nil, Buzzi, & Battig, 1988). B' increasing the specificity of th. assessment of Type A behaviour, it is hoped that pathophysiological processes leading to CHD may be elucidated. The ability of the typological Type A/B assessment of the Structured Interview, the continuous Type A/B assessment of the Jenkins Activity Survey and the Framingham Type A Scale, and the multidimensional Type A/B assessment of the SWS to predict the physiological arousal of business managers will also be compared.

Study 2

To date, no study has examined the relation between CHD, coronary risk factors, and a multidimensional self-report measure of the TABP. Perhaps there are differences in the prevalence of CHD between men characterized by different SWS profiles. Although, the previous study evaluates the construct validity of the SWS as a measure of the TABP and as a predictor of cardiovascular reactivity, the ability of scores on the SWS Type A profiles to predict

the presence of CHD has not been examined. This second study evaluates the construct validity of the SWS as a measure of coronary risk by comparing the ability of traditional risk factors to discriminate between those men who have CHD and those men who do not, to that of the SWS modal profiles. The predictive ability of a model combining traditional risk factors with the SWS modal profiles will then be determined. This study also examines the relation of several traditional risk factors such as smoking, obesity, serum cholesterol, dietary fat and cholesterol, elevated systolic and diastolic blood pressure (hypertension), physical inactivity, smoking, diabetes, and age to the SWS.

Study 3

The final study differs from the previous two studies in that it is an examination of the psychological correlates of the Type A behaviour pattern hypothesized to result from the adoption of Type A beliefs and fears. This study examines the relation between the TABP as assessed by the Survey of Work Styles Scale A (a scale developed in Study 1 from items found to predict the classifications made by the Structured Interview) and psychopathological dimensions, such as depression, interpersonal problems, alienation, and deviation as assessed by the Basic Personality Inventory (Jackson, 1989). In addition, the relation between the SWS profiles and psychopathology will be examined. The Basic

Personality Inventory and the SWS were administered to a
sample of men and women in the general population.

Chapter III

Evaluation Of The Survey Of Work Styles

<u>Overview</u>

To validate a new measure of Type A behaviour, it should first be demonstrated that it does indeed assess components of the Type A behaviour pattern. More important, it should be shown that the new self-report instrument has both theoretical and empirical advantages over existing Type A measures. This study is a direct examination of the construct validity of the SWS. The SWS is correlated with the JAS and the Framingham Type A Scale, and the classification agreement of these instruments are compared using the Structured Interview as the ultimate criterion.

The empirical and theoretical contribution of the SWS to understanding and predicting cardiovascular reactivity, that may lead to CHD will also be evaluated. Blood pressure and heart rate responses before, during, and after administration of the Structured Interview will be compared among the SWS profiles. In addition, the ability of the JAS, the Framingham Type A Scale, and the Structured Interview to predict cardiovascular responses to stress will be compared.

It is hypothesized that the SWS will show moderate to high internal consistency, moderate correlations with the JAS and Framingham Type A Scale, and significantly higher classification agreement with the Structured Interview than both the JAS and Framingham Type A Scale. It is also

expected that scores on the SWS profiles would predict physiological arousal to the Structured Interview. Because of the exploratory nature of this study, no directional hypotheses were made with respect to the relation between the SWS profiles and measures of physiological arousal.

Method

Subjects. The sample consisted of 163 male middle-level managers drawn largely from manufacturing and financial businesses. These men ranged in age from 27 to 60 years, with an average age of 42.3 years. Subjects who had a history of coronary heart disease were excluded from this sample. Men who smoked or were taking medications believed to influence the physiological measures were also excluded.

Measures and Procedures

Assessment of Type A Behaviour. The Structured Interview, developed by Rosenman and Friedman (Rosenman, 1978), consists of about 24 questions designed to elicit components of the TABP (e.g., hostility, impatience, competitiveness). The interview was administered by a young female trained in 1985 by R. H. Rosenman and colleagues. A fast, interruptive interview style was used. Interviews were conducted in a private and quiet room at each subject's workplace. Each interview was video and audiotaped to facilitate the scoring of the individual into one of five categories of Type A1 (fully developed Type A), A2 (incompletely developed Type A), X (nearly equal mixture of Type A and Type B characteristics), B4 (exhibition of Type B

pattern to some degree), and B5 (exhibition of Type B pattern to an extreme degree).

The behaviour pattern classification was based on speech stylistics and behaviours, and to a lesser extent on the self-reports of Type A behaviour (Matthews, 1983). Sn individual receiving a A1 classification generally exhibited the following characteristics: firm handshake; brisk walking pace; loud or vigourous voice; terse, clipped, rapid and/or explosive speech; responses frequently given before the interviewer completed the question; speech hurrying; frequent sighing; vehement reactions to questions concerning time delays; and display of hostility. In contrast, an individual receiving a B5 classification would generally have displayed the following motor and behavioural characteristics: calm, quiet, relaxed expression; slow walking pace; gentle handshake; quiet voice; slow speech delivery; minimal speech inflection; rarely interrupted or hurried the interviewer; rarely showed hostility or impatience; rarely sighed, and rarely clenched fist.

The interviews were assessed by the interviewer and an observer, who was also trained by R. H. Rosenman, and the categorization was decided by consensus. Ten interviews were sent to Rosenman for scoring. Rosenman's classification and the consensus rating by the interviewer and the observer were the same for eight of the interviews, resulting in an 80 percent classification agreement. For the purpose of comparison, subjects were then grouped into

two categories such that the Type A category consisted of all subjects classified as A1 or A2, and the non-Type A category included subjects classified as Type X, B4, or B5.

The JAS (Form C), the Framingham Type A Scale, and the SWS were completed by all subjects following the Structured Interview. Scoring of the JAS and Framingham Type A Scale followed standard procedures (Haynes, Levine, Scotch, Feinleib, & Kannel, 1978; Jenkins, Zyzanski, & Rosenman, 1979), resulting in a continuous Type A/B score for both the JAS and the Framingham Type A Scale, and scores on the three JAS subscales.

The SWS was scored using summed five-point weights for positively and negatively keyed subscale items. Raw scale scores were standardized to a mean of 0 and a standard deviation of 1. A cluster analysis procedure, modal profile analysis (Jackson, Holden, Locklin, & Marks, 1984; Jackson & Williams, 1975; Skinner, 1977) was used. As noted in Chapter 1, this procedure classifies subsets of entities based on similarity of profile shape using multivariate analyses. Each cluster yields an associated modal profile that is characteristic of individuals falling within the cluster. Each modal profile can be viewed as a summary of a configuration of scores on a series of components of the TABP. Rather than treating types as ranges along a single dimension, modal profile analysis yields a number of types, each having a different profile or configuration of scores.

Given a matrix of 163 subjects by 6 scales, modal profile analysis yields the mathematical equivalent of a principal components analysis of the 163 x 163 correlation matrix of profile shapes by applying singular value decomposition with varimax rotation to the 163 x 6 matrix. The analysis yields for each individual profile an index of the degree of similarity between the profile and each of a small number of characteristic or modal profile types. It is thus possible to cluster respondents in terms of their similarity in profile shape.

Cardiovascular measures. Blood pressure and heart rate were measured using an automatic recording digital sphygmomanometer with visual display. During the baseline (lasting 11 minutes) four physiological readings were taken after the fifth, seventh, ninth, and eleventh minute. For each physiological variable, a baseline value was calculated as the mean of the last two recordings. Following the baseline period, the Structured Interview was administered. Blood pressure and heart rate was measured within the first minute of the interview, and every two minutes thereafter until the interview was completed. The interview physiological levels were calculated as the mean of all recordings taken during the interview. Following the interview, two recovery measures were taken: one within the first minute of completion of the interview, the second two minutes after. The recovery level of heart rate and blood pressure was the mean of the two recordings. Cardiac effort

was calculated from the baseline, interview, and recovery measures using the following formula:

CARDIAC EFFORT = HEART RATE X MEAN ARTERIAL PRESSURE

where mean arterial pressure is

DBP + (SBP - DBP)/3.

Results

Psychometric Analyses

Reliability of Type A measures. The alpha reliability of the SWS total score, obtained by summing scores for the six scales (96 items) was .90. This compares with a reliability of .55 obtained for the JAS A/B scale, and .71 for the Framingham Type A Scale. Reliabilities of the individual SWS subscales were in a range from .71 to .82 with a median of .82. In comparison, the subscales of the JAS had lower alpha reliabilities, ranging between .37 to .55. Means, standard deviations, and reliabilities for all self-report Type A Scales are presented in Table 2.

Relations among Type A measures. Examination of the correlation matrix in Table 3 indicates that the Type A measures were moderately related. The SWS correlated .67 ($p<.0001$) with the Framingham Type A Scale and .56 ($p<.0001$) with the JAS A/B Scale. Results also indicated that the JAS A/B scale was only weakly related to the Anger subscale ($r=.25$, $p<.005$), and was not related to the Job Dissatisfaction subscale ($r=.02$, $p>.75$). The Framingham Type A Scale was most strongly related to the Time Urgency ($r=.54$, $p<.0001$), Job Dissatisfaction ($r=.44$, $p<.0001$), and

Table 2

Scale Statistics of the Survey of Work Styles, Jenkins Activity Survey, and the
Framingham Type A Scale

Type A questionnaires	Number of items	Mean	Standard deviation	Alpha reliability
Jenkins Activity Survey				
A/B	21	2.4	0.71	.55
Speed-Impatience	21	2.0	0.65	.55
Job Involvement	24	2.3	0.45	.47
Hard Driving/Competitive	20	1.1	0.24	.37
Framingham Type A Scale	10	4.5	1.81	.71
Survey of Work Styles				
Total Sum	96	278.5	34.74	.90
Impatience	16	51.7	8.94	.82
Anger	16	43.5	8.00	.71
Work Involvement	16	47.5	10.22	.82
Time Urgency	16	49.1	9.50	.81
Job Dissatisfaction	16	38.4	9.57	.82
Competitiveness	16	48.3	9.27	.80

Note. Summary statistics based on 163 male business managers.

Table 3
Intercorrelations Among Type A Questionnaires

Scale	2	3	4	5	6	7	8	9	10	11	12
Jenkins Activity Survey											
1. A/B	60	39	49	56	56	53	25	38	47	02	46
2. Speed-Impatience		26	22	44	53	54	40	27	38	17	25
3. Job Involvement			23	19	39	31	08	45	32	-08	33
4. Hard Driving-Competitive				30	30	13	07	34	27	07	24
5. Framingham Type A Scale					67	54	26	37	55	44	34
Survey of Work Styles											
6. Total Sum						74	55	64	79	49	55
7. Impatience							41	25	43	25	47
8. Anger								10	25	26	15
9. Work Involvement									62	06	27
10. Time Urgency										33	26
11. Job Dissatisfaction											-08
12. Competitiveness											

Note. Decimals omitted. p(r>0.27)=.0005, p(r>0.22)=.005, p(r>0.16)=.05. N=163.

Impatience ($r=.54$, $p<.0001$) subscales of the SWS. Estimates of the correlations corrected for attenuation between the Type A scales were computed so as to yield correlations based on true scores. The SWS total score corrected correlation was .80 with the JAS A/B scale and .84 with the Framingham Type A Scale.

Classification agreement of self-report Type A measures with the Structured Interview. Discriminant function analysis using jackknifing procedures was undertaken on the data in an attempt to predict the Structured Interview category (Type A versus non-Type A) from the Survey of Work Styles items. This analysis involved selecting items that maximally discriminated criterion groups based on the Structured Interview. Because cross-validation was planned, items with differences between groups that corresponde i to an F of 1.0 or greater were chosen. Basing the results of classification on the same sample of cases that were used to develop the discriminant function introduces a bias (Tabachnick & Fidell, 1983), so the BMDP7M jackknife classification procedure was used to eliminate this source of bias. With this method each subject is successively omitted from the computation of the discriminant function developed from all the sample except the person being classified. Thus the jackknife results can be seen as a more powerful but largely equivalent version of classical cross validational procedures.

The results shown in Table 4 indicate that about 83 percent of the Type As and 63 percent of the non-Type As were correctly classified on the basis of this discriminant function using the Structured Interview as the criterion. This resulted in the correct classification of over 76 percent of the total sample. It should be recognized that errors in classification, when they occur, are due not only to the predictor measure but also to the fallibility of the criterion. Interrater agreement has found to be between 75 and 90 percent (Matthews, 1982) for the Structured Interview, demonstrating that it is not a completely reliable instrument.

A total of 35 SWS items were identified by the discriminant function analysis as items that discriminated the Type A and non-Type A groups classified by the Structured Interview. All six SWS scales were represented in the 35 items select nine on Impatience, seven on Anger, seven on Time Urgency, five on Job Dissatisfaction, four on Work Involvement, and three on Competitiveness. The coefficient alpha reliability of this 35-item scale is .79. In this sample, the Structured Interview classified over 67 percent of the business managers as Type A, so by chance, agreement rates should be 67 and 33 percent for Type A and non-Type A managers, respectively. Thus the SWS scale and the Structured Interview concur 16 and 29.5 percent above chance levels for Structured Interview defined Type As and non-Type As, respectively. This is a higher percentage than

Table 4

The Classification Agreement of the Survey of Work Styles
with Type A and Non-Type A Categories of the Structured
Interview

Structured Interview category	Predicted category		
	Type A	Non-Type A	Total
Type A	89 (83.2)	18 (16.8)	107 (100.0)
Non-Type A	21 (37.5)	35 (62.5)	56 (100.0)
Total	110 (67.5)	53 (32.5)	163 (100.0)

Note. Thirty-five Survey of Work Styles items selected by
discriminant function analysis with jackknifing cross-
validational procedures were used. Data are expressed in
terms of raw frequencies. Parenthesized values indicate
percentages. Results based on 163 male business managers.

those reported by Matthews (1982) for the JAS and Framingham Type A measures, that showed concurrence rates with the Structured Interview classification in the range of 10 to 20 percent above chance levels in previous studies.

In the present sample, the JAS correctly predicted 80 percent of the Type As but only 50 percent of the non-Type As from the 19 items identified by the discriminant function, resulting in an agreement with the Structured Interview 14 and 16 percent above chance levels. The classification accuracy for the total sample was approximately 70 percent. The classification of cases on the basis of this analysis is shown in Table 5.

The five items selected by the discriminant analysis from the Framingham Type A Scale concurred with the Structured interview in 82 percent of the Type A group, but only 27 percent in the non-Type A sample, resulting in an overall classification agreement of only 63 percent. These results, shown in Table 6 are largely due to the overclassification of men as Type As.

In order to compare the validity of the SWS with the JAS for predicting the Structured Interview classifications, phi correlations (Pearson product-moment correlation for dichotomous variables) were computed. The correlation between the SWS and the Structured Interview (phi=.46) was significantly greater (p<.05, one-tailed) than that obtained for the JAS and Framingham Type A Scale with the Structured Interview (phi=.31 and .10, respectively). To correct for

Table 5

The Classification Agreement of the Jenkins Activity Survey with Type A and Non-Type A Categories of the Structured Interview

Structured Interview catego.y	Predicted category		
	Type A	Non-Type A	Total
Type A	86 (80.4)	21 (19.6)	107 (100.0)
Non-Type A	28 (50.0)	28 (50.0)	56 (100.0)
Total	114 (69.9)	49 (30.1)	163 (100.0)

Note. Nineteen Jenkins Activity Survey items selected by discriminant function analysis with jackknifing cross-validational procedures were used. Data are expressed in terms of raw frequencies. Parenthesized values indicate percentages. Results based on 163 male business managers.

Table 6 .

<u>The Classification Agreement of the Framingham Type A Scale</u>
<u>with Type A and Non-Type A Categories of the Structured</u>
<u>Interview</u>

Structured Interview category	Predicted category		
	Type A	Non-Type A	Total
Type A	88 (82.2)	19 (17.8)	107 (100.0)
Non-Type A	41 (73.2)	15 (26.8)	5ι (100.0)
Total	129 (79.1)	34 (20.9)	163 (100.0)

<u>Note</u>. Five Framingham Type A Scale items selected by
discriminant function analysis with jackknifing cross-
validational procedures were used. Data are expressed in
terms of raw frequencies. Parenthesized values indicate
percentages. Results based on 163 male business managers.

the difference in the proportion of subjects falling within Type A and non-Type A categories, Sakoda's modification of the Pearson contingency coefficient was used (Liebetrau, 1983). To obtain an estimate of how well the self-report questionnaires would predict the criterion if the criterion was perfectly reliable, another correction to the phi correlations was made to correct the degree to which the correlations between the self-report measures of Type A and the Structured Interview were attenuated by the unreliability of the Structured Interview (test-retest reliability=.74) (Nunnally, 1978). The corrected estimates of the validity of the SWS, JAS, and Framingham Type A Scale were .69, .49, and .16, respectively.

