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The Occurrence and Distribution of the
JAS Type A Behavior Pattern in a
University Student Population

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Submitted in partial fulfillment of the
requirements for the degree of
MASTER OF SCIENCE
From Saint Mary's University
Halifax, Nova Scotia

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Abstract

The Occurrence and Distribution of the
JAS Type A Behavior Pattern in a
University Student Population

Sandra Hodson

September 24, 1984

The Type A behavior pattern, characterized by excessive competitive drive, aggressiveness, impatience, and time urgency, has been associated with a twofold risk of coronary heart disease (CHD). Despite the long-term negative health effects of the behavior pattern, it has been resistant to change once established. Some clinicians propose that it may be more effective to prevent the development of this behavior pattern in young people rather than try to change it once it is well established. The present study examined the occurrence and distribution of the Type A behavior pattern in students at two Maritime universities to examine (1) the degree to which university students reported Type A behaviors, (2) whether the level of Type A behavior varied with students from different programs of study, and (3) whether there were gender differences. A sample of 722 students drawn from four faculties and four levels of study were assessed by a modified form of the Jenkins Activity Survey (JAS). The results of this study indicate that university students scored similarly on the JAS to the normative Western Collaborative Group Study and relevant occupational samples on the Type A scale and the Speed-and-Impatience

scale, but scored lower on the Hard-Driving-and-Competitive scale. Commerce students obtained the highest JAS scores, followed by Engineering students. In general, JAS scores increased as students advanced from 1st year to graduate or professional study. Females scored higher than male students in all programs but Commerce. Demographic variables did not significantly relate to students' JAS scores. These results identify four target groups for preventative programs: (1) Commerce students, (2) graduate students, (3) professional students, and (4) female students. Extremely high scores for females in graduate studies and Engineering suggest that women in non-traditional fields may be at particular risk. Questions related to the extent that Type A individuals actively choose occupations known to reinforce their behavior patterns and the extent to which the behavior pattern is shaped by environmental contingencies need to be examined.

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Behavioral medicine has emerged in the last fifteen years as a rapidly expanding field of psychology. This is due, in part, to a change in the nature of health care requirements: North American morbidity and mortality rates are no longer primarily due to infectious diseases, but rather to chronic disorders many of which seem to be closely related to certain lifestyles. Ultimately these diseases are not medical problems, but behavior problems which require alteration of characteristic response patterns (Stachnik, 1980).

Agras (1982) links behavioral medicine with a revival of interest in how environmental and psychological factors interact with physiological and biochemical processes in determining the outcome of the natural history and treatment of disease. Coronary heart disease (CHD) is one area where a great deal of interdisciplinary research has been done into these multiple and complex relationships. This interdisciplinary research has identified a behavior pattern which is an independent and equal risk factor in the prediction of coronary heart disease. This pattern has been labeled as coronary-prone or Type A behavior pattern.

Throughout medical history there have been numerous references to distinctive behavior patterns observed in individuals suffering from CHD (see Jenkins, 1978a, and Jenkins & Zyzanski, 1980, for a review of this literature). In the late 1960's two San Francisco cardiologists, Dr. Meyer Friedman and Dr. Ray Rosenman, became puzzled in trying to explain the causes of CHD. In fact, half their cases of heart disease could not be directly linked to any single known or suspected causative factor such as smoking, diet, exercise, habit, or

other contributing diseases (Friedman & Rosenman, 1974). Friedman and Rosenman began to explore the effect of the environmental stress of Western culture as a possible factor. Through systematic observation of their patients who were suffering from CHD, they were able to define a distinctive, repeating behavior pattern common to these individuals.

Using questionnaires and personal interviews, Friedman and Rosenman developed a profile of behaviors that were characteristic of their coronary patients. They labeled this behavioral profile "Type A behavior pattern" and defined it as "an action-emotion complex that can be observed in any person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time, and if required to do so, against the opposing efforts of other things or other persons" (Friedman & Rosenman, 1974, p. 84). The elemental factors of this behavior pattern are excessive competitive drive, aggressiveness, impatience, and time urgency. A less stressed behavior pattern showing a lack of these characteristics was labeled "Type B."

Subsequent research by Friedman and Rosenman (1974) yielded four important findings: (1) The Type A behavior pattern was generally present in patients already exhibiting CHD, (2) in prospective studies, individuals who later suffered CHD had been previously diagnosed as Type A, (3) a cluster of coronary biochemical abnormalities were found in Type A subjects, and (4) experimentally inducing a facsimile of Type A behavior in laboratory animals resulted in their developing CHD.

Since this promising beginning, a great deal of research has been conducted by cardiologists, psychologists, epidemiologists,

biologists, and others in an effort to verify that Type A behavior pattern is a risk factor in the development of CHD.

Despite the growing mass of data confirming a relationship between the Type A behavior pattern and CHD, attempts at intervention to change this behavior pattern before CHD develops have met with little success. This lack of success might be attributed to the fact that our society associates many of the target behaviors with financial and personal success (Cooper, Detre, & Weiss, 1981; Deszca & Burke, 1981; Price, 1982). Short of experiencing a coronary event, most individuals in our society are unwilling to give up a behavior pattern which, while unhealthy, is reinforced by parents, school, and the workplace.

Thus the Type A behavior pattern seems to present a considerable paradox. On the one hand, the behaviors included in this pattern overtly lead to success in our society in terms of academic and occupational performance. Extreme Type A individuals are totally involved in their work and work hard to achieve success. On the other hand, the Type A behavior pattern can, literally, be deadly. Type A individuals are twice as likely to develop CHD as those classified as Type B. As well, Type A individuals, because of their competitiveness, aggressiveness, and impatience, have the capacity to have a strong negative influence on the home and family environment as well as the work environment.