Modal profile analysis of the Survey of Work Styles.
The modal profile analysis of the SWS yielded three bipolar modal profiles from the sample (Figure 1). As seen from the figure, the first profile can be identified by an elavation of the Anger and Impatience subscales, and depression of the Work Involvement and Competitiveness subscales. The second profile was characterized by low scores on the Work Involvement and Competitiveness subscales, and high scores on the Job Dissatisfaction subscale. The final profile can be identified by high Anger, Work Involvement, and Time Urgency, with low Competitiveness scores. To simplify the presentation and discussion of results, Profile 1 will be referred to as the Anger/Impatience profile, Profile 2 will be labelled the Job Dissatisfaction profile, and Profile 3
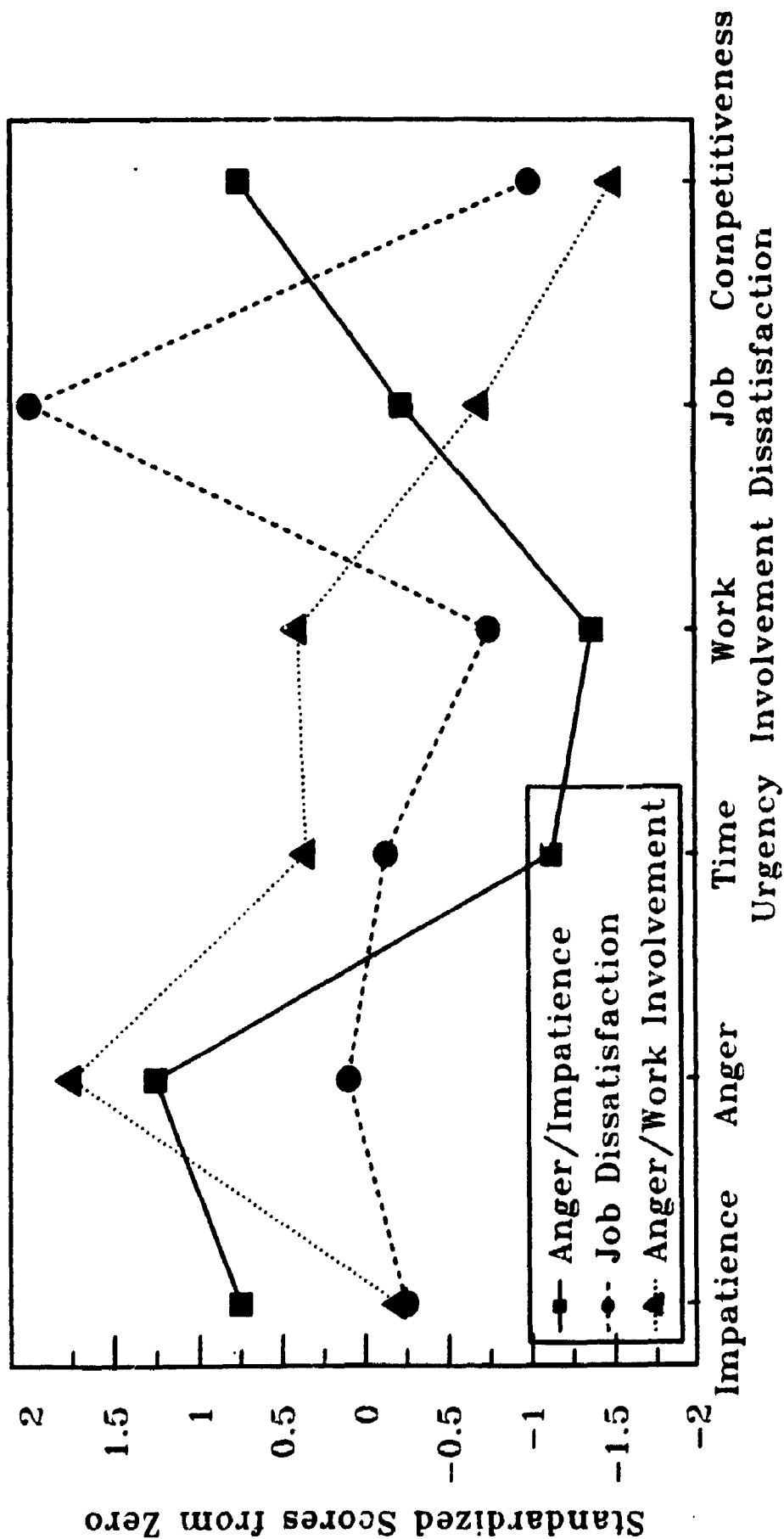
Figure 1. Survey of Work Styles Modal Profiles for Male Business Managers

will be identified as the Anger/Work Involvement profile. Any individual's SWS profile might show either a positive or negative relation with a particular modal profile. A person who was classified at the positive pole of the dimension underlying the second modal profile would have generally obtained a high score on Job Dissatisfaction and low scores on Work Involvement and Competitiveness, whereas a person who was classified at the negative pole of the same dimension would have shown an opposite pattern of scores, that is, low Job Dissatisfaction score, but high Work Involvement and Competitiveness scores.

Cardiovascular Analyses

Cardiovascular effects of the Structured Interview.

Before attempting to evaluate the relation between the Survey of Work Styles profiles and blood pressure, heart rate, and cardiac effort, the effectiveness of the Structured Interview to elicit changes from baseline was evaluated. Repeated two-factor analyses of variances for Structured Interview defined Type As versus non-Type As with experimental phase (baseline, interview, recovery) as a within factor revealed a significant phase effect for heart rate (F=26.01, p<.0001), systolic blood pressure (F=230.50, p<.000), diastolic blood pressure (F=107.52, p<.0001), and cardiac effort (F=99.00, p<.0001). For all physiological variables, there was a significant increase in level during the Structured Interview. This demonstrates that the Structured Interview was a successful stressor because it

increased the physiological responses of the business managers.

Predicting cardiovascular reactivity with the Survey of Work Styles. Preliminary analyses revealed that baseline values of the physiological measures were correlated with scores on the modal profiles. First, regression analysis was conducted predicting each physiological measure by its corresponding baseline value (i.e., ~ean heart rate was predicted f.om baseline heart rate, mean systolic blood pressure was predicted from baseline systolic blood pressure, etc.). Next, four separate stepwise regression analyses were employed (one for each phy iological measure) to select those SWS profiles that significantly ($p<.05$) increased the amount of variance explained in tl e mean level of the physiological measure, after having taken into account the mean baseline level of the corresponding physiological measure. This procedure determined whether or not scores on a certain profile were predictive of increased and/or prolonged physiological arousal to the Structured Interview, controlling first for baseline differences in blood pressure, heart rate, and cardiac effort.

Mean systolic blood pressure was predicted by a linear combination of the three profiles. A comparison of the standardized regression coefficients shown in Table 7 reveals that all three profiles were positively associated with essentially the same amount of change in mean systolic blood pressure.

Table 7

Stepwise Regression Results for Predicting Physiological
Arousal From the Modal Profiles of the Survey of Work Styles

Modal profiles in model	Beta	B	S.E.	F	p-value
Mean systolic blood pressure					
Anger/Impatience	.08	2.39	1.15	4.37	<.04
Job Dissatisfaction	.09	2.69	1.09	6.06	<.02
Anger/Work Involvement	.09	2.90	1.20	5.86	<.02
Mean diastolic blood pressure					
Anger/Work Involvement	.09	2.06	0.99	4.28	<.04

Mean heart rate

No modal profiles were significant predictors.

Mean cardiac effort

No modal profiles were significant predictors.

Note. All stepwise models were adjusted for baseline values
of the physiological measures. Results based on 163 male
business managers. S.E. = Standard error.

With respect to diastolic blood pressure, only the Anger/Work Involvement profile was predictive of the mean level during the interview. Mean heart rate and cardiac effort were unrelated to scores the the three SWS modal profiles. No recovery measures of blood pressure, heart rate, and cardiac effort were predicted by the modal profiles.

Predicting cardiovascular reactivity with the Structured Interview. A series of repeated analyses of covariances, using the Structured Interview Type A/non-Type A classification as the between groups factor was conducted on the cardiovascular measures of heart rate, blood pressure, and cardiac effort. No significant main effect for Type A/non-Type A classification was found for systolic blood pressure (F=2.63, p>.10), diastolic blood pressure (F=0.19, p>.65), heart rate (F=1.80, p>.15), and cardiac effort (F=2.52, p>.10). Structured Interview Type As and non-Type As did not differ significantly during or after the Structured Interview. Similarly, no significant differences were found when the original Structured Interview classifications (A1, A2, X, B4, B5) were used. These results are summarized in Table 8. Thus, the use of a typological Type A measure did not identify men who have greater physiological arousal to the interview.

Predicting cardiovascular reactivity with the Jenkins Activity Survey and the Framingham Type A Scale. Scores on the JAS (Form C) and the Framingham Type A Scale were

Table 8

Comparison of Physiological Means for Structured Interview
Classifications

Physiological measure	Structured Interview classification				
	A1 (n=37)	A2 (n=69)	X (n=29)	B4 (n=23)	B5 (n=5)
Diastolic blood pressure					
Interview	90.5 (1.01)	91.5 (0.74)	91.5 (1.14)	92.4 (1.28)	89.7 (3.53)
Recovery	86.4 (1.01)	87.7 (0.74)	84.4 (1.14)	88.0 (1.29)	83.5 (3.56)
Systolic blood pressure					
Interview	141.0 (1.22)	142.6 (0.90)	140.0 (1.39)	142.4 (1.56)	139.2 (4.33)
Recovery	135.3 (1.26)	135.3 (0.93)	132.2 (1.44)	133.9 (1.62)	128.5 (4.49)
Heart rate					
Interview	75.4 (1.03)	74.7 (0.76)	74.4 (1.18)	73.6 (1.33)	74.0 (3.67)
Recovery	71.5 (1.06)	70.8 (0.78)	69.5 (1.?1)	69.0 (1.36)	74.3 (3.76)
Cardiac effort					
Interview	8114.9 (144.9)	8143.8 (106.8)	8031.0 (165.8)	8051.8 (186.0)	7832.7 (515.1)
Recovery	7385.9 (138.4)	7373.1 (102.0)	6980.7 (158.4)	7191.7 (177.7)	7316.9 (492.0)

Note. Entries are mean physiological values adjusted for
the corresponding physiological measure baseline values.
Parenthesized values are the standard error of the mean. No
means were significantly different. Sample consists of 163
male business managers.

correlated with baseline, interview, and recovery measures of heart rate, blood pressure and cardiac effort. Also, change scores between baseline and interview levels, and between interview and recovery levels were computed and correlated with Type A scores. As seen in Table 9, correlations between the Type A measures and the physiological measures ranged between -.12 to .15, but none of the correlations reached statistical significance. It is apparent then, that a continuous approach to Type A assessment also did not identify managers with greater physiological reactivity.

Discussion

Criterion Validation of the Survey of Work Styles

The results of this study indicate that when the SWS is scored using a multidimensional approach there are three distinct bipolar modal profiles underlying the sample of business managers. A major criticism of past approaches to Type A assessment has been that "psychometric imprecision may result because persons may be classified as Type As for different reasons" (Matthews, 1982, p. 301). As shown in Figure 2, it is quite possible for two people who have the same global Type A score to have very different profiles. Figure 2 contrasts the profiles of two subjects in this study. Subject 037 has a highly differentiated profile, with elevated scores on the SWS Impatience, Work Involvement, Time Urgency, and Competitiveness subscales, and a very low score on the Job Dissatisfaction subscale.

Table 9

Correlations of Physiological Measures with the Jenkins
Activity Survey and the Framingham Type A Scale

Physiological measures	Jenkins Activity Survey				Framingham
	A/B	S/I	HD	J/I	
Diastolic blood pressure					
Baseline	.00	.05	.07	.07	.02
Interview	.09	.14	.09	.05	.09
Recovery	.07	.13	.05	.06	.02
Interview-baseline	.14	.15	.02	-.02	.10
Interview-recovery	.03	.02	.10	-.01	.11
Systolic blood pressure					
Baseline	-.04	.01	.04	.01	.01
Interview	.03	.09	.01	.02	.02
Recovery	.05	.07	-.05	.05	.01
Interview-baseline	.12	.15	-.06	.03	.03
Interview-recovery	-.03	.04	.12	-.05	.03
Heart rate					
Baseline	-.12	.02	.05	.03	-.05
Interview	-.05	.07	.03	.03	-.04
Recovery	-.05	.06	.03	.11	-.03
Interview-baseline	.12	.07	-.04	-.01	-.03
Interview-recovery	.01	.01	-.00	-.12	-.00
Cardiac effort					
Baseline	-.11	.04	.07	.04	-.03
Interview	-.01	.12	.05	.04	.01
Recovery	-.01	.11	.03	.11	-.02
Interview-baseline	.15	.14	-.04	-.00	.05
Interview-recovery	.01	.03	.03	-.11	.04

Note. Entries are Pearson correlations. No correlations
were significant. Sample consists of 163 male business
managers. A/B=Type A, S/I=Speed-Impatience, HD=Hard-
driving, J/I=Job Involvement.
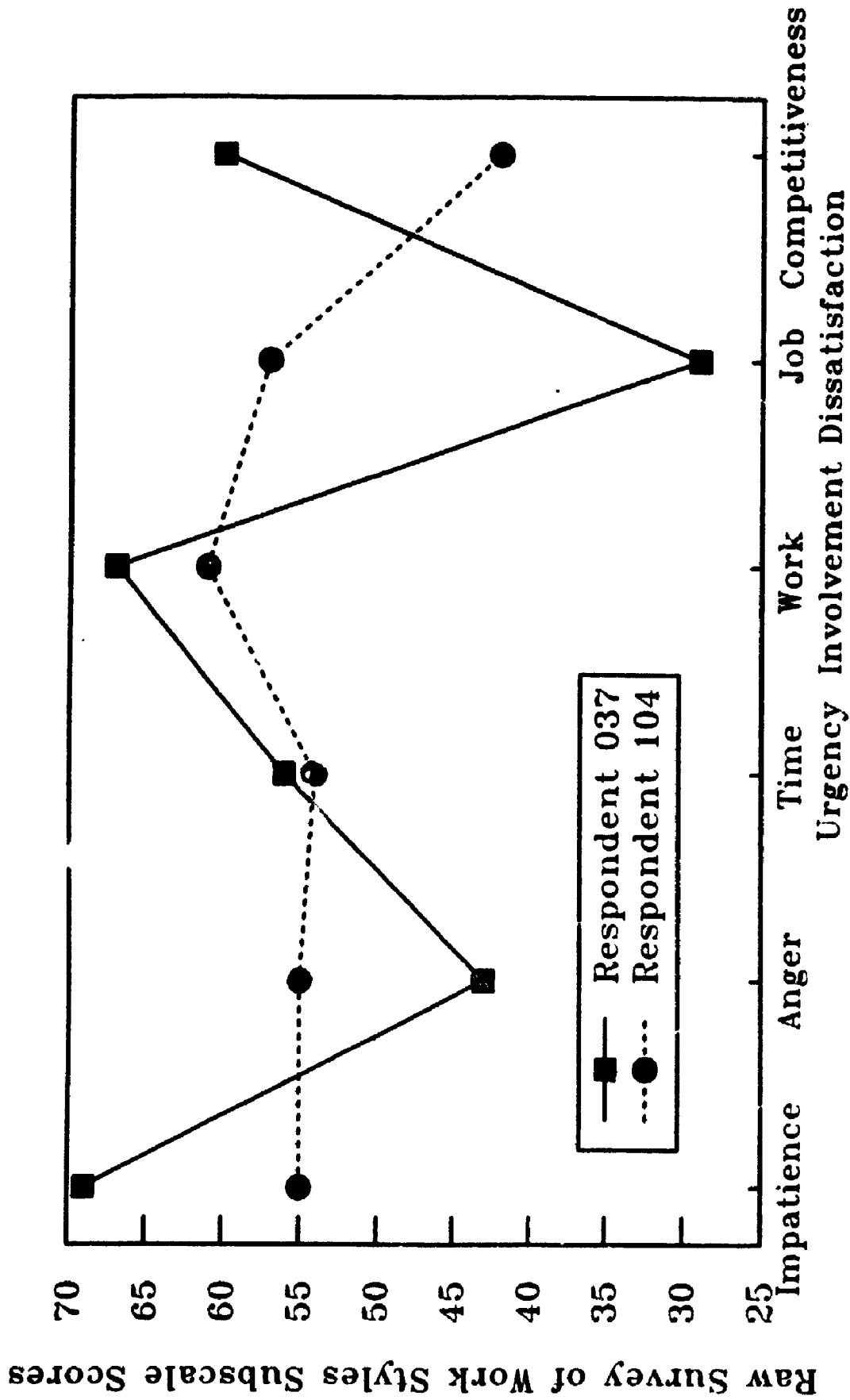
Figure 2. Comparison of the Profiles of Two Business Managers with
          Identical Survey of Work Styles Total Scores

The profile of subject 104 is flatter, but with a different configuration of scores, particularly for the Job Dissatisfaction and Competitiveness subscales.

A question might arise regarding the degree of distinctiveness of the profiles. Because the modal profile analysis yields profile types based on orthogonal dimensions, the profile types are orthogonal and hence mutually independent. Evidence of the stability of the profile types was obtained in a cross-validation sample drawn from a somewhat different sample of 73 male university students (Gray & Jackson, in press). The results of the cross-validation study yielded similar profiles to those obtained from the businessmen. The male university Anger/Impatience profile shows a .88 correlation with the Anger/Impatience profile of the male business managers. The male university Job Dissatisfaction profile was similar to the Job Dissatisfaction profile of the business managers as evidenced by a correlation of .95 between these two profiles. The male university Anger/Work Involvement modal profile, however, only weakly resembled the Anger/Work Involvement male business manager modal profile ($r=.41$).