Because healthy Type A individuals have not been particularly motivated to change their behavior once the pattern has been established, Deszca and Burke (1981) suggest that education and intervention with

children and young adults may be a more effective strategy for dealing with this problem. Price (1982) supports this preventive approach, noting that once habits are established, they are very resistant to change, especially if they generate positive consequences. Early intervention may also influence the adverse physiological consequences of the behavior pattern which seem to worsen over time.

The task remains to identify appropriate target groups for intervention programs among young people. One group that would seem to have a high risk of developing Type A behavior is university students. A majority of these come from a middle-class background where the predominance of Type A adults have been found. They are studying in an academic environment which reinforces competitiveness, time urgency, and achievement, and they are headed for the white-collar and professional occupations which continue to elicit and reinforce Type A behaviors.

The purpose of this study was to examine the occurrence and distribution of the Type A behavior pattern in a university student population. Students were assessed to determine (1) the degree to which the Type A behavior pattern was already apparent in young people attending university, (2) whether the prevalence and degree of Type A behavior reported was similar among students registered in different faculties within the university, and (3) whether Type A behavior changed over time as students proceeded from first year to graduate or professional study.

Review of Literature

Clinical Recognition of the Type A Behavior Pattern

Jenkins (1979) offers the following description of the Type A behavior pattern:

"The coronary-prone behavior pattern is considered to be an overt behavioral syndrome or style of living characterized by extremes of competitiveness, striving for achievement, aggressiveness (sometimes stringently repressed), haste, impatience, restlessness, hyperalertness, explosiveness of speech, tenseness of facial musculature, and feelings of being under the pressure of time and under the challenge of responsibility. Persons having this pattern are often so deeply committed to their vocation or profession that other aspects of their lives are relatively neglected. Not all aspects of this syndrome or pattern need be present for a person to be classified as possessing it. The pattern is neither a personality trait nor a standard reaction to a challenging situation, but rather the reaction of a characterologically predisposed person to a situation which challenges him. Different kinds of situations evoke maximal reaction from different persons." (p.6).

Type B individuals are described as exhibiting a relative absence of these behaviors. The differences in relevant behavior between these two types are succinctly summarized in Table 1 according to Chesney, Eagleston, and Rosenman (1980).

An individual does not have to display all of these characteristics to be labeled Type A. Classification is based on a preponderance of characteristics. Likewise the focus of one individual's Type A-ness may be different from that of another; i.e., the majority of one individual's Type A responses may be in the area of time urgency, while those of another may be related to competitiveness.

Clinical observations of behavior and factor analysis of assessment items have yielded several independent features of the Type A behavior pattern. According to Jenkins (1979), these are:

1. Vocational involvement, including work addiction, multiple jobs, overtime, and work overload.
2. Achievement striving and competitiveness.

Table 1

Profiles of the Type A and Type B Behavior Patterns

Characteristic	Type A	Type B
Speech		
Rate	Rapid	Slow
Word production	Single-word answers; acceleration at the end of sentences	Measured; frequent pauses or breaks
Volume	Loud	Soft
Quality	Vigorous; terse; harsh	"Walter Mitty"
Intonation/inflection	Abrupt; explosive speech; key word emphasis	Monotone
Response latency	Immediate answers	Pauses before answering
Length of responses	Short and to the point	Long, rambling
Other	Word clipping; word omission; word repetition	
Behaviors		
Sighing	Frequent	Rare
Posture	Tense; on the edge of the chair	Relaxed; comfortable
General demeanor	Alert; intense	Calm; quiet attentiveness
Facial expression	Tense; hostile; grimace	Relaxed; friendly
Smile	Lateral	Broad
Laughter	Harsh	Gentle chuckle
Fist clenching	Frequent	Rare
Responses to the interview		
Interrupts interviewer	Often, particularly on question 13	Rarely, even on question 13

Table Continued ...

Table 1 Continued.

Characteristic	Type A	Type B
Returns to previous subject when interrupted	Often	Rarely
Attempts to finish interviewer's questions	Often	Rarely
Uses humor	Rarely	Often
Hurries the interviewer ("yes, yes", "m,m" head nodding)	Often	Rarely
Competes for control of the interview	Wide variety of techniques - interruptions; verbal duets; extraneous comments, lengthy or evasive answers; questioning or correcting the interviewer	Rarely
Hostility	Often demonstrated during the interview through mechanisms such as boredom, condescension, authoritarianism, challenge	None
Typical content	No, wants to move up Yes, by own and others' judgements Yes Hates waiting in lines; will not wait at a restaurant; annoyed when caught behind a slow-moving vehicle	Yes Not particularly No Takes delays of all kinds in stride and does not become frustrated or annoyed

Table Continued

Table 1 Continued.

Characteristic	Type A	Type B
Competition	Enjoys competition on the job; plays all games (even with children) to win	Does not thrive on competition and rarely engages in competitive activities
Admits to polyphasic thinking and activities	Often does or thinks two (or more) things at the same time	Does not thrive on competition at once
Hostility	In content and stylistics - argumentative responses, excessive qualifications, harsh generalizations, challenges, emotion-laden words, obscenity	Rarely present in any content

Note. From "The Type A Structured Interview: A Behavioral Assessment in the Rough" by M.A. Chesney, J.R. Eagleston, and R.H. Roseman, 1980, Journal of Behavioral Assessment, 2, pp. 260-261.

3. Speed, impatience, and restlessness manifest in speech and actions.
4. Hostility.

Glass (1977) conducted a series of studies to establish the construct validity of these factors. The studies were done with university student volunteers who were assigned to Type A and Type B categories on the basis of their scores on the Jenkins Activity Survey which had been modified for students. The results confirmed the relationship of the Type A behavior pattern to achievement striving, time urgency, and hostility. As the Glass study is conducted using a university student sample, the results are summarized in detail.