Further, the present study offers evidence supporting the reliability and convergent validity of the Survey of Work Styles. Using 35 SWS items, the classification procedure correctly classified 83 percent of the Type A managers and 63 percent of the non-Type A managers, resulting in an overall correct classification of 76

percent, significantly higher than the classification accuracy of the JAS and Framingham Type A Scale. Despite the significant overall concordance rates between the self-report measures and the Structured Interview, there are important clinical and research implications of the misclassifications of Type As and Type Bs by the JAS, Framingham, and SWS. Whereas all three scales have comparable misclassification rates for labelling coronary risk men as low coronary risk (between 17 and 20 percent), there is a large difference in the misclassification of low risk men as high risk (between 38 and 73 percent). Clinically, the more serious of these misclassification rates is the labelling of false negatives (i.e., classifying Type As as Type Bs) because these individuals may be excluded from treatment or intervention that may reduce their risk of heart disease. If one's only concern was to use a scale that had a small number of false negatives then either the SWS, JAS, or Framingham Type A Scale would be appropriate.

The labelling of false positives (i.e., classifying Type Bs as Type As) also has important implications, especially for large-scale screening programs. The JAS and Framingham Type A Scale yielded 50 and 73 percent false positive rates, respectively. Such high false positive rates might result in a less accurate prediction of disease because the majority of the persons are identified as at high risk for coronary disease. Also, an increase in the

number of persons classified as Type A will greatly increase the time, resources, and money required in research, clinical assessment, and intervention. The SWS does not show the high false positive rate yielded by the JAS or Framingham Type A Scale.

These results suggest that the SWS assesses a substantial portion of the variance measured by the Structured Interview. Of course it is recognized that even the Structured Interview is itself a fallible measure (Matthews, 1982). This will limit the SWS's agreement with the Structured Interview and it's apparent ability to identify correctly all Type A patients. For example, if it could be assumed that the Structured Interview correctly identified 90 percent of all Type As with respect to some ideal or ultimate criterion, then the SWS would be expected to identify correctly at least 75 percent (.90 x .83) of Type A patients, plus any Type A individuals the SWS might be able to identify correctly that were not correctly assessed by the Structured Interview. The 35-item SWS (that would take less than 10 minutes to administer to a group of individuals) could be used when a global Type A score similar to the Structured Interview is desired. If one wants Type A component scores, the SWS subscales should be given to maximize the reliability and validity of measurement. The moderate correlations between the JAS and the Framingham Type A Scale are consistent with past

research that has shown that the two scales assess somewhat different aspects of the TABP (Matthews, 1982).

Both the JAS and the Framingham Type A Scales were found to have weak correlations with the SWS Anger Scale. The lack of relation of these scales to anger has important implications for the use of these questionnaires to predict CHD events, severity of coronary artery disease, and physiological reactivity. The available evidence from recent research suggests not all Type A characteristics are linked to CHD. Instead, recent thinking indicates that anger/hostility is emerging as the "toxic" aspect of the TABP (Williams & Barefoot, 1988). Thus, the JAS and Framingham Type A Scales have limited usefulness in research designed to further our understanding of the cognitive and biological mechanisms underlying anger/hostility and its pathophysiological consequences.

Type A Prediction of Cardiovascular Reactivity

The results of the present study indicate that a continuous or typological approach to Type A assessment failed to predict physiological arousal during and after the Structured Interview. However, the results of the present study support a multidimensional self-assessment approach to Type A assessment. Systolic blood pressure during stress was related to an individual's scores on all three modal profiles. Diastolic blood pressure was related only to scores on the Anger/Work Involvement profile. Consistent with most past research that has found no A-B differences,

no significant relations were found between the SWS modal profiles and the physiological measures of heart rate, and cardiac effort (Matthews & Haynes, 1986).

These results imply that the failure to recognize individual differences in the expression of the Type A behaviour pattern by categorizing a sample into a Type A and non-Type A group or into Structured Interview types, or by only recognizing a quantitative difference in an overall Type A score, results in an inability to identify individuals who may be coronary-prone because they are physiologically reactive in a social situation. But, when subjects are classified according to a multidimensional pattern of Type A expression, these individuals can be identified.

It is possible that Type As do not respond with significantly greater physiological reactivity to all situations. This particular challenge or interviewer may not have evoked some of the Type A components of the Structured Interview or JAS-defined subjects. Perhaps, a different situation (such as performance of a moderately difficult cognitive task) would have elicited A-B differences in JAS and Structured Interview-defined subjects. Past researchers that have reported physiological differences between Type As and Type Bs have employed difficult and moderately competitive tasks, with a moderate external incentive to perform well (Houston, 1983; Matthews, 1982). A recent meta-analysis (Harbin, 1989) found that

Type A males respond to cognitive and psychomotor situations with greater heart rate and systolic blood pressure responses, and that the relation is stronger when the Structured Interview is used.

Another possibility is that the interviewer's style of administering the Structured Interview affected the Type A behaviour of the subjects and the subsequent ratings and/or the cardiovascular reactivity during the interview. In three of the four studies (Dembroski, MacDougall, & Lushene, 1979; Krantz et al., 1981; MacDougall, Dembroski, & Krantz, 1981) conducted using the Structured Interview as a stressor, physiological differences between Type As and Bs were found. Thus, the interviewer and his/her style may be a moderator of the relation between Type A behaviour and physiological responses. Recent findings by Scherwitz (1988) suggest that the styles in which the Structured Interview is conducted affects its ability to predict CHD. In addition, Houston and associates (Houston, Smith, O'Connor, & Funk, 1988) found that diastolic blood pressure reactivity was positively related to Type A ratings from interviewers with a slower, less disruptive styles of interviewing (one that departs from standard practice), but was negatively related to Type A ratings from interviewers with fast, interrupting styles.

Over the past several years a number of component scoring systems of the Structured Interview have been developed (Dembroski et al., 1985; Matthews et al., 1977,

1982). The present study uses only a global Type A scoring system, so it is not known if a component scoring system to the Structured Interview would have predicted physiological reactivity in this study. Dembroski, MacDougall, Herd, and Shields (1979) found that the Structured Interview hostility/competition dimension was predictive of systolic blood pressure during the Structured Interview.

The finding that high profile scores on the Anger/Impatience profile, the Job Dissatisfaction profile (an indicator of hostility, and stress related to work), and the Anger/Work Involvement profile were associated with greater mean systolic blood pressure during the Stuctured Interview is consistent with past research (Dembroski, MacDougall, & Lushene, 1979; Dembroski et al., 1978; Diamond et al., 1984; MacDougall et al., 1981) where others have found a correlation between physiological changes and anger or hostility, especially with respect to blood pressure. Previous research has also linked anger and hostility to CHD (Barefoot et al., 1983; Matthews et al., 1977; Shekelle et al., 1983).

The Structured Interview was specifically designed to elicit anger and impatience from interviewees, so it is not surprising that persons high in the Anger and Impatience scales of the SWS would experience heightened arousal as assessed by systolic blood pressure. These individuals may have experienced more stress, which may have resulted in the increased release of catecholamines. Catecholamines

(especially norepinephrine) act to increase blood pressure
(Herd, 1981). This type of response suggests that
individuals characterized by the Anger/Impatience profile
perceive the interview situation as threatening (in terms of
loss of control, self-esteem, etc.), and the sympathetic-
adrenal-medullary system is activated (the "fight-flight"
response). This explanation is supported by the finding of
increased amounts of norepinephrine in individuals who have
expressed irritation (Frankenhaeuser & Gardell, 1976;
Friedman, Byers, Diamant, & Rosenman, 1975; Funkenstein,
1956).

Individuals characterized by the Job Dissatisfaction
profile tend to be high in job dissatisfaction and low in
work involvement and competitiveness. These individuals
also experience heightened systolic blood pressure arousal
in response to the Structured Interview, but possibly for
different reasons. The increased arousal may occur because
certain questions in the Structured Interview are directly
concerned with job satisfaction (e.g., "Are you _satisfied_
with your job level? (Why not?)). This is likely to arouse
negative and hostile feelings in persons dissatisfied with
their job, resulting in the "fight-flight" response
previously described.

Business managers showing high scores on the Anger/Work
Involvement profile tend to have high scores on anger and
work involvement, but low scores on impatience, job
dissatisfaction, and competitiveness. These individuals

tend to show heightened systolic and diastolic blood pressure during the Structured Interview. Increases in systolic blood pressure may be due to these individuals becoming easily angered by certain interview questions, resulting in the "fight-flight" response. Increases in diastolic blood pressure also occur during this response, but changes may be magnified by the participant's involvement in the situation. Individuals high in work involvement and low in job dissatisfaction may enjoy discussing their work in response to questions on the Structured Interview. Past research has found that subjects who enjoyed a testing situation felt less anxious prior to the situation, were more fully engaged in the task, and had heightened diastolic blood pressure during the situation (Arnetz & Fjellner, 1986).

If blood pressure responsiveness is indeed a pathophysiological mechanism underlying the development of CHD, then the present data suggest that business managers showing a similar pattern as the one of the SWS modal profiles may be at a higher risk for CHD. Men showing an opposite pattern of scores on the SWS scales are expected to be at a lower risk for CHD. These results are somewhat consistent with past research (Gray & Jackson, in press) that found the pattern of physiological responses in men was influenced by his SWS profile. In a sample of 73 male university students, the scores on the Anger/Impatience were associated with mean systolic blood pressure during an

arithmetic task, but diastolic blood pressure was related to scores on the Job Dissatisfaction profile. Contrary to current findings the Anger/Work Involvement profile was related to heart rate.

Individual differences in the observed physiological levels appear to be related to individual differences in the manifestation of the TABP, and also the type of stressor task. In the present study, men scoring high on the Anger/Work Involvement profile show elevations in both systolic and diastolic blood pressure, but men high in either the Anger/Impatience or Job Dissatisfaction profile show elevations only in systolic blood pressure. The psychological processes leading to heightened physiological arousal may be different for men characterized by each modal profile. In general, studies show that cardiac patients have greater physiological reactivity, but the results have been inconsistent (Krantz, Glass, Schaeffer, & Davia, 1982).

While the identification of patterns of Type A components that have increased diastolic and/or systolic blood pressure reactivity to stress is quite encouraging, further research is needed before one will be able to predict accurately the environmental and individual variables that result in cardiovascular reactivity. It would be desirable for future studies to use a variety of larger samples (e.g., females, blue-collar workers) in order to determine the generalizability of these findings. It is necessary to assess whether or not these SWS patterns and

the physiological responses associated with them are replicable in other populations or whether they are specific to the male business managers in this study. As assessed by the Structured Interview, 107 of these business managers were Type As, and this may result in less variance on the SWS subscales than one may find in other more heterogenous populations.

Another related direction for future research is to determine if different stressors (e.g., cognitive, physical) produce different results in SWS-defined profiles of the TABP. Do men high in anger and work involvement have increased blood pressure responses during a serial subtraction task? Studies are needed to determine the range and types of situations that interact with SWS profiles of Type A components to produce differential sympathetic arousal between the profiles. It is recommended that one not rely exclusively on SWS assessments until the validity of the SWS is established in predicting CHD and physiological reactivity in a variety of stressful situations. Although the items in the SWS were selected to minimize the effects of response biases such as social desirability and defensiveness, and acquiescence, self-report measures, wherever possible, should be supplemented with those stemming from other methods (including those based on direct observation of behaviour). The SWS could be used to screen large samples of individuals, and the

behaviour of those who are at risk could later be observed directly.

Efforts should also be made to conduct research in natural settings. It would be useful to know if profile differences generalize to other situations outside an experimental setting. In the present study we have emphasized a multidimensional self-report approach to the assessment of Type A behaviour. Future studies might appropriately extend this approach to incorporate an appreciation for the multidimensionality of settings, modes of response, stressors, and occasions. For example, TABP might be studied in a variety of settings (e.g., experimental, physician's office), in which several indicators of physiological responsivity are measured (e.g., blood pressure, heart rate, catecholamine release) to different types of stress (e.g., physical, cognitive, social) on separate occasions (e.g., weekday, weekend) using different modes of Type A assessment (e.g., multidimensional self-report, interview, behavioural). This more comprehensive method of examining profile differences may help in the elucidation of physiological and psychological mechanisms underlying the relation between the TABP and CHD.

In summary, this study has provided evidence of the construct validity of the SWS as a measure of the TABP by demonstrating that (1) the SWS is related to the JAS and Framingham Type A Scale, (2) there is a high classification agreement between the Type A category predicted by a 35-item

Type A Scale from the SWS and the Type A classification of
the Structured Interview, and (3) the SWS predicts systolic
and diastolic blood pressure reactivity to a social
stressor. These preliminary results are considered
encouraging, and demonstrate the importance of a
multidimensional approach to Type A assessment.

Chapter IV

The Relation of The Survey of Work Styles to Coronary Heart
Disease and Coronary Risk Factors

Overview

The previous study in this dissertation revealed some evidence for the construct validity of the SWS by demonstrating (1) a high classification agreement between Scale A and the Structured Interview, and (2) a relation with cardiovascular reactivity to stress. However, as noted in Chapter I, considerable controversy exists over whether or not the Type A construct is an independent risk factor for coronary heart disease. It was suggested that a multidimensional self-report measure of work styles may be useful for predicting coronary heart disease.

This study is a retrospective study of the relation of SWS modal profiles and traditional risk factors with the prevalence of coronary heart disease in a random sample of middle aged men. The relation between traditional coronary risk factors (e.g., cholesterol, smoking, obesity) and work styles will also be examined.

On the basis of findings from Study 1, it is hypothesized that men with CHD will have higher scores on the SWS modal profiles than will men without CHD. Further, it is expected that positive scores on the SWS profiles will be predictive of the prevalence of CHD. The ability of the SWS to predict CHD is hypothesized to be independent of its association with traditional coronary risk factors.

Method

Subjects

The men in the present study were a subset of a large male aging study. Participants in the male aging study were randomly selected from a general population of men. Men were sampled from the towns and cities contained within the Boston Metropolitan Statistical Area. Annual census lists were provided by each town and city and 1709 men participated in this male aging study. The resulting sample consisted of 252 middle-aged men ranging in age from 39 to 70 years.

Measures and Procedures

Field technicians contacted sample respondents in person or by telephone in order to verify their eligibility and to make an appointment for administering the full field protocol. The initial contact was generally made in the evening or on weekends to optimize the chance of speaking to the respondent and making an appointment. Appointments were made to visit the respondents within four hours of awakening, ensuring measurement of lipoproteins at the same stable point in the diurnal cycle. Thus the variability among men is not confounded with diurnal variation. Most interviews were conducted at the respondent's home in a quiet and private room. To reciprocate the donation of blood, all respondents were sent a complete comprehensible computer-generated report on the blood analysis, with a suitable explanation of the values. When requested, a copy

of the report was sent to the respondent's physician or health centre.

All participants completed an in-person standardized interview that included questions about health status and practices (e.g., tobacco use, physical activity), socio-demographic characteristics, and a self-report dietary recall survey. Table 10 is a list of the traditional risk factors assessed in this study. The physiological measurement protocols were adapted from the protocols developed and employed by the Canadian government in the 1 78 National Health Survey. All measures were completed in the participant's home, using portable equipment. Height was measured to the nearest 1/2 inch using a hinged, wooden set square and a wooden carpenter's rule. The respondent was placed (without shoes) against a hard smooth surface. Weight was measured (without shoes, and in indoor clothing) to the nearest 1/5 pound using a portable, battery-operated scale that uses electrode sensitivity rather that a spring.

Blood pressure was measured in a sitting position (legs not crossed) after the participant had sat through 1/2 of the interview, and at the end of the interview before the blood samples were drawn. A standard portable mercury manometer was used, and was checked and cleaned regularly. Random zero sphygmomanometers are not adaptable to regular field use given the bulk and calibration needs. The protocol used was that developed for use in the Hypertension and Detection Follow-Up Program (Taylor, 1977).

Table 10

Traditional Risk Factors Assessed in 252 Middle-Aged Men

1. Age (years)

2. Serum cholesterol (mg/dl)

3. Serum high density lipoprotein (mg/dl)

4. Systolic blood pressure (mmHg)

5. Diastolic blood pressure (mmHg)

6. Hypertension (yes/no)

7. Dietary cholesterol (grams/week)

8. Dietary animal fat (grams/week)

9. Dietary saturated fat (grams/week)

10. Dietary polyunsaturated fat (grams/week)

11. Calories from dietary fat (kcal)

12. Total fat consumed (grams/week)

13. Dietary monounsaturated fat (grams/week)

14. Dietary vegetable fat (grams/week)

15. Cigarette smoking (yes/no)

16. Physical activity (kcal/week)

17. Diabetes (yes/no)

18. Body Mass Index (kg/m^2)

Two venous blood samples were drawn after 30 minutes, and at the end of the interview. Total cholesterol and high density lipoproteins were analyzed by a trained technician using a desktop analyzer, the DT60. Test-retest reliability for cholesterol in the male aging study was .81.

To assess obesity, the Body Mass Index (Abdel-Malek, Mukherjee, & Roche, 1985; Garrow & Webster, 1985) was used. This provided an estimate of the percentage of body fat by dividing weight by the square of height. Traditionally, this index is expressed as kilograms per square metre so it was necessary to convert the measure of height from inches to metres. Weight was converted from pounds to kilograms. This index was calculated as follows:

Body Mass Index $=$ (weight x .4536)/(height x .0254)^2 kg/m^2.

The use of cigarettes was assessed using a self-report question. In past research, self-reports of smoking have correlated .96 with physiological assessments of smoking (Petitti, Friedman, & Kahn, 1981).

Physical activity was assessed using a seven-day recall instrument based on the work of Blair et al. (1985). The types of activities and the frequency and duration of each activity were recorded. These activities were classified as light, medium, and hard based on standardized categories (Sallis et al., 1985). Only those activities performed for at least 5 minutes were scored. Caloric expenditure was estimated based on the intensity, duration, and frequency of each activity. These were then summed to yield a total

score of kilocalories per week expended. Reported two week test-retest reliability for kilocalories per day is .67 (Sallis et al., 1985).

Dietary intake of fat and cholesterol was assessed using a diet history method (Willett et al., 1985). This measure, scored by the Willett laboratory yielded several subscale scores on dietary cholesterol, dietary animal fat, dietary saturated fat, dietary polyunsaturated fat, calories from fat, total fat eaten, dietary monounsaturated fat, and dietary vegetable fat. Reported test-retest reliability for the subscales range between .49 to .70 (Willett et al., 1985).

Men completing the standardized interview protocol were later invited by mail to complete the SWS, a short medical history, a medication inventory, and a coronary symptoms checklist.

Statistical Analyses

Stepwise discriminant function analysis with jackknife cross-validation was used to predict the presence of CHD in this sample using only SWS modal profiles, only traditional risk factors, or a combination of traditional risk factors with the SWS modal profiles. Means on the traditional risk factors, the SWS scales, and the SWS modal profiles were compared between men with CHD and those without using multiple t-tests. The relation of SWS subscales and modal profiles with traditional risk factors were examined using Pearson correlations and t-tests.

<u>Results</u>

<u>Summary Description of Sample Characteristics</u>

Table 11 presents the means, standard deviations, and reliabilities of the SWS subscales and total scale. Internal consistency reliability ranged from .69 for Competitiveness to .85 for Work Involvement and Job Dissatisfaction. Summary statistics for the traditional risk factors and the presence of CHD are presented in Table 12 and are compared to those from the Massachusetts Male Aging Study. These results show that the means and standard deviations of the traditional risk factors are comparable to those obtained from the Massachusetts Male Aging Study. In terms of these risk factors, there appears to be little volunteer bias. Twenty-five (9.9 percent) of the 252 men completing the risk assessment and the SWS reported having CHD. In the Massachusetts Male Aging Study 12.6 percent of the men reported having CHD.

<u>Modal Profile Analysis of the Survey of Work Styles</u>

Modal profile analysis of the SWS yielded three bipolar modal profiles as shown in Figure 3. These profiles were quite consistent with those obtained in Study 1. The Anger/Impatience profile correlated .87 with the Anger/Impatience profile in Study 1. The Job Dissatisfaction profile in this sample correlated .90 with the Job Dissatisfaction profile in Study 1. Similarly, the

Table 11

Scale Statistics for the Survey of Work Styles

Survey of Work Styles	Number of items	Mean	Standard deviation	Alpha reliability
Total Sum	96	272.4	37.14	.91
Impatience	16	49.8	8.65	.77
Anger	16	43.2	9.46	.80
Work Involvement	16	46.7	11.05	.85
Time Urgency	16	47.6	11.80	.83
Job Dissatisfaction	16	39.7	10.66	.85
Competitiveness	16	45.3	7.69	.69
Scale A	35	98.4	15.31	.80

Note. Summary statistics based on 233 middle-aged males.

Table 12

Comparison of the Summary Statistics for the Traditional Risk Factors Assessed in the SWS Coronary Heart Disease Study with the Massachusetts Male Aging Study

	Traditional risk factors	Mean		Standard deviation	
1.	Age (years)	53.2	(54.7)	8.26	(8.66)
2.	Serum cholesterol (mg/dl)	205.3	(210.1)	54.04	(52.16)
3.	Serum high density lipoprotein (mg/dl)	40.8	(42.6)	12.87	(13.67)
4.	Systolic blood pressure (mmHg)	125.0	(127.8)	14.19	(16.03)
5.	Diastolic blood pressure (mmHg)	78.5	(80.0)	9.03	(9.29)
6.	Hypertension (yes/no)	26.9*	(30.3)		N/A
7.	Dietary cholesterol (grams/week)	302.5	(312.8)	137.57	(170.70)
8.	Dietary animal fat (grams/week)	40.7	(40.5)	19.77	(21.30)
9.	Dietary saturated fat (grams/week)	26.7	(26.7)	11.92	(13.4)
10.	Dietary polyunsaturated fat (grams/week)	14.0	(13.6)	6.36	(6.67)
11.	Calories from dietary fat (kcal)	38.1	(38.0)	18.86	(20.17)
12.	Total fat consumed (grams/week)	4.7	(2.3)	33.41	(21.00)
13.	Dietary monounsaturated fat (grams/week)	26.5	(26.6)	10.89	(12.72)
14.	Dietary vegetable fat (grams/week)	32.4	(32.2)	15.34	(17.8)
15.	Cigarette smoking (yes/no)	16.1*	(24.4)		N/A
16.	Physical activity (kcal/week)	4148.0	(4070.0)	1172.00	(1352.25)
17.	Diabetes (yes/no)	7.1*	(7.8)		N/A
18.	Body Mass Index (kg/m^2)	27.5	(27.4)	4.37	(4.43)

Note. Results based on 223 middle-aged males. Parenthesized values obtained from Massachusetts Male Aging Study (N=1709).
*Percent responding 'yes'.

Survey of Work Styles Subscales
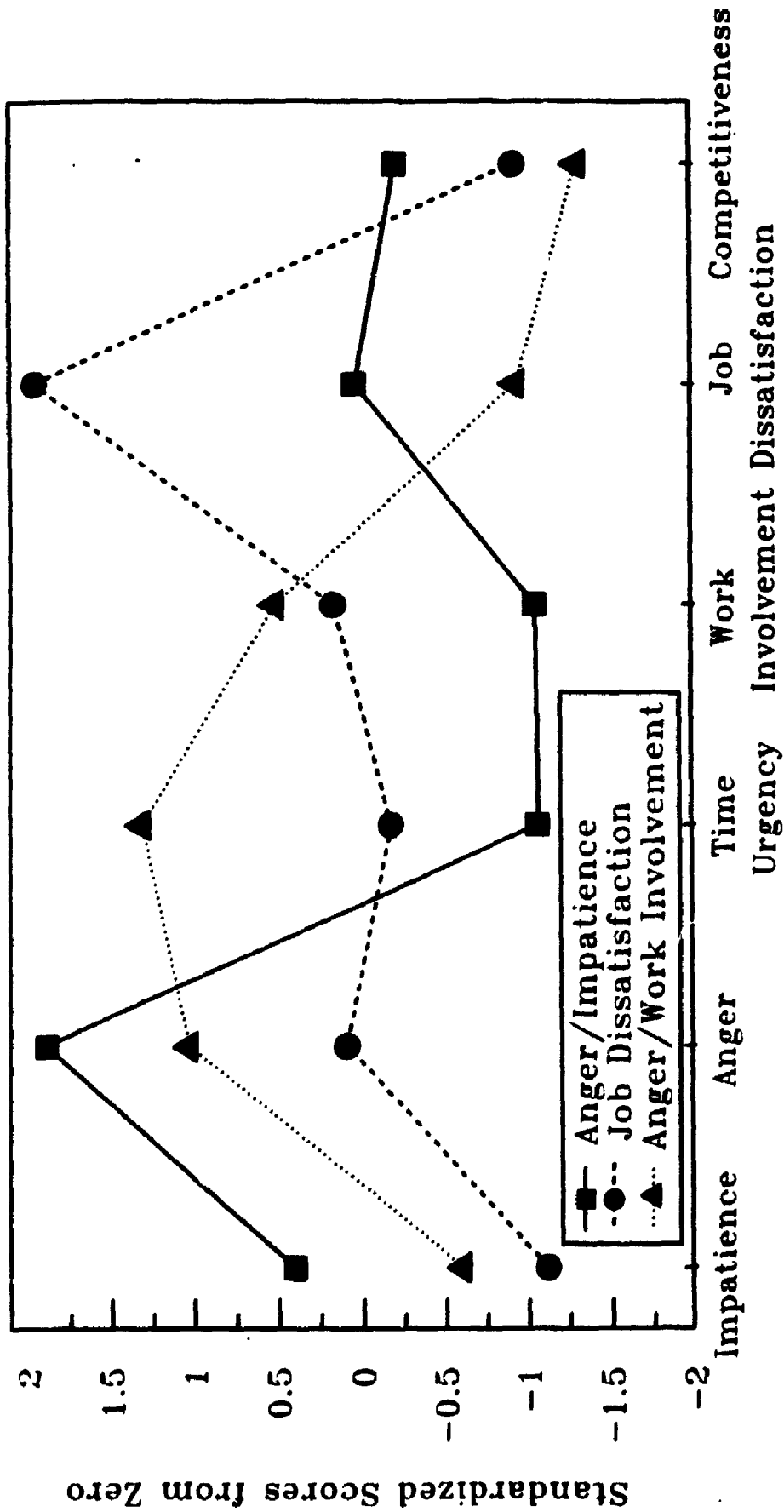
Figure 3. Survey of Work Styles Modal Profiles for Middle-Aged Males

Anger/Work Involvement profile correlated .87 with the male

business manager Anger/Work Involvement profile.

Comparison of Survey of Work Style Means for Men With and

Without Coronary Heart Disease

Means on the six SWS subscales, the total SWS scale,

and Scale A (the scale developed in Study 1 from the results

of a discriminant function analysis to predict the

Structured Interview classification) were compared between

men with coronary heart disease and those without coronary

heart disease. Mean scores on the three SWS modal profiles

were also compared. Scores on Work Involvement were

significantly higher for men without coronary heart disease

($\underline{M}$=48.2) than for men with coronary heart disease ($\underline{M}$=42.9);

($\underline{t}$=2.14, $\underline{p}$=.0335).

Men with coronary heart disease were significantly more

dissatisfied with their job ($\underline{M}$=44.2) than men without

coronary heart disease ($\underline{M}$=39.2); ($\underline{t}$=2.14, $\underline{p}$=.0335). No

other differences were found on the SWS scales. Men with

coronary heart disease were found to have significantly

higher scores on the SWS Anger/Impatience profile ($\underline{M}$=0.31)

than were men without coronary heart disease ($\underline{M}$=-0.02);

($\underline{t}$=3.17, $\underline{p}$=.0018). Similarly, men with coronary heart

disease had significantly higher scores on the Job

Dissatisfaction profile ($\underline{M}$=0.27) than those without coronary

heart disease ($\underline{M}$=-0.03); ($\underline{t}$=2.79, $\underline{p}$=.0058). No difference

was found for the Anger/Work Involvement profile. These

results are presented in Table 13.

Table 13

Comparison of Survey of Work Style Subscale and Modal
Profile Means Between Men With and Without Coronary Heart
Disease

Survey of Work Styles scales	Mean	
	Coronary heart disease	No coronary heart disease
Impatience	47.0 (8.29)	50.2 (9.53)
Anger	45.6 (9.19)	42.9 (9.19)
Work Involvement*	42.9 (12.43)	48.2 (11.64)
Time Urgency	43.0 (11.50)	47.5 (10.94)
Job Dissatisfaction*	44.2 (12.13)	39.2 (10.46)
Competitiveness	43.3 (7.37)	45.5 (7.74)
Type A Scale	96.1 (16.51)	98.9 (15.06)
SWS Total Score	266.0 (42.86)	273.6 (36.22)
Modal Profiles		
Profile 1**	0.31 (0.39)	-0.02 (0.50)
Profile 2**	0.27 (0.43)	-0.03 (0.52)
Profile 3	0.04 (0.53)	-0.01 (0.47)

Note. Parenthesized values indicate standard deviations.
Results based on 223 middle-aged males.
*p<0.05, **p<0.01.

The sample was then divided into two groups: (1) those who had a correlation of at least .20 with the Anger/Impatience profile or the Job Dissatisfaction profile (n=130), and (2) those who had a correlation of less than .20 with both the Anger/Impatience and Job Dissatisfaction profiles (n=93). A chi-square analysis compared the proportion of men with CHD who were characteristic of the Anger/Impatience profile and/or the Job Dissatisfaction profile to the proportion of men who were not characteristic of either of these two profiles. Results shown in Table 14 reveal that 88 percent of the men with CHD were characterized by the Anger/Impatience profile and/or the Job Dissatisfaction profile compared to 55 percent of the men who did not have CHD. Thus the proportion of men high in Anger/Impatience and/or Job Dissatisfaction was significantly higher in the group with CHD than the group without CHD (F=10.22, p<.001). In fact, of the 67 who did not have a positive correlation with the Anger/Impatience or Job Dissatisfaction, only one had CHD.

Comparison of Traditional Risk Factors for Men With and Without Coronary Heart Disease

Table 15 contains the mean levels of coronary risk factors for men with CHD compared to men without CHD. As expected, the body mass index was significantly higher and high density lipoprotein was significantly lower in men with CHD (t=3.15, p<.002 and t=214.0, p<.0005, respectively) than in men without CHD. Relations opposite to what those

Table 14

<u>Comparison of Scores on the Survey of Work Styles Modal</u>
<u>Profiles Between Men With and Without Coronary Heart Disease</u>

	Men with a score <.20 on Profile 1 or Profile 2	Men with a score ≥.20 on Profile 1 and/or Profile 2	Total
Men without coronary heart disease	90 (45.5)	108 (54.5)	198 (100.0)
Men with coronary heart disease	3 (12.0)	22 (88.0)	25 (100.0)
Total	93 (41.7)	130 (58.3)	223 (100.0)

<u>Note</u>. Chi-square=10.22, p<.001. Results based on 223 middle-aged males.

Table 15

Comparison of Traditional Coronary Risk Factors Means
Between Men With and Without Coronary Heart Disease

	Mean			
Traditional risk factor	Coronary heart disease		No coronary heart disease	
Age	56.2	(9.48)	52.8	(8.04)
Body Mass Index**	30.0	(4.84)	27.2	(4.22)
Diet				
Calories from fat*	30.8	(15.59)	39.0	(19.08)
Animal fat*	32./	(16.42)	41.7	(19.97)
Vegetable fat	31.1	(14.99)	32.6	(15.42)
Saturated fat*	22.3	(11.10)	27.3	(11.92)
Monounsaturated fat	23.5	(9.48)	26.9	(11.02)
Polyunsaturated fat	12.8	(5.00)	14.2	(6.52)
Cholesterol**	248.4	(95.63)	309.6	(140.81)
Serum cholesterol	209.9	(59.55)	204.7	(53.43)
High density lipoprotein**	31.9	(10.34)	41.9	(12.74)
Physical activity	4501.ى	(1251.81)	4102.5	(1156.53)
Blood pressure				
Systolic	124.8	(14.04)	125.0	(14.24)
Diastolic	76.3	(13.12)	78.8	(8.37)

Note. Parenthesized values indicate standard deviations.
Results based on 223 middle-aged males.
*p<0.05, **p<0.01.

expected were found for total kilocalories of dietary fat
(adjusted for types of fat), dietary animal fat, dietary
saturated fat, and dietary cholesterol. No significant
differences were found for age, physical activity, serum
cholesterol, blood pressure, total dietary fat (unadjusted),
dietary vegetable fat, dietary monounsaturated fat, and
dietary polyunsaturated fat.

Classification Accuracy of CHD versus Non-CHD Men Using the Survey of Work Styles Modal Profiles

On the basis of stepwise discriminant function analysis
with jackknife cross-validation to predict CHD
classification, scores on all three modal profiles of the
SWS combined to predict accurately 68 percent of those men
with CHD, and about 64 percent of those men without CHD.
These results are presented in Table 16. From these
results, it appears that the SWS overestimates the number of
men with CHD. Examination of the discriminant function
indicates that all SWS profiles are positively related to
CHD.

Classification Accuracy of CHD versus Non-CHD Men Using the Traditional Risk Factors

Many of the traditional risk factors were
intercorrelated. A stepwise multiple regression was
therefore undertaken. Those factors found to be useful
predictors ($p<.05$) were high density lipoprotein, body mass
index, dietary cholesterol, diastolic blood pressure, and
the presence of hypertension. A negative relation was found

Table 16

Classification Agreement Between Predicted Coronary Heart
Disease From the Survey of Work Styles and Self-Reported
Coronary Heart Disease

		Survey of Work Style predicted coronary heart disease classification		
		No	Yes	Total
Self-reported coronary heart disease	No	126 (63.6)	72 (36.4)	198 (100.0)
	Yes	8 (32.0)	17 (68.0)	25 (100.0)
	Total	134 (60.1)	89 (39.9)	223 (100.0)

Note. Data are expressed in terms of raw frequencies.
Parenthesized values indicate percentages. Stepwise linear
discriminant function with jackknife cross-validation= 0.05
+ 0.75 (Anger/Impatience profile) + 0.62 (Job
Dissatisfaction profile) + 0.39 (Anger/Work Involvement
profile). Regression coefficients in equation are
standardized. Results based on 223 middle-aged males.

for dietary cholesterol with CHD, which was opposite to its believed relation. This variable was omitted because it appears that men with CHD may have received medical treatment (educational, pharmacological) to alter their dietary habits.