Type A and achievement striving. Four studies on Type A behavior pattern and achievement striving (Glass, 1977) confirmed that Type A students were achievement-oriented and worked at near capacity compared to their Type B counterparts. On a math problem-solving task, with and without deadlines, Type A students produced high level effort regardless of the task demands, while Type B students responded to the requirements of the situation. On an immediate recall task, Type A students recalled more items than Type B students; this was interpreted in terms of greater achievement motivation. On a treadmill task, Type A students worked closer to their level of endurance than did Type B students, even at the end of the session when they chose to terminate the task. When exposed to an increasing high frequency tone, Type A students waited longer to terminate the tone than Type B students, perhaps showing a reluctance to admit that it was bothersome.

Type A and time urgency. Four studies were also conducted on the Type A behavior pattern and time urgency (Glass, 1977). When asked to read aloud and to stop when they thought one minute had passed, Type A students became impatient with the delay and reported that the time interval had elapsed sooner than did Type B students. When their impatience was deliberately aroused, Type A students did more poorly than Type B students on two tasks requiring a delayed response. On a task requiring discussion with a confederate to reach consensus on a series of decision problems, Type A students exhibited great annoyance and irritation at having the pace of their activities slowed down by another individual. Glass concluded that these studies demonstrate the importance of treating the Type A behavior pattern as an interplay of predispositions and eliciting environmental circumstances. The behavioral effects depended on the subjects being confronted with situations designed to elicit different responses. Otherwise, Glass believed that Type A and Type B students would probably have behaved in similar ways.

Type A and hostility. The hostility factor was demonstrated in the time urgency study mentioned above involving interruption and delay by a confederate. However, Glass points out that in many instances it is difficult to detect the aggressiveness in Type A individuals because another characteristic of the behavior pattern is covering up such affect and reactions. One index of hostility may be a note of rancor or contentiousness in the voice. Another is the tendency to compete with or to challenge other people. In an aggression experiment (Glass, 1977) which involved teaching a confederate a task using reward and punishment (shock), experimentally

aroused Type A students delivered seemingly more intense electric shock to the confederate than did comparably aroused Type B students. The Type A students were aggressive and hostile when circumstances threatened their task mastery.

Assessment of the Type A Behavior Pattern

Structured Interview. The Structured Interview (SI) has been one of the primary assessment procedures for Type A behavior. It was developed by Friedman and Rosenman as part of their early studies into the prevalence of CHD in subjects with Type A behavior (Chesney, Eagleston, & Rosenman, 1980).

The SI consists of 26 questions, which may be followed by challenging probes. Appendix A provides a protocol of the interview. The SI takes about 10-15 minutes to conduct. The interview is audio-taped or videotaped for later scoring by trained raters.

The interviewers are trained to ask the questions in a standardized manner. The goal is to elicit Type A behavior by asking questions in an abrupt manner, delaying, or interrupting. The interview is a stimulus for the subject to display time urgency, hostility, and competition with self or the interviewer (Chesney, Eagleston, & Rosenman, 1980). Training of interviewers/raters takes from one week to one month, and not all individuals have a facility with the technique (Jenkins, Rosenman, & Friedman, 1967).

Classification of A/B Type according to the SI is based on both the self-report of the subject and on the behavior observed during the interview. A four-point scale is generally used:

- A-1: Fully developed pattern.
- A-2: Many Type A characteristics present but not the complete pattern
- X: An even mix of Type A and B characteristics
- B: Relative absence of Type A characteristics

The validity of the SI was established in the Western Collaborative Group Study (WCGS) which demonstrated that more individuals classified as Type A developed CHD than those classified as Type B (Rosenman, Brand, Jenkins, Friedman, Straus, & Wurm, 1975). Interrater reliability in classifying individuals ranges from .64 to .84, with the lower reliabilities occurring with newly trained raters. The test-retest reliability over an approximate 18 month period was .82 (Chesney, Eagleston, & Rosenman, 1980).

Matthews (1982) summarizes the empirical data on the behavior of Type A individuals who were classified by the Structured Interview. Male, caucasian, employable subjects report that they behave in ways that are consistent with the Type A construct. Most notably, they respond to frustrating, difficult, and moderately competitive circumstances, including the assessment interview, with loud, explosive, and rapid speech, and with elevations in systolic blood pressure, in catecholamines, and sometimes heart rate. They do not, however, respond differently from Type B individuals in task performance.

Jenkins Activity Survey. While the Structured Interview was deemed a sufficiently valid and reliable instrument, it was not practical for use in the large epidemiological studies which were

undertaken as the medical importance of the Type A behavior pattern became established. The SI is slow, uneconomical, and relies too heavily on the interviewer's skills (Jenkins, Rosenman, & Friedman, 1967). The Jenkins Activity Survey (JAS) was developed to provide a rapid, objective measure of Type A behavior. It is a self-administered, machine-scorable, multiple choice questionnaire consisting of 52 items. A copy of the JAS appears in Appendix B.

The JAS was derived from, and was validated against, the Structured Interview. As with the SI, the scoring norms were developed on the Western Collaborative Group Study. They yield a continuous, numeric scale providing an estimate of the intensity of the behavior pattern. Scores on the JAS agree with SI judgments of behavior type on 70-73% of persons (Jenkins & Zyzanski, 1980).

The JAS yields four scale scores. The Type A scale was developed by discriminant function technique to identify individuals judged Type A or B by the SI. The three remaining scales were derived by factor analysis of those items which were valid discriminators between Type A and Type B individuals. These scales are labeled S: Speed-and-Impatience, J: Job-Involvement, and H: Hard-Driving/Competitive. The three scales are uncorrelated with each other, but each is correlated with Type A (Jenkins & Zyzanski, 1980).

The internal consistency reliability coefficient for the Type A scale using Kendall's tau b one-year test-retest coefficients is .83 and using estimates derived from the squared multiple correlation coefficient is .85. Overall, the reliability coefficients for all four JAS scales range from .73 to .85. When the same edition of the

JAS was readministered after four to six months, the retest coefficients ranged from .65 to .82. A four-year test-retest coefficient of .64 essentially reflected the reliability of alternate forms of the questionnaire since the editions has only six items in common (Jenkins, Zyzanski, & Rosenman, 1979).