Discriminant function analysis using high density lipoprotein, body mass index, diastolic blood pressure and hypertension to predict CHD resulted in the correct classification of about 68 percent of men with CHD, and about 75 percent of men without CHD (see Table 17). These classification rates, as all such rates reported in this study, would be subject to the likelihood of shrinkage with cross-validation.

Classification Accuracy of CHD versus Non-CHD Men Using the Traditional Risk Factors, and Survey of Work Styles Modal Profiles

When traditional risk factors were combined with the modal profiles of the SWS, classification agreement for CHD men increased to 80 percent (see Table 18). The classification agreement for non-CHD men was about 77 percent. The stepwise discriminant function model selected these variables in the following order: hypertension, high density lipoprotein, Anger/Impatience profile, body mass index, Job Dissatisfaction profile, and diastolic blood pressure.

Table 17

Classification Agreement Between Predicted Coronary Heart
Disease From Traditional Risk Factors and Self-Reported
Coronary Heart Disease

		Traditional risk factors predicted Coronary heart disease classification		
		No	Yes	Total
Self-reported coronary heart disease	No	148 (74.7)	50 (25.3)	198 (100.0)
	Yes	8 (32.0)	17 (68.0)	25 (100.0)
	Total	156 (70.0)	67 (30.0)	223 (100.0)

Note. Data are expressed in terms of raw frequercies.
Parenthesized values indicate percentages. Stepwise linear
discriminant function with jackknife cross-validation= 0.33
+ 0.59 (hypertension) - 0.60 (high density lipoprotein) -
0.46 (diastolic blood pressure) +0.33 (body mass index).
Regression coefficients in equation are standardized.
Results based on 223 middle-aged males.

Table 18

Classification Agreement Between Predicted Coronary Heart
Disease From the Survey of Work Styles Modal Profiles and
Traditional Risk Factors and Self-Reported Coronary Heart
Disease

		Traditional risk factors and Survey of Work Styles predicted coronary heart disease classification		
		No	Yes	Total
Self-reported coronary heart disease	No	164 (77.4)	48 (22.6)	212 (100.0)
	Yes	5 (20.0)	20 (80.0)	25 (100.0)
	Total	169 (71.3)	68 (28.7)	237 (100.0)

Note. Data are expressed in terms of raw frequencies.
Parenthesized values indicate percentages. Stepwise linear
discriminant function with jackknife cross-validation= 0.35
(Anger/Impatience profile) + 0.34 (Job Dissatisfaction
profile) + 0.48 (diastolic blood pressure) - 0.46 (high
density lipoprotein) + 0.76 (body mass index) +0.52
(hypertension) + 0.78. Regression coefficients in equation
are standardized. Results based on 237 middle-aged males.

Relations of Survey of Work Styles Scales and Profiles with
Traditional Risk Factors

Results of a correlational analysis of the relation
between the SWS and traditional risk factors presented in
Tables 19 and 20 reveal that, for the most part, the SWS is
unrelated to the traditional coronary risk factors assessed
in this sample. Anger, however, is positively related to
physical activity, body mass index, and total fat eaten.
Its relation with the body mass index and total dietary fat
indicate a higher coronary risk, whereas its relation to
physical activity indicate a lower coronary risk. Diabetes
was negatively related to Time Urgency, and smoking was
negatively related to Competitiveness.

The Anger/Impatience profile shows similar, though
nonsignificant, relations as did the SWS Anger scale with
obesity, physical activity, and total dietary fat. In
addition, the Anger/Impatience profile was significantly
negatively related to high density lipoprotein. Low levels
of high density lipoprotein are associated with CHD,
therefore the relation between the Anger/Impatience profile
1 and CHD may be partially due to its relation to high
density lipoprotein, but stepwise discriminant function
analysis showed incremental validity for the
Anger/Impatience profile. Scores on the Anger/Impatience
profile significantly increased the variance explained in
CHD, given that hypertension and high density lipoprotein
were already in the equation. The Job Dissatisfaction and

Table 19

Correlations Between Survey of Work Styles Scales and Traditional Coronary Risk Factors

Traditional risk factors	Survey of Work Style subscales							
	Imp	Ang	Work	Time	Job	Com	SI A	Tot
Physical activity	03	15*	-02	-01	-04	13	07	05
Age	-02	04	02	02	-06	03	-03	-01
Body Mass Index	04	22**	02	02	09	05	12	11
Blood pressure								
Diastolic	-07	-03	-06	-09	-09	-10	-08	-12
Systolic	-07	01	-03	-11	-06	-06	-09	-09
Diet								
Total fat eaten	04	15*	-03	-01	-10	13	03	03
Calories fat	03	06	10	06	01	-00	08	07
Animal fat	03	09	11	07	01	01	09	09
Vegetable fat	-02	04	03	03	01	04	00	04
Saturated fat	02	08	09	07	03	01	08	08
Monounsaturated fat	00	09	11	06	00	03	07	09
Polyunsaturated fat	00	04	04	04	-01	05	00	04
Cholesterol	-01	03	10	04	-01	03	05	05
High density lipoprotein	04	-11	12	04	-08	-02	-00	00
Serum cholesterol	07	02	02	-02	04	-03	03	03
Smoking	-07	-09	-06	-07	-01	-19**	-11	-12
Hypertension	-02	02	-01	-06	01	03	01	-01
Diabetes	-04	-04	-06	-15*	04	-12	-12	-10

Note. Imp=Impatience, Ang=Anger, Work=Work Involvement, Job=Job Dissatisfaction, Com=Competitiveness, SI A=Scale A, Tot=Total Survey of Work Styles scale. Results based on 209 middle-aged males.
*$p < 0.05$, **$p < 0.005$.

Table 20

Correlations Between Survey of Work Styles Modal Profiles and Traditional Coronary Risk Factors

	Survey of Work Style rodal profiles		
Traditional risk factors	Anger/ Impatience	Job Dissatisfaction	Anger/Work Involvement
Physical activity	10	-07	-03
Age	05	-01	07
Body Mass Index	12	08	03
Blood Pressure			
Diastolic	04	-01	03
Systolic	04	05	05
Diet			
Total fat eaten	11	-10	02
Calories fat	-04	01	06
Animal fat	-03	00	07
Vegetable fat	02	02	-01
Saturated fat	-02	03	04
Monounsaturated fat	-01	01	07
Polyunsaturated fat	02	-01	-00
Cholesterol	-05	00	06
High density lipoprotein	-16*	-05	07
Serum cholesterol	01	02	-02
Smoking	-01	12	03
Hypertension	06	02	-00
Diabetes	05	07	-02

Note. Results based on 209 middle-aged males.
*$p<0.05$.

Anger/Work Involvement profiles are independent of the traditional risk factors.

Discussion

The results of this cross-sectional study suggest that the SWS may discriminate between men with CHD and those without CHD. As in Study 1, three modal profiles were identified in this sample of middle-aged men. Each of these profiles correlated highly with its counterpart in Study 1. Men characterized by the Anger/Impatience or Job Dissatisfaction profile were significantly more likely to have CHD than men not characterized by these profiles. Further scores on the Anger/Impatience and Job Dissatisfaction profiles were significant independent predictors of the prevalence of CHD. For the most part, traditional coronary risk factors were not related to the SWS.

The primary research question addressed in this study was the degree to which the SWS modal profiles can discriminate between men with CHD and those without CHD. The results show that the SWS modal profiles can correctly identify 68 percent of the men with CHD and 62 percent of the .: ι without CHD. This is slightly lower than that correctly identified by a combination of the traditional risk factors of high density lipoprotein cholesterol, body mass index, diastolic blood pressure, and the presence of hypertension. The traditional risk factor model correctly identifies the same percentage of men with CHD as did the

SWS model, but correctly identifies more of the men without
CHD (almost 75 percent). The best model that discriminates
between men with CHD and CHD-free men is a combination of
the Anger/Impatience profile, the Job Dissatisfaction
profile, diastolic blood pressure, high density lipoprotein
cholesterol, body mass index, and presence of hypertension.
This model correctly identifies 80 percent of the men with
CHD and 77 percent of those without CHD. Thus, it is
important to include both the TABP and traditional coronary
risk factors to identify men with CHD.

The finding that the TABP as assessed by the SWS is an
independent predictor of the prevalence of CHD is consistent
with several previous cross-sectional studies and case-
control studies (e.g., Kenigsberg et al., 1974; Shekelle,
Schoenberger, & Stamler, 1976; Zyzanski, Wrzesniewski, &
Jenkins, 1979) that have used self-report Type A measures.
The finding that the modal profiles most predictive of the
prevalence of CHD are the Anger/Impatience profile and the
Job Dissatisfaction profile is also consistent with current
theory that anger and hostility are the components most
related to CHD (e.g., Barefoot et al., 1983, Dembroski et
al., 1989; Hecker et al., 1988). Job dissatisfaction can be
viewed as one component of life dissatisfaction, which has
been shown to be related to CHD (Floderus, cited in
Goldband, 1979; Medalie et al., 1973; Sales & House, 1971;
Theorell & Rahe, 1972). Further, these results show that
the relation between the SWS and CHD is independent of the

SWS's association with traditional coronary risk factors as has been reported in studies using other Type A measures (e.g., Brand et al., 1976; Haynes et al., 1980; Rosenman et al., 1975).

As discussed in Chapter 1, chronic increased sympathetic arousal is thought to lead to coronary atherosclerosis, which may develop into CHD. Individuals scoring high on either the Anger/Impatience or Job Dissatisfaction profiles were likely to show increased systolic blood pressure responses in Study 1. It is possible that these individuals perceive many situations as stressful and are likely to respond to these situations with increased physiological arousal. This may predispose these individuals to coronary atherosclerosis and subsequent CHD. Further, individuals with a profile characterized by high anger and impatience are likely to have lower concentrations of high density lipoprotein, which may serve to increase their risk of CHD.

Surprisingly, individuals characterized by high scores on the Anger and Work Involvement scales of the SWS were not more likely to have CHD. There are at least two possible explanations for this finding. First, there may be factors that moderate the relation between increased physiological arousal and CHD. One possible moderator of this relation is perceived social support. Considerable evidence exists for the buffering effects of supportive interpersonal relationships against the negative health consequences of

stress (for review see Lieberman, 1982). It may be that individuals characterized by the Anger/Work Involvement profile have more social support than others, thus modifying the effect of physiological arousal on health. This may result in angry/work involved persons being resistant to CHD. For these individuals stress may be expressed through less severe bodily symptoms such as headaches.

A second possibility for the lack of relation between scores on the Anger/Work Involvement profile and CHD is that individuals scoring high on this profile do not show increased physiological arousal in many situations. Heightened systolic and diastolic blood pressure may occur infrequently, perhaps only occurring in interview situations. This infrequent physiological arousal may not be sufficient to lead to coronary atherosclerosis. The development of coronary atherosclerosis may, however, be delayed. It is possible that these men will develop CHD in the future.

The secondary goal of this research was the degree of relation between the SWS and traditional coronary risk factors. Results revealed that the SWS Type A scale is not significantly related to any of the traditional risk factors. Further analysis indicated that the SWS Anger scale is positively related to a few coronary risk factors (higher body mass index, and higher intake of total dietary fat). Anger is positively related to physical activity, decreasing the expected coronary risk. Time Urgency is

negatively related to the presence of diabetes, and Competitiveness is negatively related to smoking. The SWS modal profiles are unrelated to the traditional risk factors, except for the Anger/Impatience profile which is negatively related to high density lipoprotein cholesterol. Although some researchers have found differences between Type A and Type B individuals in total serum cholesterol (Rosenman & Friedman, 1961; Rosenman et al., 1975; Weidner, Sexton, McLellarn, Connor, & Matarazzo, 1987), blood pressure (Rosenman et al., 1975), diabetes (Rosenman et al., 1975), and smoking (Rosenman et al., 1975), in latter studies (especially in those that utilize self-report measures of the TABP) no or few significant associations have been found between the TABP and traditional risk factors (Reunanen, 1988). In general, results of the present study are consistent with past research that has demonstrated that the TABP is uncorrelated or only weakly related ($r \leq .10$) to (1) smoking (Cohen & Reed, 1985; Gallacher, Yarnell, & Butland, 1988; Haynes, Levine, Scotch, Feinleib, & Kannel, 1978; Howard, Cunningham, & Rechnitzer, 1976; Hughes, Pickens, Gust, Hatsukami, & Svikis, 1986; Langeluddecke et al., 1988; Jordan & Perry, 1987; Mann & Brennan, 1987; Shekelle et al., 1976; Weidner, Istvan, & McKnight, 1989; Zyzanski et al., 1979), (2) systolic blood pressure (Cohen & Reed, 1985; Gallacher, Yarnell, & Butland, 1988; Haynes, Levine, Scotch, Feinleib, & Kannel, 1978; Johnston et al., 1987; Mann & Brennan, 1987; Shekelle et

al., 1976; Zyzanski et al., 1979), (3) diastolic blood
pressure (Haynes, Levine, Scotch, Feinleib, & Kannel, 1978;
Johnston et al., 1987; Shekelle et al., 1976; Zyzanski et
al., 1979), (4) age (Gallacher, Yarnell, & Butland, 1988;
Hughes et al., 1986; Johnston et al., 1987; Langeluddecke et
al., 1988; Mann & Brennan, 1987; Rosenman et al., 1975;
Shekelle et al., 1976; Weidner et al., 1987; Zyzanski et
al., 1979), (5) relative weight (Cohen & Reed, 1985;
Gallacher, Yarnell, & Butland, 1988; Langeluddecke et al.,
1988; Rosenman et al., 1975; Shekelle et al., 1976; Weidner
et al., 1987), (6) serum total cholesterol (Cohen & Reed,
1985; Friedman, Hellerstein, Eastwood, & Jones, 1968;
Gallacher, Yarnell, & Butland, 1988; Haynes, Levine, Scotch,
Feinleib, & Kannel, 1978; Johnston et al., 1987; Keith,
Lown, & Stare, 1965; Langeluddecke et al., 1988; Rifai,
McMurray, & Silverman, 1987; Schwertner, Troxler, Uhl, &
Jackson, 1984; Shekelle et al., 1976), (7) serum hi h
density lipoprotein cholesterol (Rifai, McMurray, &
Silverman, 1987; Rosenman & Friedman, 1961; Weidner et al.,
1987), (8) hyperglycaemia/diabetes (Langeluddecke et al.,
1988; Shekelle et al., 1976), (9) physical activity or
exercise (Burke & Weir, 1980; Cohen & Reed, 1985; Jordan &
Perry, 1987; Langeluddecke et al., 1988), and (10) dietary
fat (Cohen & Reed, 1985; Gallacher, Fehily, Yarnell, &
Butland, 1988; Rosenman & Friedman, 1961).

The finding of a relation between the SWS and CHD, and
the apparent lack of relation between the SWS and

traditional coronary risk factors needs to be interpreted with caution. This study was cross-sectional in design and examines the relation between the TABP and the prevalence of CHD. A prospective study would examine the relation between the TABP and the incidence of CHD. Consequently, temporal cause and effect relations cannot be determined from this study. It is as likely that Anger and Job Dissatisfaction were caused by CHD as it is that Anger and Job Dissatisfaction caused CHD. As stated by Matthews (1988), the cross-sectional design may yield spurious nonassociations and associations because of sampling and measurement biases. One flaw of this study is its susceptibility to the prevalence-incidence bias (Neyman, 1955). Individuals who suffered fatal myocardial infarctions or sudden death are not included in this study. This study's exclusion of these individuals means that the findings cannot be generalized to all men with CHD. A prospective study including CHD cases ending in fatalities might have identified higher or lower associations between the SWS and CHD.

Another example of prevalence-incidence bias is the alteration of coronary risk factors, including the TABP with disease onset. It has been shown that a risk factor may be related to CHD in prospective studies but not in cross-sectional studies (Pearson, 1984). This nonassociation may occur in the case of the TABP because men with CHD may alter their TABP to decrease their risk of recurrent CHD such that

their post-CHD TABP classification is not a valid indicator of their pre-CHD classification. Friedman et al. (1986) found that the TABP was significantly reduced in myocardial infarction patients who were not undergoing Type A intervention. In the present study there is evidence that serum cholesterol levels may have been altered by drugs or health habits after the diagnosis of CHD because its relation with CHD was opposite to the expected relation.

Relations between the TABP and CHD are also usually smaller in prospective than in cross-sectional studies (Booth-Kewley & Friedman, 1987). In two recent studies, a positive relation between the TABP and CHD was found in a cross-sectional analysis but not in a prospective analysis (Cohen & Reed, 1985; Johnston et al., 1987). This suggests that cross-sectional study results might be different from those obtained in a prospective study. Thus, the true relation between the SWS and CHD remains to be clarified. Inferences about the causal effects in such a study would minimize the probability that the disease caused the TABP.

Despite these limitations, cross-sectional studies are useful for generating hypotheses to be tested in a prospective study. The results of this study provide encouraging preliminary results that the TABP as assessed by the SWS may be a valid predictor of CHD. Whether or not this relation can be demonstrated in a prospective study will be examined in the future. A study is planned to examine the ability of the SWS to predict prospectively the

recurrence of myocardial infarction in a hospital based sample of men and women.