Matthews (1982) summarizes the empirical data on the behavior of Type A individuals who were classified by the JAS. These individuals sense time passing rapidly, work quickly, persist in the face of fatigue or the possibility of failure, and ignore distractions that can interfere with a good performance. They are willing to inflict harm on others in the context of helping them to learn. They report that they work hard and achieve success. Many Type A individuals show elevations in systolic blood pressure during difficult and moderately competitive tasks.

Assessment problems. While the SI and the JAS appear to be satisfactorily reliable, the association between them is not strong. The JAS agrees with the A/B classification of the SI in only 60-70% of middle-aged white-collar and undergraduate male subjects (Matthews, 1982). In the WCGS the JAS Type A scale predicted the SI judgment only 73% of the time for the entire sample; however, there was 90% agreement for persons scoring one standard deviation from the mean (Jenkins, 1978b).

Behaviorally, the two measures would seem to assess different characteristics. The predominant characteristic of SI-determined Type A men appears to be reactivity to events that are frustrating, difficult, and somewhat competitive. JAS-determined Type A individuals are vigorous achievement strivers who can be aggressive and competitive

(Matthews, 1982).

Musante, MacDougall, Dembroski, and Van Horn (1983) suggest the primary reason for lack of agreement between the SI and JAS is that subjects are designated Type A or B by different criteria. The SI classification is based primarily on non-content speech parameters and clinical judgments of hostility, while the JAS Type A scale is purely content-based questions empirically derived from the SI. Matthews, Krantz, Dembroski, and MacDougall (1982) demonstrated this difference in a study to identify the factors that account for discrepancies and similarities in classification by the SI and the JAS. The SI classification was predicted by the subjects' promptness of response, voice emphasis, and hurried speech. JAS classification was predicted by subjects' reports of time pressure. The common sources of variance were self-reported pressured drive and judgments of hostility, competitiveness, and energy level.

Similarly, Friedman, Thoresen, and Gill (1981) emphasize the importance of psychomotor manifestations such as facial signs of hostility, rapidity of eye blinking, grimaces, expiratory sighing, periorbital pigmentation, jarring laughter, and hostile reactions of various sorts in classifying subjects by the SI. They state that more than half of their subjects exhibiting Type A behavior can be identified in less than 45 seconds of conversing with and observing them. The diagnosis depends on observation of the psychomotor manifestation rather than what the person thinks about himself.

Both type A measures were standardized on the middle-class, employed, middle-aged men of the WCGS and reflect predominantly white-

collar upwardly mobile values. While they are not known to be invalid for students, housewives, or other special populations, there is not yet empirical evidence that all the items mean the same thing to these groups as to the normative sample (Jenkins, 1978b).

In addition to the common concerns about self-report measures, the JAS may be biased by several behavioral characteristics of Type A individuals (Friedman, Thoresen, & Gill, 1981): (1) They are often impatient and have an aversion to filling out questionnaires, (2) they lack awareness of how impatient and hostile they are, and (3) like many people, they are unwilling to give an unflattering portrait of themselves.

Jenkins (1978b) compares the interview and questionnaire methods of assessing the Type A behavior pattern. His review shows the SI and JAS to have a comparable ability to predict CHD and to be equally useful in studies to explain the relationship of Type A behavior and CHD. The SI is described as somewhat more reliable, while the JAS is more convenient and cost effective. Thus it would seem that the choice of assessment technique would depend on the nature of the study.

Evidence Relating the Type A Behavior Pattern and Coronary Heart Disease

Prospective studies. The Western Collaborative Group Study was the first prospective epidemiological study which used a measure of Type A behavior at intake (Rosenman, Friedman, Straus, Wurm, Kositchek, Hahn, & Werthessen, 1964; Rosenman, et al., 1975). A sample of 3,154 initially healthy men were studied over an 8½ year period. The subjects were aged 39 to 59 years at the time of intake and were

employed in ten California companies.

In this double-blind study the behavior pattern raters had no knowledge of the presence of other risk factors, while the physicians diagnosing medical conditions had no knowledge of the behavioral assessment. Of the 3,154 subjects, approximately 50% were assessed by the SI as Type A and 50% as Type B. At the 8½ year follow-up, subjects classified as Type A had developed 2.37 times more CHD than subjects classified as Type B (Rosenman et al., 1975).

In 1965 after 4½ years of follow-up in the WCGS, the newly developed JAS was administered to all subjects. As mentioned earlier, the Type A/B classification agreement with the SI was 73%. Four years later, at the 8½ year follow-up, men in the top third of the JAS Type A distribution had developed 1.7 times more new CHD than had men in the bottom third (Type B) of the distribution. While this incidence is not as high as clinicians would like in order to make predictions, it is consistent with other traditional CHD risk factors which typically yield 1.7 to 3.5 times as much CHD in subjects exhibiting a single factor, than in those who do not (Jenkins & Zyzanski, 1980).

The Framingham Heart Study (Haynes, Feinleib, & Kannel, 1980) was the first prospective study to report an association between Type A behavior and CHD incidence in women. A questionnaire, which included a ten-item Type A scale, was administered to 1,674 men and women, aged 45-77, who were free of CHD. The subjects were followed over an eight year period for the development of CHD.

The Framingham Type A scale was significantly correlated with the JAS (.0.41) and especially with the JAS Speed-and-Impatience scores

(0.52) for male aerospace employees. When compared with the SI on the same sample, the Framingham scale correctly classified the males as Type A or Type B 60% of the time. Agreement for a sample of women was not significant (Haynes, Feinleib, & Kannel, 1980).

Despite different assessment techniques, the results of the Framingham study were quite similar to the WCGS for men. Framingham Type A men aged 45-64 developed 1.8 times more CHD than Type B subjects as compared to 2.2 times for WCGS men assessed by the SI and 1.8 times for those assessed by the JAS. The lower rate compared to the SI can in part be explained by the lower precision of the Framingham Type A scale and also different socioeconomic compositions of each group (Haynes, Feinleib, & Kannel, 1980). Approximately 80% of the WCGS subjects were white-collar workers, as compared to only 20% of the Framingham study. When Framingham men were classified by white-collar and blue-collar occupations, the association of Type A behavior with CHD was significant only among white-collar workers. Framingham women under the age of 65 classified as Type A were 2.1 times as likely to develop CHD as those classified Type B.

Retrospective studies. Retrospective studies further demonstrate the relationship of the Type A behavior pattern and CHD. Jenkins, Zyzanski, and Rosenman (1971) compared 83 men who had sustained a first attack of CHD prior to taking the JAS to 468 random control subjects. The CHD cases had higher Type A scores than did controls on all scales except Factor J (Job-Involvement). The Type A scale and Factor H (Hard-Driving) were significantly higher for CHD cases than for controls ($p = 0.01$). Factor S (Speed-and-Impatience) was higher for CHD cases, but not significant.

Another retrospective study examined two groups of hospitalized patients: one group hospitalized for coronary disease and the other group for some serious condition not involving the cardiovascular system (Kenigsberg, Zyzanski, Jenkins, Wardwell, & Licciardello, 1974). The CHD cases scored a quarter of a standard deviation above the mean of the normative population of the JAS ($p = 0.01$), while the control group was much more Type B. Again the CHD cases were much higher on the H factor ($p = 0.002$). Hospitalized controls demonstrated that the illness of the subjects did not influence the higher Type A scores.

Jenkins and Zyzanski (1980) cite similar retrospective studies which replicate these findings in other locations in the USA, as well as in Hawaii, The Netherlands, Belgium, Sweden, Poland and the USSR. The authors feel these studies suggest that the Type A behavior pattern is associated with CHD despite differences in genetic characteristics, social factors, geographic, and political or economic systems.

Retrospective studies linking the Type A behavior pattern to CHD certainly outnumber the prospective studies; however, retrospective studies may be influenced by two sources of bias: (1) The impact of the disease on behavior, and (2) selective survival (Jenkins, 1979). Consequently, researchers have looked more to the prospective studies which eliminate this bias.

Concurrent validity studies. A number of studies have examined how the Type A behavior pattern relates to other risk factors and symptoms of CHD. In the early days of their research Friedman, Rosenman, Straus, Wurm, & Kositchek (1968) conducted an autopsy study of fifty-one subjects which revealed a greater degree of

atherosclerosis in the arteries of those judged to have been Type A than those judged Type B.

The more recent use of the technique of coronary angiography has allowed studies of the association of the Type A behavior pattern and the extent of obstruction in the coronary arteries of living subjects. Glass (1976) cites an unpublished 1975 study by Blumenthal, Williams, Kong, Thompson, Jenkins, and Rosenman involving 156 patients referred for diagnostic angiography. Following a double-blind procedure, patients received the medical procedure and were classified either Type A or B according to the SI. The average degree of atherosclerosis was greater in Type A patients than in Type B patients, with age and sex controlled. Zyzanski, Jenkins, Ryan, Flessan, and Everist (1976) replicated this study with 94 patients who were classified Type A or B according to the JAS. Those with more than 50% obstruction in two or more vessels ($n = 55$) were rated more Type A than those who were less diseased ($n = 36$). This relationship between Type A scores and the extent of atherosclerosis still held when degree of angina pain, age, or prior experience with myocardial infarction were controlled.

Summary of data relating the Type A behavior pattern and CHD.

Jenkins and Zyzanski (1980) summarize the data relating Type A behavior and CHD as follows:

1. Individuals assessed as Type A have twice the risk of developing CHD as those classified as Type B.
2. Prospective studies showed younger Type A men to have a higher risk of CHD than older Type A men.
3. There is a consistency of positive findings across

different nations and using different measures.

4. The risk prediction for Type A behavior pattern is at least equal to other standard risk factors for CHD.
5. Type A behavior pattern clearly precedes clinical CHD and is not a subclinical manifestation of the disease.
6. Type A behavior pattern is specific to CHD and is not found with more-than-average frequency in patients with other types of disease.
7. There is a dose-response relationship of Type A behavior and CHD, both for intensity of risk and likelihood of recurrence, i.e., individuals assessed as more Type A have higher risk for CHD and greater likelihood of recurrence.

Applying evaluation criteria utilized by epidemiologists to determine a cause-effect relationship, Jenkins (1978a) concludes that there is a well-established relationship between Type A behavior pattern and coronary heart disease prevalence, incidence, recurrence, and underlying atherosclerotic pathology.

Five review panels of biomedical and behavioral scientists met in 1978 to evaluate the existing theory and research linking behavior and coronary heart disease (Cooper, Detre, & Weiss, 1981). Having reviewed published studies of demonstrated associations between Type A and CHD, the panels were in agreement that existing research data clearly supports a relationship between Type A behavior and coronary heart disease.

Relationship Between the Type A Behavior Pattern and other Variables

Early studies of the Type A behavior pattern were conducted

primarily with white, middle-class males between the ages of 35 and 65 who were employed in white-collar jobs. More recently the research has expanded to include females, younger people, blue-collar workers, the unemployed, and other races.

Gender, age, race, and locale: The Chicago Heart Association Detection Project in Industry is one large study which included both males and females (Waldron, Zyzanski, Shekelle, Jenkins, & Tannenbaum, 1977). The 5,347 employed subjects included 3,667 white men, 1,149 white women, 265 black men, and 266 black women. The subjects were between the ages of 18-64 at the time of examination. Subjects were administered the JAS and the responses were factor-analyzed within each of six gender-race-age subgroups. Three multivariate analyses of variance were performed to determine the degree to which the Type A and factor scores were influenced by gender, age, educational and racial differences.