There are at least two implications arising from the identification of distinct subtypes of the TABP. First, there is the possibility of going beyond the global prediction of coronary heart disease to an explication of the psychological and physiological processes underlying distinct behaviour patterns. There is evidence that persons experiencing different types of coronary disease show different facets of the TABP. Jenkins et al. (1978) found that men who later developed angina pectoris were low on Time Urgency and Anger, but high on Competitiveness. This is a similar pattern of Type A components to that of men scoring negatively on the Anger/Work Involvement profile. Jenkins and his colleagues also found that men who later developed myocardial infarction were high on Work Involvement. These men might be expected to score positively on the Anger/Work Involvement profile. Research is urgently needed linking more directly psychological patterns with different clinical syndromes of heart disease.

A second implication stemming from the present results is in the area of intervention. Intervention programs designed to alter Type A behaviour have been shown to be effective in reducing the recurrence of coronary disease in post-myocardial infarction patients (Friedman et al., 1982). There is the possibility that such programs could be even more effective if they were individually tailored.

Particular facets of TABP elevated for a particular patient could be targeted for modification. If a patient's behaviour was characterized by high anger and impatience, it would be prudent to focus behaviour modification efforts on this facet, rather than on time urgency or work involvement, which are expected to be low for persons scoring positively on the Anger/Impatience profile. Also, only those men characterized by profiles associated with coronary heart disease would need to be referred for treatment. If these results are accurate, persons scoring low on the Anger/Impatience and Job Dissatisfaction profiles would not be candidates for Type A treatment, if the intervention was directed solely at reducing the risk of CHD.

Chapter V

Psychopathological Correlates of the Survey of Work Styles

Overview

The previous two studies have examined Type A behaviour within a medical context, that is, addressing the question of the relation of Type A behaviour to physiological processes and health behaviours that might lead to CHD. Only recently have researchers examined work styles such as the TABP in nonmedical contexts. Given the complexity and multidimensionality of Type A behaviour it is unlikely that the usefulness of the construct for understanding human behaviour is limited to cardiovascular research. Most behaviours or actions produce a broad range of consequences, some of which may be medical. It is hoped that the SWS will be useful in a variety of research settings, such as in (a) studies of employee selection and placement; (b) investigations of the personological bases for job satisfaction, employee turnover and absenteeism; (c) research on work-related stress; (d) studies of job performance and satisfaction, and (e) psychological studies relating to retirement, quality of marital relations, and maintenance of self-esteem.

As noted earlier, adopting Type A beliefs may put individuals at risk for psychopathology. Psychological health is probably as important as physical health for the overall well-being of people, and any new measure of Type A behaviour should be useful for identifying a variety of

correlates of Type A behaviour. In order to evaluate the utility of the SWS in a nonmedical area, the psychological correlates (e.g., interpersonal problems, depression, neuroticism) of Type A behaviour were examined in 109 male and female adult volunteers.

On the basis of the review of the literature presented in Chapter I, it was expected that interpersonal problems, depression, anxiety, alienation, and persecutory ideas would be positively related to the strength of Type A behaviour expressed (as assessed by scores on Scale A). Social introversion was expected to be related to low scores on Scale A. With regards to the SWS modal profiles, it was hoped that individual differences in the correlates of specific patterns of scores on the SWS scales would be found, thus elucidating the relation between the TABP and psychopathology. Because of the exploratory nature of this study, no directional hypotheses were made regarding the relation between the SWS modal profiles and measures of psychopathology.

Method

Subjects

The sample consisted of 33 male and 76 female volunteer employees. The men ranged in age between 23 and 61 years with a mean age of 34.5 years, and the women ranged in age between 19 and 61 years with a mean age of 32.8 years.

Measures and Procedures

An envelope containing a cover letter, the Survey of Work Styles, the Basic Personality Inventory (BPI; Jackson, 1989), and a self-addressed envelope was placed in the mail box of employees at several businesses (research, banks, restaurants, scientific, hospital) in Watertown, Massachusetts. When a company did not have employee mail boxes, several packets were left with the receptionist or personnel director to distribute among the employees. Participation was completely voluntary.

The BPI is a 240 item true-false questionnaire that assesses 12 broad facets of personality and psychopathology. Table 21 presents a list of the scale names and descriptions of a high scorer for each BPI scale. The BPI was developed using the same modern methods and standards of test construction as those used to develop the SWS. The approach used in the development of the BPI scales resulted in the construction of scales that (1) suppressed the irrelevant sources of response bias (e.g., due to responding in a socially desirable fashion), (2) were independent of scales measuring other distinct constructs, (3) were internally consistent, and (4) assessed behavioural characteristics that varied systematically both in a general population and within clinical groups. The BPI scales have demonstrated convergent and discriminant validity in studies using peer ratings, and clinical psychiatric diagnoses (Jackson, 1989).

Table 21

Scale Descriptions of the Basic Personality Inventory

Scale name	High scorer
Hypochodriasis	Excessive preoccupation with the state of one's health.
Depression	Inclined to be in a low mood, extremely despondent, and pessimistic.
Denial	Relatively unemotional, lacking insight into own feelings and behaviour.
Interpersonal Problems	Frequently uncooperative, disobedient, and resistant to rules, regulations, and authority. Frequently shows extreme annoyance with little inconveniences, frustrations or disappointments.
Alienation	Displays unethical and socially irresponsible attitudes and behaviour.
Persecutory Ideas	Believes people are malicious, and untrustworthy.
Anxiety	Frequently displays inappropriate uneasiness, apprehension, and fear of novelty, and the possibility of physical or interpersonal harm.
Thinking Disorder	Has trouble distinguishing daydreams from reality. Is markedly confused, distracted and disorganized.
Impulse Expression	Tends to behave recklessly, with little consideration of the consequences of one's actions. Lacks the patience to cope with a routine task.
Social Introversion	Generally avoids people, thus has few friends. Uncomfortable and quiet around others
Self Depreciation	Degrades self as worthless, unpleasant, and undeserving. Expresses low opinion of self, and refuses to take credit for accomplishments.
Deviation	Behaviour patterns are very different from those of most people, and tends to admit to unusual and pathological symptoms and thoughts. May indicate non-purposeful responding.

Statistical Analyses

The SWS was scored using modal profile analysis, and scores on the BPI scales were correlated with SWS profile scores and SWS scale scores. The correlational analysis between individual SWS and BPI scales will provide results that are comparable with past studies where the TABP was measured as a continuous variable. Stepwise regression was also conducted to predict psychopathology, as measured by the BPI, from a linear combination of the SWS modal profiles.

Only ten BPI scales were employed in the correlation and regression analyses. The Deviation scale was excluded because it does not assess a single construct. Individuals who score high on this scale may have responded in a nonpurposeful manner. The Denial scale was excluded because it is considered a response style variable. An elevation on this scale suggests that scores on the other BPI scales would have been higher if the individual had responded more openly.

The final analysis compared mean scores on psychopathological dimensions for individuals at the 75th percentile on the SWS Scale A and those at the 25th percentile. This analysis will provide results that are comparable to past studies where extreme Type As were compared with extreme Type Bs.

Results

Modal Profile Analysis Of the Survey of Work Styles

Modal profile analysis of the Survey of Work Styles yielded three modal profiles as shown in Figure 4. The Anger/Impatience profile correlated .98 with the Anger/Impatience profile in Study 1 and .86 with the corresponding profile in Study 2. The Job Dissatisfaction profile correlated .78 and .85 with the Job Dissatisfaction profile in Study 1 and Study 2, respectively. The Anger/Work Involvement profile showed only modest correlations of .67 and .44 with the Anger/Work Involvement profiles in Study 1 and Study 2, respectively.

Relation of the Survey of Work Styles Scales to Measures of Psychopathology

Table 22 presents the mean, standard deviation, and alpha reliability of each SWS and BPI scale. In this sample the SWS subscale reliabilities ranged from .73 for Anger to .88 for Work Involvement. BPI subscale reliabilities (excluding Deviation and Denial) ranged from .60 for Thinking Disorder to .83 for Depression.

Pearson correlations were computed between the Survey of Work Styles and the Basic Personality Inventory. As shown in Table 23, Scale A (the scale consisting of items predictive of the Structured Interview) was related to the BPI Interpersonal Problems, Hypochondriasis, and Persecutory Ideas scales. Impatience was positively related to Interpersonal Problems, and Anxiety. Anger was positively
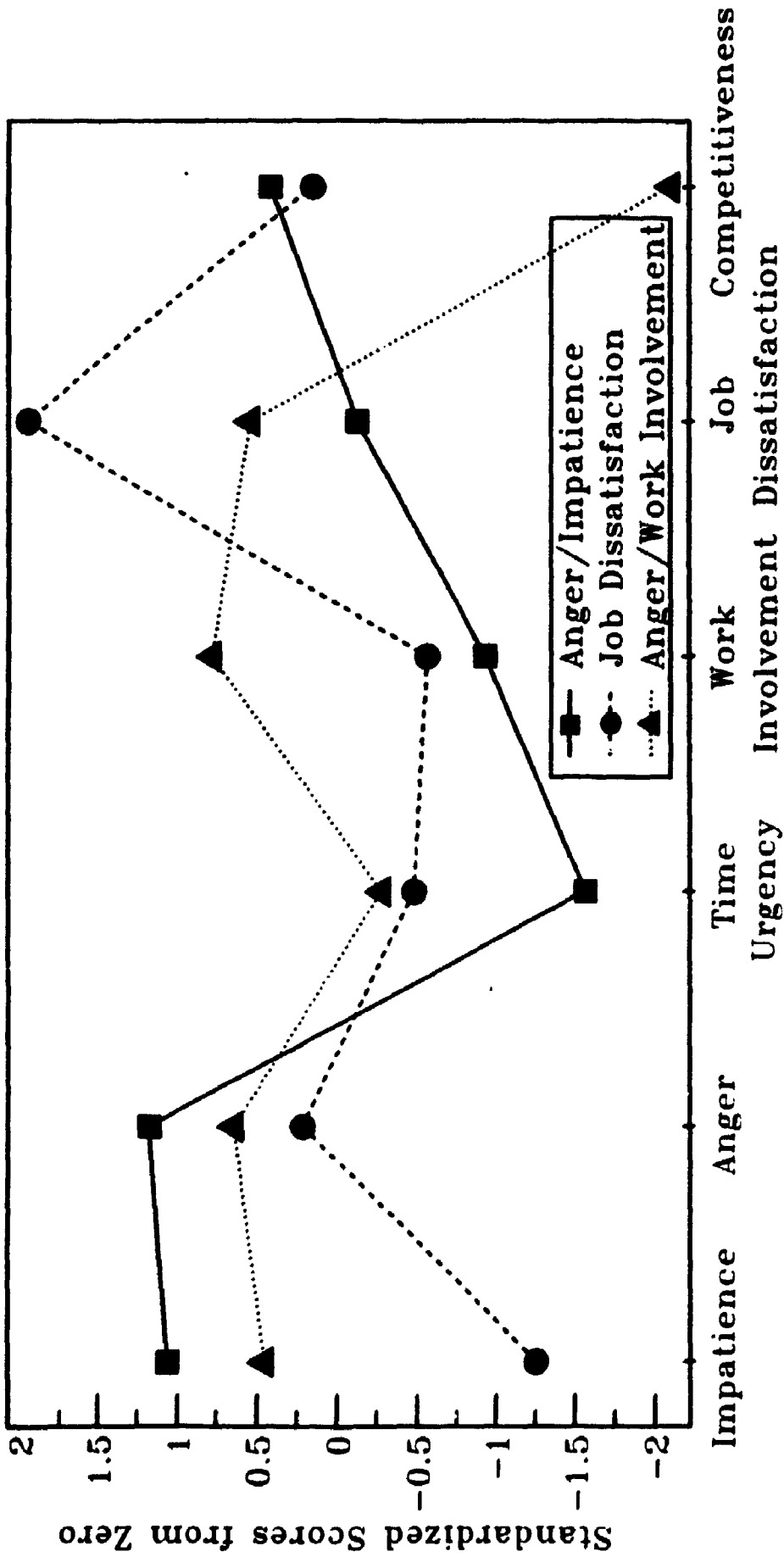
Figure 4. Survey of Work Styles Modal Profiles for Male and Female Volunteers

Table 22

Scale Statistics for the Survey of Work Styles and the Basic Personality Inventory

Scales	Number of items	Mean	Standard deviation	Alpha reliability
Survey of Work Styles				
Impatience	16	49.0	8.81	.77
Anger	16	42.5	8.53	.73
Time Urgency	16	44.0	12.61	.82
Work Involvement	16	49.0	10.63	.88
Job Dissatisfaction	16	37.7	11.41	.87
Competitiveness	16	42.5	8.94	.77
Scale A	35	96.0	16.67	.83
Total Sum	96	264.8	40.33	.92
Basic Personality Inventory				
Hypochondriasis	20	4.2	3.45	.80
Depression	20	3.4	3.37	.83
Denial	20	5.2	2.74	.63
Interpersonal Problems	20	8.3	3.47	.72
Alienation	20	3.9	2.70	.64
Persecutory Ideas	20	3.9	2.65	.68
Anxiety	20	6.7	3.44	.74
Thinking Disorder	20	2.0	1.90	.60
Impulse Expression	20	6.0	3.87	.79
Social Introversion	20	4.9	3.14	.74
Self-Depreciation	20	1.6	2.04	.70
Deviation	20	2.1	1.87	.55

Note. Summary statistics based on 33 male and 77 female employed volunteers.

Table 23

Correlations Between the Survey of Work Styles Subscales and the Basic Personality Inventory Scales

Basic Personality Inventory scales	Survey of Work Style subscales						
	Imp	Ang	Work	Time	Job	Com	SI A
Hypochondriasis	.18	.26	.19	.05	.28	.09	.21
Depression	-.01	.05	.06	.06	.28	-.05	.02
Interpersonal Problems	.49	.54	.30	.17	.17	.17	.43
Alienation	.15	.23	.16	.15	.19	.13	.18
Persecutory Ideas	.18	.26	.29	.22	.40	.02	.29
Anxiety	.19	.28	.15	-.03	.20	.04	.13
Thinking Disorder	.10	.16	.11	.08	.19	.05	.13
Impulse Expression	.13	.17	.08	-.08	.02	.12	.07
Social Introversion	.10	-.02	.03	.03	.11	.00	.02
Self-Depreciation	.06	-.03	-.04	-.02	.14	-.07	.01

Note. Imp=Impatience, Ang=Anger, Work=Work Involvement, Job=Job Dissatisfaction, Com=Competitiveness, SI A=Scale A. Results based on 77 female and 33 male volunteer employees.
$p(r) > |.19| = .05$, $p(r) > .25 = .01$.

related to Interpersonal Problems, Hypochondriasis,
Alienation and Persecutory Ideas. Time Urgency was
positively related to Persecutory Ideas. Job
Dissatisfaction was positively related to Hypochondriasis,
Depression, Anxiety, Persecutory Ideas, and Thinking
Disorder. Impulse Expression, Social Introversion, and
Self-Depreciation were unrelated to the SWS. Depression,
Alienation, and Thinking Disorder were related to only one
or two specific Type A components, while Hypochondriasis,
Interpersonal Problems, Persecutory Ideas, and Anxiety were
predicted by several components of the TABP.

Relation Between the Survey of Work Styles Modal Profiles and Psychopathology

As shown in Table 24, results of the correlational
analysis of the relation of the SWS profiles with the
psychopathological dimensions assessed by the BPI revealed
that these psychopathological dimensions were associated
with different SWS profiles. The Anger/Impatience profile
was related to Interpersonal Problems ($r=0.28$, $p<.01$). In
contrast, the Job Dissatisfaction profile was negatively
related to Interpersonal Problems ($r=-.22$, $p<.05$). This
indicates that men who showed the opposite pattern of Type A
components (that is high impatience and low job
dissatisfaction) were likely to have higher scores on the
BPI Interpersonal Problems scale. Although not all the
correlations reached statistical significance, the remaining
correlations with psychopathology (except Impulse

Table 24

**Correlations of the Survey of Work Styles Modal Profiles
with the Basic Personality Inventory Scales**

	Survey of Work Styles modal profiles		
Basic Personality Inventory scales	Anger/ Impatience	Job Dissatisfaction	Anger/Work Involvement
Hypochondriasis	.04	.04	.32**
Depression	-.02	.15	.12
Interpersonal Problems	.28**	-.22*	.19*
Alienation	.09	.02	.08
Persecutory Ideas	-.02	.15	.27**
Anxiety	.17	.04	.23*
Thinking Disorder	.03	.07	.11
Impulse Expression	.16	-.07	.08
Social Introversion	.02	.00	.10
Self-Depreciation	-.03	.08	.13

Note. Summary statistics based on 33 male, and 77 female
volunteer employees.
* p<0.05, ** p<0.01.

Expression) were in a positive direction. The profile most strongly related to psychopathology, however, was the Anger/Work Involvement profile. This profile was significantly related to the BPI Hypochondriasis (r=0.32, p<.01), Interpersonal Problems (r=0.19, p<.05), Persecutory Ideas (r=0.27, p<.01), and Anxiety (r=0.23, p<.05) scales. Although not all the correlations between this profile and psychopathology reached statistical significance, all correlations with psychopathology were in a positive direction.

In the next step, stepwise regression was conducted to predict the psychopathological dimensions from a combination of the SWS modal profiles (see Table 25). Although the Hypochondriasis scale remained uniquely related to the Anger/Work Involvement profile, the Interpersonal Problems, Persecutory Ideas, and Anxiety scales were related to a combination of the profiles. A combination of the scores on the three modal profiles accounted for 19 percent of the variance in Interpersonal Problems. A combination of scores on the Job Dissatisfaction profile and the Anger/Work Involvement profile accounted for 9 percent of the variance in Persecutory Ideas. About 9 percent of the variance in Anxiety was attributable to a combination of scores on the Anger/Impatience profile and the Anger/Work Involvement profile.