The JAS factors determined for white subjects in this study were closely related to the three factors previously derived in the Western Collaborative Group Study. Factors for the black samples were also similar to those of the WCGS, but did show some cultural differences. The name "Speed-and-Impatience" used in the WCGS was appropriate for the first factor for both races. For the second factor, the WCGS name "Job-Involvement" seems appropriate for whites, while the name "Striving-to-Advance" seems more appropriate for blacks. The third factor, "Hard-Driving-and-Competitive," seems more appropriate for whites, while "Hardworking" best describes the less competitive blacks.

Waldron et al. (1977) conclude from their data analysis that the Type A behavior pattern is more common among employed women than among housewives of the same age; that among employed persons, Type A may be more common among men than women at younger ages, but that these differences are not significant at older ages; and considering all adults, housewives included, Type A is more common among men than among women of the same age.

Shekelle, Schoenberger, and Stamler (1976) analyzed the same Chicago data as Waldron for white subjects only ($n = 4108$), controlling particularly for socioeconomic status (SES). With SES controlled on the basis of education and occupation, the men did not differ significantly in mean Type A score from women. However, both men and women aged 45-64 years had lower mean Type A scores than men and women aged 25-44 years.

Jenkins, Zyzanski, and Rosenman (1979) note that age has not typically been related to the Type A behavior pattern in studies where the subjects are older. For example, there was not a significant correlation between Type A and age in the WCGS where subjects were aged 39-59 at intake. However, when younger subjects, i.e., aged 20-25, are included, there are modest inverse relationships between Type A scores and age. This relationship can be noted in the Shekelle et al. (1976) analysis of the Chicago data and also a study by Mettlin (1976) which examined 943 employed men.

The relationship between the Type A behavior pattern and CHD was upheld for women in the eight year Framingham study (Haynes, Feinleib, & Kannel, 1980). Women aged 45-64 years who were classified

Type A on the Framingham scale developed twice as much CHD and three times as much angina as Type B women. Type A scores among working women in this study were significantly higher than among housewives, and were almost identical to the scores for men (Haynes, Feinleib, Levine, Scotch, & Kannel, 1978).

Butensky, Farralli, Heebner, and Waldron (1976) interviewed students in the fifth, ninth, and twelfth grades to determine the extent to which they reported Type A behaviors. Subjects were from a rural, a suburban-mixed, and a suburban Catholic school. Results showed no sex differences and only a small age trend. The authors attribute this lack of age trend to substantial fluctuations in behavior pattern for many individuals in this age range. Suburban students reported more Type A behavior than rural students. Rural students felt less time urgency, but were as competitive and as achievement oriented as their suburban counterparts. The authors believe these suburban/rural differences are due to rural students striving to achieve in well-defined, readily attainable roles, while suburban students have goals that are more open-ended and uncertain of attainment.

Palladino and Tryon (1980) sampled university students using the JAS modified for students. These authors found no differences in Type A scores between male and female students or between rural and urban students.

In summary, there is generally no difference in Type A scores between men and women or between blacks and whites when occupation and education are controlled. Age differences occur only in samples

that cover a wide age range. The effects of growing up in rural/urban areas are unclear.

Occupation and education. In the WCGS, which included only male subjects, both higher occupational level and higher level of education were associated with higher JAS Type A scores (Jenkins, Zyzanski, & Rosenman, 1979). The Chicago Heart Study, which included both male and female subjects, yielded similar results. Shekelle, Schoenberger, & Stamler (1976) found the Type A score positively correlated with SES (i.e., educational and occupational status) for all sex/age groups in their analysis of the Chicago data. Waldron et al. (1977), in their analysis of this same data, also found higher educational status to be associated with higher Type A, Speed-and-Impatience, and Job-Involvement scores. The Hard-Driving-and-Competitive scores were negatively correlated with education.

Mettlin (1976) found positive relationships between JAS Type A scores and occupational prestige and educational level in his study of employed males. Correlations showed the Type A behavior pattern to be related to career achievement, rapid career achievement, and career mobility. Higher levels of Type A behavior were also observed where the subject perceived his employer as having high expectations for the quality of work performed, the quantity of work done, and the competitiveness with which he approached the job.

Haynes et al. (1978) interpret their findings of higher Type A scores for working women than for housewives in the Framingham study as supporting Mettlin's observations that the workplace may be somewhat responsible for the full development of the Type A behavior

pattern. However, a more recent analysis of this study (Haynes, Feinleib, & Kannel, 1980) suggests that incidence rates of CHD among Type A housewives and working women were not significantly different. Working in the home may not protect women from developing a Type A behavior pattern and an increased risk of CHD.

Waldron (1978) studied the relationship of Type A behavior pattern in women to employment and socioeconomic status. Subjects were women aged 40-59 years sampled from a middle-class neighborhood. A modified version of the JAS was constructed so that Type A scores of employed women and housewives would be comparable. The Type A behavior pattern was associated with high occupational status, but not to the occupational status of the woman's husband or to whether she was currently married. Type A behavior was more common among women employed full-time than among housewives or women working part-time. Full-time employment was related to higher Type A scores only for women of higher educational status. Waldron concludes that the Type A behavior pattern may be related to success in the traditional male occupational role, but not to a woman's success in the marital role.

Morrell and Katkin (1982) studied the prevalence of the Type A behavior pattern in women of five occupational groups: professionals, non-professionals, homemakers, part-time employees, and students. The 299 subjects were matched on marital status and general socioeconomic status. Results showed that JAS Type A scores were significantly higher among women employed outside the home than among comparably educated homemakers. Professionals had the highest scores; non-professionals, part-time employees, and students were

intermediate between professionals and homemakers. Education and family history of CHD were unrelated to Type A scores. The levels of Type A behavior for professionals and students were comparable to those of males in similar activities and environments.