Table 25

Stepwise Regression Results of the Prediction of Psychopathology from the Survey of Work Styles Modal Profiles

Basic Personality Inventory scales	Anger/ Impatience	Job Dissatisfaction	Anger/Work Involvement	R^2
Hypochondriasis	—	—	2.49 (-.38)	.10
Depression	—	—	—	—
Interpersonal Problems	2.18 (0.33)	-1.80 (-0.27)	1.87 (0.24)	.19
Alienation	—	—	—	—
Persecutory Ideas	—	-0.71 (-0.14)	1.58 (0.26)	.09
Anxiety	1.23 (0.19)	—	1.89 (0.24)	.09
Thinking Disorder	—	—	—	—
Impulse Expression	—	—	—	—
Social Introversion	—	—	—	—
Self-Depreciation	—	—	—	—

Note. Entries are unstandardized regression coefficients found to significantly predict the relevant Basic Personality Inventory scale ($p < .05$). Parenthesized values are standardized regression coefficients. Results based on 33 male and 77 female volunteer employees.

Psychopathological Profiles of Extreme High and Low Scorers
on the Survey of Work Styles Type A Scale

Respondents who scored in the top or bottom 25 percent
of the sample on the SWS Type A scale were selected for the
next analysis. Scores on the BPI scales were compared
between those individuals who scored extremely high on the
SWS Type A scale, and those who scored extremely low (see
Figure 5). As summarized in Table 26, individuals who were
extreme Type As scored significantly higher on the
Hypochondriasis (M=5.3 versus M=3.1) (t=2.47, p<.02),
Interpersonal Problems (M=10.4 versus M=7.0) (t=3.74,
p<.0005), Alienation (M=4.5 versus M=2.9) (t=2.63, p<.01),
Persecutory Ideas (M=4.8 versus M=2.8) (t=3.27, p<.002), and
Anxiety (M=7.5 versus M=5.7) (t=2.22, p<.05) scales. These
results were confounded by differences in the proportion of
males and females in the extreme categories. Males were
significantly more likely to be classified as extreme Type
A, while females displayed a more even distribution in the
two categories (chi-square=4.71, p<0.05).

Discussion

These results offer additional support for the finding
that the TABP is related to psychopathology. According to
the cognitive social learning model, certain cognitions
(especially those related to excessively high standards for
performance evaluation) foster a variety of fears which
promote the development and maintenance of the TABP. In an
attempt to fulfill their excessively high goals, this theory
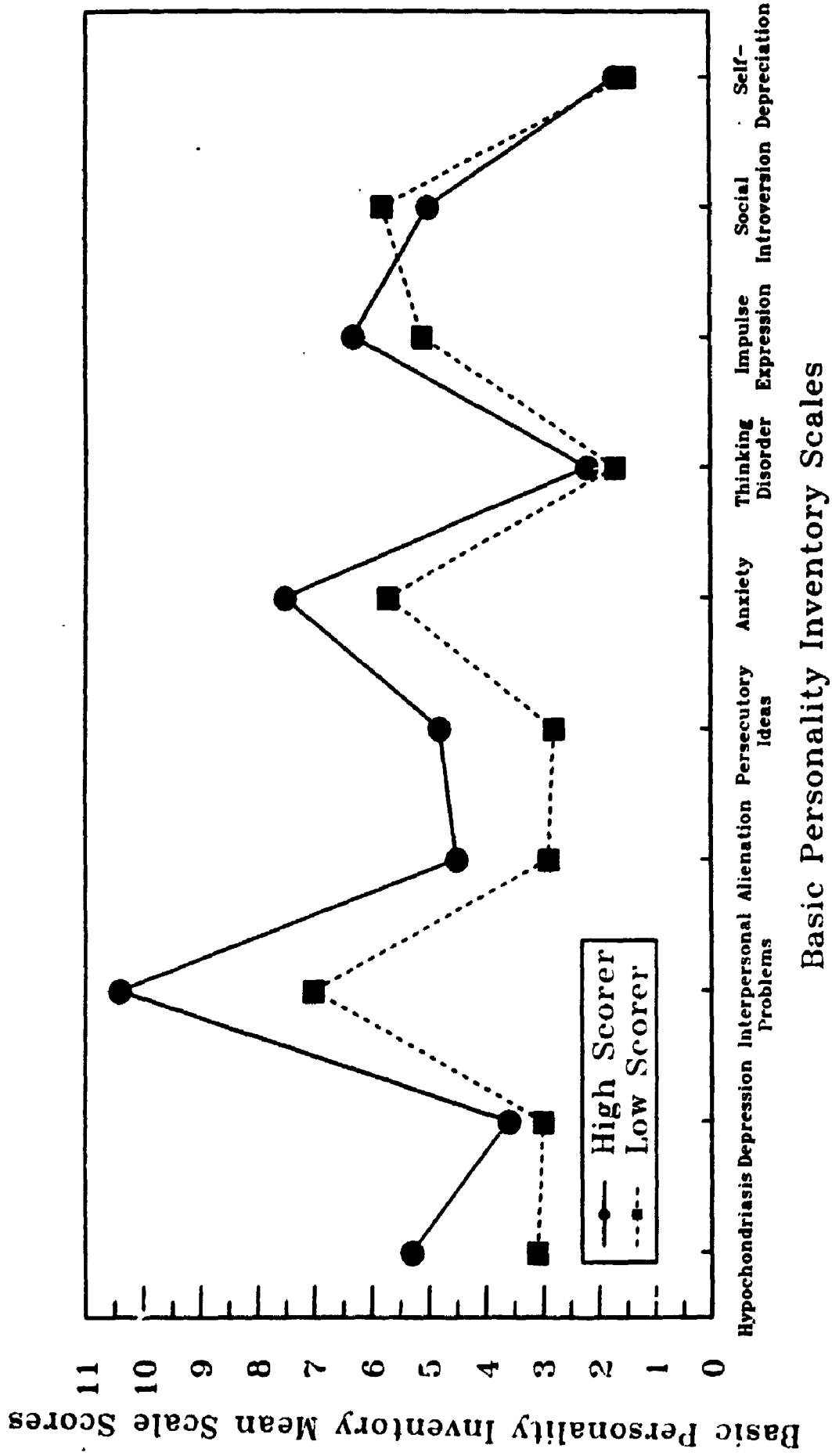
Figure 5. Basic Personality Inventory Scale Means for High and Low Scorers on the Survey of Work Styles Scale A

Table 26

Comparison of Basic Personality Inventory Scale Means
Between High and Low Scorers on the Survey of Work Styles
Scale A

Basic Personality Inventory scale	Survey of Work Styles Scale A	
	Low Scorer (n=30)	High Scorer (n=29)
Hypochondriasis*	3.1 (2.88)	5.3 (4.06)
Depression	3.0 (3.51)	3.6 (3.73)
Interpersonal Problems**	7.0 (2.87)	10.4 (4.00)
Alienation*	2.9 (2.08)	4.5 (2.72)
Persecutory Ideas**	2.8 (2.09)	4.8 (2.88)
Anxiety*	5.7 (2.94)	7.5 (3.29)
Thinking Disorder	1.7 (1.38)	2.2 (1.68)
Impulse Expression	5.1 (3.75)	6.3 (3.81)
Social Introversion	4.8 (2.56)	5.0 (3.35)
Self-Depreciation	1.5 (1.68)	1.7 (2.55)

Note. Entries are mean values. Parenthesized values are
standard deviations. Number of females in low and high
scoring groups is 26 and 18 respectively. Sex difference in
proportion of extreme high and extreme low scorers on Scale
A is significant (chi-square=4.71, $p<0.05$).
*$p<.05$, **$p<.005$.

predicts that individuals become competitive, hard-driving, aggressive and overly involved in their work. An individual may then try to accomplish more in less time, resulting in a chronic sense of time urgency that leads to impatience and hostility when it is perceived that his/her progress is being impeded. This model and previous research predicts that Type As will be more prone to depression, interpersonal problems, alienation, persecutory ideas, anxiety, neuroticism and social extraversion.

The findings from this study indicate that extreme Type As as identified by the SWS Scale A scored significantly higher in hypochondriasis, interpersonal problems, alienation, persecutory ideas, and anxiety. Contrary to expectations, extreme Type As and Type Bs did not differ in depression and social introversion. This pattern indicates that the TABP is not associated with a general elevation on all psychopathological scales. Instead the TABP is related to specific types of psychopathology.

Discrepancies between these results and those of past studies may be due to differences in samples. Previous studies have been conducted on samples that appear to have different characteristics than the current sample; for example, male employees at a missile company (Chesney et al., 1981), introductory psychology students (Lobel, 1988), adolescents (Heaven, 1989), obese and/or hypertensive patients (Wadden et al., 1983), male patients with chest pain (Bass, 1984a), and British members of a psychology

department panel (Furnham, 1984). Another possibility for the inconsistency is that past findings may due to the shared response bias of the Type A and the psychopathology scales. These scales, unlike the SWS and BPI have not been developed to suppress social desirability. It is possible that no relation was found in the present study for Type A behaviour wi+: social introversion and depression because both the BPI and the SWS were constructed to minimize their susceptibility to response bias.

Discrepancies in these findings may also be due to differences in the dimensions assessed by the psychopathology scales. For example, Eysenck's extraversion scale measures "tendencies to exteriorization, a lack of inhibition, impulsive and social tendencies" (Rustin, Kittel, Dramaix, Kornitzer, & De Backer, 1978, p.90). This is a much broader definition than that for the BPI Social Introversion scale used in the present tudy. The Eysenck Extraversion scale seems to include dimensions of both the BPI Social Introversion, and Impulse Expression scales, and therefore the scales may not be assessing the same construct.

Another example of differing construct definitions is the difference between Eysenck's definition of neuroticism and Jackson's definition of anxiety. Eysenck defines neuroticism as "general emotional hypersensitivity and a predisposition to nervous depression under stress, with a tendency to minor somatic disturbances" (Rustin et al.,

1978, p. 90). This definition seems to include dimensions
of the BPI Anxiety, Hypochondriasis, and Depression scales.
The BPI Anxiety and the Eysenck Neuroticism scale appear to
assess different constructs. The failure to find a relation
between the TABP and anxiety suggest that the TABP is not
related to a neurotic predisposition. Instead, the TABP may
be related to aspects of behaviour specific to the
Neuroticism scale of the Eysenck Personality Inventory.

The strongest correlation between the SWS and the BPI
was found for Interpersonal Problems. Over 18 percent of
the variance in Interpersonal Problems was predicted by
scores on Scale A. Strong positive correlations were also
found for Anger and Impatience with Interpersonal Problems.
The stronger an individual's manifestation of the TABP, the
more likely it was that she/he admitted to being
uncooperative, disobedient, resistant to rules, regulations,
and authority, revengeful, argumentative, hot-tempered,
irritable, and insensitive. Obviously dimensions of the
Anger and Impatience scales of the SWS overlap with aspects
of the Interpersonal Problems scale of the BPI.

These results are consistent with those of Stensrud
(1985) who found that Type As tended to respond
competitively rather than cooperatively to a simulation,
even though it was in the Type As' best interest to behave
cooperatively. This tendency to compete rather than
cooperate is supported by studies that reported that Type As
competed and punished more often than did Type Bs during a

computer-controlled interaction (Van Egeren, 1979b; Van
Egeren, Abelson, & Sniderman, 1983; Van Egeren, Sniderman, &
Roggelin, 1982). Type As also cooperated significantly less
than Type Bs. Type As sent their partner more threatening
and competitive messages than Type Bs (Van Egeren, 1979b;
Van Egeren et al., 1982). This tendency to compete rather
than cooperate can be viewed as a struggle for dominance and
an attempt to assert, maintain, and/or restore control over
others (Van Egeren, 1979a; Yarnold & Grimm, 1988). Past
research has revealed a strong positive relation between the
TABP and dominance/authoritarianism (Byrne & Reinhart, 1989;
Grimm & Yarnold, 1985; Langeluddecke & Tennant, 1986;
Palladino & Motiff, 1984; Ray, 1984; Van Egeren, 1979b;
Yarnold & Grimm, 1986, 1988; Yarnold, Grimm, & Lyons, 1987).
Type As also tend to promote their own views more often and
attack antagonistic positions more often than Type Bs
(Yarnold & Grimm, 1986, 1988; Yarnold, Mueser, & Grimm,
1985). This argumentative, hostile, and uncooperative
behaviour may explain the greater number of interpersonal
conflicts relating to family and work reported by Type As
compared to Type Bs (Falger, 1983; Waltz et al., 1988).

The results discussed so far may lead to the erroneous
conclusion that all persons who exhibit a pattern of Type A
components have higher levels of anxiety, hypochondriasis,
interpersonal problems, alienation, and persecutory ideas.
Modal profile analysis of the SWS components, though,
revealed differences in the psychopathological correlates of

persons characterizing each of the modal profiles. Only the BPI Interpersonal Problems scale was related to all three bipolar profiles of the SWS. The Anger/Impatience profile showed the strongest significant relation with Interpersonal Problems.

The Job Dissatisfaction profile was negatively related to Interpersonal Problems. In fact, with the exception of Impulse Expression, all BPI scales showed positive but nonsignificant relations with the Job Dissatisfaction profile. Interpersonal problems was also significantly related to the Anger/Work Involvement. In addition, this profile displayed the most psychopathology, being related to Hypochondriasis, Persecutory Ideas, and Anxiety. Relations with all other scales were also positive though nonsignificant.

The three SWS modal profiles combined with their psychopathological correlates are similar to the three Type A states proposed by Price (1982). She proposes that Type A persons assume at least three psychological states. The following discussion represents a summary of Price's proposed three Type A states based on her clinical observation. The first state is the "Super(man or woman)" state, characterized by a preoccupation with the need for achievement to prove one's self-worth. A person in this state sets excessively high performance standards and drives to achieve them. The second state is the "depressed" state characterized by psychological depression, including

dysphoria and low energy, accompanied by negative self-appraisal and pessimism about the future.

The third state is termed the "angry" state, and is characterized by self-justification, accusation of others, impatience, interpersonal tension, intolerance, and anger. Persons in this state fear that justice may not prevail, therefore, they often seek revenge. This directed anger towards others is a coping strategy to reduce anger towards oneself.

If Price (1982) is correct in the identification of the three Type A states, the results of the current study suggest that the Type As characterized by the Anger/Impatience profile are in the "angry" state. This profile is significantly correlated with interpersonal problems, that (consistent with Price's "angry" state) indicates that individuals high in anger and impatience report more frequent uncooperativeness, disobedience, annoyance with minor inconveniences, frustrations, or disappointments.

The Job Dissatisfaction profile appears to be similar to Price's "depressed" state. Although the correlations with the BPI Depression, Persecutory Ideas, and Self-Depreciation scales did not achieve statistical significance, the direction of these correlations were consistent with Price's description of this state. Individuals scoring high on this profile tended to be more self-critical, despondent, and lacking in energy. The

negative relation with interpersonal problems suggests that these persons may be withdrawing from interpersonal interactions, seemingly because they lack the energy to resist others' demands or wish to avoid others' criticism.

The Anger/Work Involvement profile may characterized persons in the "Superman" (or "Superwoman") state. In the present study, individuals scoring high on this profile have a pattern of SWS scores identified by high Impatience, Anger, Work Involvement, and Job Dissatisfaction, and low Competitiveness. Persons in the "Superman/Superwoman" are hypothesized to be engaged in a relentless drive to achieve. This may include excessive haste, high levels of activity, aggressiveness, and hard-driving effort. The central attribute of this state is an excessive amount of time spent on work-related activity, accompanied by uneasiness, agitation, and restlessness. Price hypothesizes that this state reflects the actions of someone with low self-esteem. Someone who is this hard-driving will eventually deplete his/her energy source, resulting in feelings of inadequacy, anxiety, and depression. Results of the present study are consistent with this hypothesis, showing that these individuals report more somatic complaints (perhaps resulting from being overworked), anxiety, and interpersonal problems. The belief that people are untrustworthy is also a significant correlate of this profile, perhaps resulting in increased efforts to achieve. Although the correlations with Self-Depreciation and Depression scales of the BPI

failed to reach statistical significance, the direction of the correlation is consistent with Price's observation that individuals in this state te..d to feel inadequate and depressed.

Whether or not the SWS modal profiles represent stable traits or temporary states has not been established in this study. It is not known, for example, whether or not an individual scoring high on the Anger/Impatience profile is generally an angry/impatient person. It is possible that this individual is simply in an angry state. Further research is needed to investigate the same individuals assessed over a long period of time to determine whether or not the SWS is a state or trait measure. It is likely that these profiles measure underlying traits rather than states because scores on the profiles reflect a pattern of SWS scores, rather than an elevation of scores. As mentioned in Chapter I, elevation is thought to be affected by temporary factors such as the situation, whereas, shape is thought to reflect a stable predisposition to respond to situations is a certain way.

The results of this study provide only limited support for the predictions of the cognitive social learning theory. As hypothesized, a continuous measure of the TABP (as measured by Scale A or the SWS modal profiles) was related to Anxiety, Interpersonal Problems, and Persecutory Ideas. The hypothesis that the TABP would be related to Self-Depreciation, Social Introversion, and Depression was,

however, not confirmed. This implies that Type As are not driven by low self-esteem or negative self-evaluations. Instead, Type As appear to motivated by a desire to control others and the environment and this desire places them at risk for higher levels of anxiety, persecutory ideas, and interpersonal problems.