The distribution of JAS scores in the all-male normative WCGS sample was 10% strong Type A (A1), 40% incompletely developed Type A (A2), 40% incompletely developed Type B (B3), and 10% strong Type B's (B4) (Jenkins, 1979). A recent survey of 135 senior female managers in Britain (Davidson & Cooper, 1980, 1981) resulted in a distribution of 21.5% A1, 40% A2, 38.5% B3, and no B4. This sample contained twice the proportion of extreme A's individuals, however the report did not specify how the behavior pattern was measured. There was no difference in education level between Type A and Type B subjects, but Type A behavior pattern was associated with higher salary level.

In summary, higher Type A scores have been related to higher occupational and educational status, particularly in the case of women.

School, social, and work performance. The academic activities, outside responsibilities, and importance of academic success of 41 male and 91 female first year university students were assessed by Ovcharchyn, Johnson, and Petzel (1981). Analysis of data from a questionnaire and from university records showed that JAS-determined Type A students reportedly engaged in more scholastic and paid work, had higher and more articulated academic aspirations, earned higher grades at end of semester, and had higher aspiration levels with goals integrated into plans for future career. They reported greater satisfaction with the university experience, had more pressure from

parents to attend university and were striving for jobs concordant with their parents' SES. They perceived expectations of teachers more clearly, took on more outside activities without feeling it a hindrance to academic achievement, and did not report an increase in somatic symptoms of stress.

Glass (1977) interviewed 100 male university students aged 18-20 about their past and present involvement in athletic, social, and related extracurricular activities, and about their past and present scholastic and athletic achievements. There were no differences between JAS-determined Type A and Type B students on social class as determined by the educational and occupational level of their parents. Type A students had participated in more sports in high school and had won more athletic awards than Type B students. There was not a significant difference between Type A and Type B students in the number of high school honors attained, but Type A students earned more honors in college than Type B students. Type B students reported a somewhat greater social life in high school than did Type A students. Regarding plans after college, 60% of the Type A students said they would go on to graduate or professional school, while 70% of the Type B students said they intended to get a job. Glass views these results as supporting the picture of the Type A man as hard-driving, action-oriented, with his sights set on achievement and success, not on the pleasure of interpersonal pursuits.

Ditto (1982) conducted a construct validity study to determine the degree to which JAS-determined Type A and Type B university students actually displayed the behavior pattern in their daily lives. Thirty-one male (16 Type A, 15 Type B) and 39 female (19 Type A, 20

Type B) students kept a detailed, hourly account of their activities for one week. Results showed that Type A students spent more time in class, studying, and participating in religious services and less time socializing with friends than did Type B students. Type A students were also more likely to belong to a sorority or fraternity and to report higher career aspirations. There was no difference between Type A and Type B students for course loads or year in college.

Waldron, Hickey, McPherson, Butensky, Gruss, Overall, Schmader, and Wohlmuth (1980) conducted a similar study with 42 male and 42 female students. Subjects were administered a modified form of the JAS, questioned about their time expenditures and success in academic and social activities, and asked to keep a diary of their activities and feelings for a week. Subjects were reassessed at the end of the term. Students who were more Type A spent more time studying or in classes and had higher grade point averages. Type A students were not more successful in relationships with the opposite sex nor in social relationships generally. The authors conclude that the Type A behavior pattern appears to contribute to career success, but not to social success. There were no significant relationships between Type A behavior and reported levels of general tension or anxiety. However, Type A students did report higher levels of tension during a variety of specific social or academic activities during the week preceding the testing session. There was a tendency for Type A scores to increase from the beginning to the end of the term; students with more evidence of academic pressure had a greater increase in Type A scores.

Wolf and Kissling (1983) administered a modified JAS to 133 male

and 50 female first-year medical students at the beginning and the end of the year. Despite enrollment in a high-pressure program, Type A scores declined over the year. Type A scores were unrelated to demographic variables (age, sex, race, number and age of siblings, place of birth, and social class) and to academic achievement (pre-med grades, MCAT scores, and medical school GPA). The authors speculate that the decline in Type A scores over the year reflect the students' learning to handle the stressful environment in a non-Type A style. The lack of relationship between Type A scores and academic achievement may be a result of the highly select group academically and the limited range ($SD = 3.51$) of scores on the JAS.

In contrast, Jenkins, Zyzanski, and Rosenman (1979) report a study of 64 senior level medical students which showed the JAS-determined Type A scale to be significantly associated with cumulative gradepoint average during the years in medical school (.26) and with relative ranking in class (.35). The authors speculate that this relationship between the Type A behavior pattern and performance may be attributable to sustained hard-driving behavior.

While Waldron et al. (1980) conclude that the Type A behavior pattern is more conducive to career success than social success, Streufert, Streufert, and Gorson (1981) point out that some characteristics of the Type A behavior pattern (e.g., time urgency) may actually interfere with career effectiveness. Contrary to the belief of many Type A individuals, these researchers found that managerial activities that require complex decision-making and long-term future planning are hindered, rather than aided by time urgency. Time urgency interacts with information load to produce performance

outcome. Moderately complex planning and decision-making was found to be optimal at intermediate load levels, but disintegrated when time urgency increased to high levels. Similar results were found for long-term complex planning. Higher levels of time urgency also resulted in rapid, inappropriate decision-making.

Likewise a negative relationship between Type A behavior and marital satisfaction has been indicated. Burke, Weir, and DuWors (1979) examined the marriage and family life of 85 senior administrators from correctional institutions in Ontario. The managers were assessed by a Type A scale developed by Sales, and their spouses were sent a questionnaire concerning their marital satisfaction, emotional well-being, and health-related behaviors. Wives saw their husbands as having more Type A behaviors than husbands reported themselves. Results showed the degree of the administrators' Type A behavior negatively related to the well-being of their spouse and marital satisfaction. Specifically, wives of high Type A subjects reported less marital satisfaction, greater impact of husband's work on home and family life, fewer friends and social contacts, less sense of support and belonging, and greater feelings of depression, worthlessness, anxiety, tension, guilt, and isolation. Nonetheless, the wives' self-esteem did not seem to be affected, nor were they less satisfied with their lives.