There are some important implications for the treatment of the TABP that emerge from the results of this study. They include the examination of the TABP as a multidimensional construct. The TABP may be expressed differently by different individuals, and this will put these individuals at risk for different dimensions of psychopathology. Obviously, treatment and modification programs would be more effective if interventions could be tailored to reduce the specific psychopathological risk associated with each specific pattern of Type A expression. The profile could be used to develop the treatment protocol and to better evaluate changes that occur after treatment.

Several limitations apply to the findings of this study. First, sex differences were not examined because of the limited number of males in the sample. Although sex differences have been observed in the expression of the TABP and psychopathology (Haynes, Feinleib, Levine, Scotch, & Kannel, 1978; Jackson, 1989; Maccoby & Jacklin, 1974), it is not known whether or not sex is a moderator of the relation between the TABP and psychopathology. Heaven (1989) found that the TABP was more strongly related to Psychoticism,

Impulsiveness, and Extraversion in females than in males.
It is quite conceivable that sex is a moderator of the Type
A and psychopathology relation. Second, these results are
limited to the TABP as assessed by the SWS. The moderate
convergent validity of the Type A measures suggest that
these results may not be replicated when the TABP is
assessed by the JAS or Structured Interview. Third, the
results of the present research are restricted to volunteer
samples of working adults. It is important for future
research to confirm these findings in random samples of this
and other populations (e.g., white collar workers,
university students, coronary patients). Last, these
results are cross-sectional, providing only an initial
correlational analysis of the relation between TABP and
psychopathology. A more precise examination of the
cognitive social learning model would be provided by
longitudinal research.

In summary, a multidimensional approach to Type A
assessment revealed important psychopathological differences
in individuals displaying separate patterns of the
components of the TABP. Overall, the Anger/Work Involvement
pattern of the TABP components was related to the most
dimensions of psychopathology. Using a multidimensional
approach, individuals whose profile of Type A component
expression is characterized by high scores on the SWS Anger
and Work Involvement subscales and low scores on the Job
Dissatisfaction subscale showed the most psychopathology

with higher levels on the BPI Hypochondriasis, Persecutory

Ideas, Interpersonal Problems, and Anxiety scales.

Chapter VI

General Discussion

The results of the present study demonstrate the internal reliability and construct validity of the SWS. The results of Study 1 provide support for the criterion validity of the SWS as a measure of the TABP. The SWS was significantly related to the Jenkins Activity Survey, the Framingham Type A Scale, and the Structured Interview. The results of Study 1 also provide support for the proposition that the SWS is associated with increased physiological reactivity to stress. Further, the results of Study 2 demonstrate the association of the SWS with CHD, and its relative lack of association with traditional coronary risk factors. Study 3 shows that the SWS modal profiles are differentially related to dimensions of psychopathology. These results provide some support for the cognitive social learning model.

Reliability and Validity of the Survey of Work Styles

The internal reliability of the subscales of the SWS was remarkably consistent across all three studies. Only the reliability of the Competitiveness and Anger scales seemed affected by the type of sample. The reliability of the Competitiveness scale was only .69 in the CHD study, lower than that obtained in Study 1 (.80) and Study 3 (.77). Reliability of the Anger scale was lower in Study 1 (.71) and Study 3 (.73) than in Study 2 (.80). Although these two scales are somewhat less reliable in some samples, they

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still demonstrate acceptable internal consistency. The
total scale was highly reliable across the three samples
with an alpha reliability of at least .90. In comparison,
Boyd and Begley (1987) note that the coefficient alpha
reliability of the JAS ranges from .24 to .56 (e.g., Mayes
et al., 1984; Shipper et al., 1986). Reliability of the SWS
is important because low reliability limits the predictive
power of a measure. In general the validity of a measure
cannot exceed the geometric mean of prediction and criterion
reliabilities (Gulliksen, 1950). Because the total scores
on the SWS shows high reliability, the upper bound for the
validity of the SWS is expected to be higher than that for
existing self-report Type A measures.

Following a satisfactory demonstration of reliability,
it is necessary to establish the validity of the SWS.
Evidence of the concurrent validity of the SWS was provided
in Study 1. The SWS showed moderate correlations with other
self-reports of the TABP. The correlation of .56 between
the SWS and the JAS and the correlation of .67 between the
SWS and the Framingham Type A Scale is consistent with the
results of past studies that have reported intercorrelations
between self-report Type A measures in the range of .31 to
.70 (Byrne et al., 1985; Haynes et al., 1980; Herbertt &
Innes, 1982; Johnston & Shaper, 1983). Differences in the
Type A ratings are not surprising as they assess different
aspects of the TABP. In the first study, both the JAS and
the Framingham Type A Scale failed to correlate

substantially with the Anger scale of the SWS. The JAS was also not associated with the Job Dissatisfaction scale. Instead, these two scales are associated with Impatience and Time Urgency.

Further, the SWS correlated significantly higher with the Structured Interview than did the other self-report measures. Although the correlation between the SWS and the Structured Interview was modest (r=.46), somewhat lower than its correlation with other self-report measures, the correlation is attenuated by method variance associated with the Structured Interview and the SWS, and by various sources of unreliability in both the SWS and the Structured Interview. It appears that the SWS captures some but not all of the aspects of the TABP assessed by the Structured Interview. It is probable that like other self-report measures, the SWS fails to assess the typical speech behaviours of Type As (Matthews et al., 1982). It is desirable for the SWS to show only a moderate correlation with the Structured Interview for several reasons. First, if the correlation was not significant, it would seriously call into question the heteromethod construct validity of the TABP. Second, if the correlation was too high, a multidimensional approach would not likely be more predictive than the existing measures, nor could it enhance the predictive capabilities of the Structured Interview.

Given the high classification agreement for Type As between the SWS and the Structured Interview, the SWS could

be used to screen individuals to identify Type As whose behaviour pattern may be studied and verified at a later point by the Structured Interview. This would substantially decrease the cost of Type A/B determination in terms of time and money. Component and profile scores as well as behavioural and speech characteristics would then be available as a guide for intervention. Changes in the overall Type A behaviour pattern and its components can easily be monitored by readministering the SWS during and after intervention. Using the SWS in this situation might result in a more objective, quantifiable, and sensitive measure of the TABP and its modification. This is critical to the assessment of Type A modification effects because certain Type A components might be more modifiable. Also, changes in certain Type A components may result in a greater reduction in CHD risk than changes in other components. Assessment in intervention is essential to determine the effectiveness of the program, and as recognized by others (Tasto, Chesney, & Chadwick, 1978) a "multidimensional approach to measurement holds the greatest promise for detecting what may be rather subtle behavioral changes that results from interventions" (p. 114).

The next step in the evaluation of the SWS was the examination of its construct validity. The TABP is thought to be related to physiological reactivity to stress, and to the incidence and prevalence of CHD. In Study 1, the SWS was predictive of systolic and diastolic blood pressure.

Exploration of the physiological responses to stress was examined using a multidimensional assessment of the TABP. Scores on·all the SWS modal profiles were predictive of systolic blood pressure responses to the Structured Interview. Scores on the Anger/Work Involvement profile were predictive of systolic and diastolic blood pressure. These relations, though, are not due solely to the anger and job dissatisfaction components of the SWS. Correlations between the SWS subscales and physiological arousal were nonsignificant. It appears that individual Type A components interact to increase the physiological reactions of Type As. Further, these results provide support that physiological responses of Type As are not homogeneous.

Results from Study 2 provide support for the possibility that these two modal profiles predictive of physiological arousal may be predictive of CHD. Eighty-eight percent of men with CHD had at least a moderate score on one of the these two profiles compared to less than 55 percent of men without CHD. Although these results are from independent samples, they suggest that the link between the TABP and CHD involves increased cardiovascular reactivity to stress. This study fails to support the hypothesis that the TABP increases the risk of CHD through its association with traditional risk factors. The Anger scale of the SWS, however, was associated with several risk factors so the possibility that the pathogenicity of anger may involve traditional coronary risk factors cannot be ruled out.

Given the limitations of the cross-sectional study design, the finding that the SWS is independently predictive of CHD provides further evidence of the construct validity of the SWS.

The measurement of the TABP has focussed primarily on its prediction of CHD. Evaluation of the validity of the SWS, however, also involves the prediction of psychological disturbances hypothesized to be associated with the TABP. In Study 3 the SWS was found to be related to several dimensions of psychopathology. Although Scale A was associated with hypochondriasis, interpersonal problems, and persecutory ideas, a multidimensional approach to Type A assessment provides insight into the pattern of Type A components related to types of psychopathology. Scores on the Anger/Impatience profile were predictive of high interpersonal problems. Scores on the Job Dissatisfaction profile was significantly associated with low interpersonal problems. The Hypochondriasis, Interpersonal Problems, Persecutory Ideas, and Anxiety scales of the BPI were all positively related to scores on the Anger/Work Involvement profile. Further, this profile was nonsignificantly but positively associated with all dimensions examined. These three modal profiles were analagous to the three Type A states posited by Price (1982). The cross-sectional design does not allow us to make cause and effect determinations. These results do, however, suggest that individuals characteristic of the Anger/Work Involvement profile are

candidates for behaviour modification. These individuals report more uncooperativeness, disobedience, resistance to rules and regulations, distrust of others' behaviours and motives, uneasiness, and apprehension.

Sex Differences in Type A Research

The research in this dissertation has not established the criterion and construct validity of the SWS in women. The TABP as measured by existing measures appears to be less prevalent in women than in men (Haynes, Feinleib, Levine, Scotch, & Kannel, 1978; Waldron, 1976; Waldron, Zyzanski, Shekelle, Jenkins, & Tannenbaum, 1977), although in university samples women have higher Type A scores than do their male counterparts (Waldron et al., 1980). Also, certain Type A behaviours such as ambition, aggression, competitiveness, hostility, and anger may be higher in men than in women (Haynes, Feinleib, Levine, Scotch, & Kannel, 1978; Maccoby & Jacklin, 1974; Weidner, Friend, Ficarrotto, & Mendell, 1989). The extent to which the SWS and other measures of the TABP rely on these dimensions to identify the TABP will affect its validity to assess the TABP in women.

The validity of the Structured Interview for Type A behaviour in women is questionable. The weighting of specific behavioural and speech characteristics in Type A assessment have been found to differ for men and women (Anderson & Waldron, 1983; Scherwitz et al., 1977). In addition, the judgmental agreement rates between self-report

Type A measures and the Structured Interview are generally lower than the agreement rates for men (Anderson & Waldron, 1983; Haynes et al., 1980; Meininger, 1983). Further research is needed to determine whether or not the SWS is a valid indicator of the TABP in women. Also, further research is required to examine the generalizability of the items selected to be predictive of the Structured Interview classification. Differences in the validity of Type A measures and the expression of the TABP may result in differences in the relation between CHD and the TABP.

In general studies of women have found that the TABP or its components are related to CHD (Bengtsson, Hallstrom, & Tibblin, 1973; Haynes, Feinleib, Levine, Scotch, & Kannel, 1978; Haynes et al., 1980; Kenigsberg et al., 1974; Rosenman & Friedman, 1961) and coronary atherosclerosis (Blumenthal, Williams, Kong, Schanberg, & Thompson, 1978. Sex differences have been found between the relation of the TABP and coronary risk factors (Shekelle et al., 1976; Weidner, Istvan, & McKnight, 1989; Weidner et al., 1987). The association of the SWS with CHD and traditional risk factors in women must be empirically examined. The modal profiles associated with CHD may also be different for women.

Sex differences in cardiovascular and endocrine responses to stress have been found (Durel et al., 1989; Frankenhaeuser, Lundberg, & Forsman, 1980; Mavrogiannis, 1986; Tischenkel et al., 1989; Van Egeren, 1979a). A recent meta-analysis found that men show significantly greater

physiological reactivity than do women (Stoney, Davis, & Matthews, 1987). Also, differences between the relation of anger and Type A behaviour to blood pressure have been reported (Dimsdale et al., 1986; Durel et al., 1989; Johnson, Schork, & Spielberger, 1987; Johnson, Spielberger, Worden, & Jacobs, 1987). It is recommended that the results of Study 1 not be generalized to women until evidence is provided that the relation between the SWS and physiological arousal is the same in women as in men. Thus, empirical evidence is needed to determine whether or not the SWS is a valid predictor of physiological responses in women, and whether or not the relation is the same as that observed for men.

It is generally believed that women suffer from psychopathology more often than do men. In Canada, neuroses and affective psychosis (exaggerated deviations of mood) are more common in women than in men (Statistics Canada, 1977). Further, men are more likely to be diagnosed in sociopathic categories, while women are more likely to be diagnosed into neurotic or emotional categories (Smith, 1975), especially depression (Weissman & Klerman, 1977). Unfortunately, the sample of males in Study 3 was too small to examine sex differences in psychopathology and its relation to the TABP. This relation should be examined in random samples of men and women to determine whether or not sex is a moderator of this relation.

Future Research Directions Using the Survey of Work Styles

Future research with the SWS should focus on demonstrating the predictive validity of the SWS, and the possible moderators of its validity. Once acceptable concurrent validity has been demonstrated, a prospective study should be undertaken to provide support for the cause and effect relation of the SWS and CHD. This is a time-consuming and expensive endeavour, but it will assess directly whether or not the SWS is associated with the incidence of CHD. Along this line of research, the ability of the SWS to predict prospectively traditional coronary risk factors, recurrent myocardial infarctions, and mortality of CHD needs to be addressed. On the basis of these prospective results, intervention programs can be developed and the extent to which changes in coronary risk are dependent upon the level of the TAP an be determined. The prospective relations between the SWS and psychological disturbances also needs to be evaluated in order to determine whether or not t ese disturbances are antecedents, concomitants, or consequences of the TABP. In these types of studies, the test-retest reliability of the SWS can also be determined. This is important be ause one needs to establish that in stable conditions the SWS is reliably assessing a stable trait. One can then be more confident that changes in the TABP due to intervention or stressful incidents is the consequence of this event. Past longitudinal research has indicated that the TABP is a

relatively stable trait (Bergman & Magnusson, 1986), so it is critical that the test-retest reliability of the SWS be determined.

As mentioned, another direction for future research is the examination of the effect of moderators thought to affect the TABP and its relation to other constructs. Possible moderators include demographic variables, such as sex, race, socioeconomic status, and age (e.g., Cohen et al., 1979; Durel et al., 1989; Helgeson, 1989; Williams et al., 1988), environmental factors, such as different settings, types of stressors, and occasionr (e.g., Harbin, 1989), cognitive factors such as perceived social support (Blumenthal et al., 1987), and physiological factors, such as the level of traditional coronary risk factors (Friedman, 1988). This will add support to the validity of the SWS, and will allow for finer distinctions of the "types" of Type As prone to psychopathology and illness. It is hoped that a multidimensional approach will lead to a better understanding of the antecedents, consequences, and moderators of the TABP.

Conclusions

In summary, the results of these three studies provide positive evidence for the internal reliability and construct validity of the Survey of Work Styles as a measure of the Type A behaviour pattern. Several conclusions can be made from the studies in this dissertation.

1. The SWS scales demonstrate moderate to high internal consistency in the three independent sample of employed adults.

2. The SWS shows good concurrent validity in middle-aged men. For example, it correlated moderately with the JAS and the Framingham Type A Scale. The SWS also showed a significantly higher Type A/non-Type A classification agreement with the Structured Interview than did either the JAS or the Framingham Type A Scale.

3. Modal profile analysis of the SWS results in the identification of three independent bipolar modal profiles. The Anger/Impatience and Job Dissatisfaction profiles appear to be consistent across samples, but the Anger/Work Involvement profile varies somewhat, possibly due to different Work Involvement means in the samples. These profiles are similar to the three Type A states proposed by Price (1982). The Anger/Impatience profile is similar to the "angry" state. The Job Dissatisfaction profile resembles the "depressed" state, and the Anger/Work Involvement profile is similar to the "Superman/Superwoman" state.

4. Results regarding the relation of distinct modal profile of the SWS to physiological arousal, CHD, and psychopathology support a multidimensional interpretation of the TABP. For example, the Job Dissatisfaction and Anger/Impatience profiles were predictive of mean systolic blood pressure during the Structured Interview. The

Anger/Work Involvement profile was predictive of both mean systolic and diastolic blood pressure during the Structured Interview. In another sample, 88 percent of men with CHD showed moderate scores on either the Anger/Impatience or Job Dissatisfaction profile compared to about 55 percent of those men without CHD. In a different sample, the Anger/Impatience profile was related to interpersonal problems, but hypochondriasis, interpersonal problems, persecutory ideas, and anxiety were associated with the Anger/Work Involvement profile.

5. The SWS Anger/Impatience profile may represent the most "toxic" pattern of Type A components. In separate samples, it was predictive of systolic blood pressure during stress, the prevalence of CHD, and interpersonal problems. The Job Dissatisfaction profile was predictive of systolic blood pressure, and the prevalence of CHD, but it was negatively related to interpersonal problems. The Anger/Work Involvement profile was related to increased systolic and diastolic blood pressure in response to stress, and several dimensions of psychopathology, but it was not independently related to the prevalence of CHD.

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