In summary, these studies demonstrate that Type A individuals are involved in more activities, attain higher academic achievement, and set higher goals, but they are involved in fewer social interactions and have less interpersonal satisfaction.

A Need for Further Research

The review of current literature supports the hypothesis that university students may be a population with high risk of developing Type A behavior. An inverse relationship between Type A scores and age was found when studies included younger people. Higher Type A scores were related to higher educational and occupational status in both men and women. And women scored as high as men when education and occupation were held constant.

The evidence also indicates that the university environment reinforces the Type A behavior pattern in students. Students with higher Type A scores did more academic work, earned higher grades and more honors, and had higher career aspirations requiring graduate or professional study. One study showed Type A scores related to GPA and class rank in a medical school.

An increasing number of researchers and clinicians (Butensky et al., 1976; Deszca & Burke, 1981; Price, 1982) have suggested that the most effective time to influence Type A individuals is before the behavior pattern is fully developed. Price (1982) identifies three reasons why it may be more appropriate and promising to aim intervention efforts at children and young adults than at middle-aged pre-coronary or post-coronary patients:

1. Established habits are very resistant to change, especially if they generate positive consequences.
2. The adverse physiological consequences of the Type A behavior pattern seem to worsen over time.
3. Evidence is accumulating that CHD is only one adverse

effect of the Type A behavior pattern. There may also be negative effects on mental well-being, family relationships, and the development of mutually satisfying relationships.

The prevalence of the Type A behavior pattern in the university student population has not been examined. Previous Type A studies involving university students have consisted of volunteers from a particular course and have usually been designed to validate the characteristics of the behavior pattern. No studies have been reported which examine the prevalence, distribution, and severity of Type A behavior in this population. This is the focus of the present study. This research is the first step in identifying groups within the population which are at highest risk so that preventive programs can be appropriately designed to meet their particular needs.

Purpose of Study

The present study examined the occurrence and distribution of the Type A behavior pattern in two Nova Scotia universities. Three questions were explored:

1. To what degree do university students report Type A behavior as measured by a modified form of the JAS?
 - a. Is there a significant difference in JAS scores between the university sample and specified subgroups of the WCGS?
 - b. Is there a significant difference in JAS scores between specified subgroups in the university sample and relevant reference groups cited in

the literature?

2. Do the JAS scores of university students vary according to the program in which the student is enrolled, the level at which the student is studying, or the gender of the student?
 - a. Is there a significant difference in JAS scores between students enrolled in the faculties of Arts, Science, Commerce, or Engineering?
 - b. Is there a significant difference in JAS scores between students enrolled in 1st year, 4th/honors year, graduate study, or professional programs.
 - c. Is there a significant difference in JAS scores between male and female students?
3. Are the JAS scores of university students significantly related to any of the following demographic variables?:
 - a. age
 - b. nationality
 - c. where they grew up
 - d. employment status
 - e. decision on major area of study
 - f. awareness of GPA
 - g. specified occupational goal
 - h. status of father's occupation
 - i. status of mother's occupation
 - j. nature of financial resources
 - k. status of own occupational goal

Method

Subjects

A sample of 722 full-time students (471 male and 251 female) from Dalhousie University and Technical University of Nova Scotia (TUNS), both in Halifax, Nova Scotia, participated in this study. Table 2 shows a breakdown of students according to their program (Arts, Science, Commerce, and Engineering); their year of study (first year, fourth or honors year, graduate study, and professional study), and their average age.

Students sampled from the Arts program in first year, honors year, and graduate study were enrolled in either History or Political Science courses. First year Law students represent the professional category in Arts. Students sampled from the Science program in first year, honors year, and graduate study were enrolled in Biology. First year Medicine students represent the professional category in Science. History and Political Science were selected from among the Arts courses because these majors often lead to the study of Law, while Biology was seen as the most common Science major leading to acceptance in Medical School. Commerce students were sampled in the first and fourth years of a four-year Bachelor of Commerce program. Graduate students in Commerce were enrolled in the Masters of Business Administration (MBA). All students in Arts, Science, and Commerce were enrolled at Dalhousie University, as were the first year Engineering students. Fourth year and graduate students in Engineering were enrolled at TUNS. At the time this study was conducted, the four-year Bachelor of Engineering

Table 2

Breakdown of Sample According to Program and Year of Study

Program	Year of Study				Total
	1st	4th/H	GS	PS	
Arts					145
Male	16	12	20	21	
Female	42	6	5	23	
Science					258
Male	36	14	38	54	
Female	60	11	14	31	
Commerce					113
Male	22	24	28		
Female	17	18	4		
Engineering					206
Male	99	43	44		
Female	13	4	3		
Total	305	132	156	129	722
Mean Age	18.6	22.2	26.9	23.5	

Note. 1st = 1st year; 4th/H = 4th/Honors year; GS = graduate study;
PS = professional study.

program consisted of two years study at Dalhousie University followed by a third and fourth year at TUNS. The Bachelor of Engineering program has since expanded to five years.

Twelve percent of the sample were international students. These students were enrolled primarily in the Engineering program and graduate study (4th year Engineering, 34% non-Canadian; graduate Engineering, 34%; graduate Arts, 24%; graduate Science, 31%; 1st year Commerce, 13%; and graduate Commerce, 13%)

A total of 852 subjects made up the original sample. One hundred thirty were eliminated for the following reasons: wrong year (84), part-time students (18), wrong program (15), invalid JAS scores (12), and gender not indicated (1):

Data Collection

Data were collected in October and early November of 1983, except for graduate students in Engineering who were contacted in January, 1984. October was selected for sampling because it was felt that students would have settled into a routine by then, but would not yet be feeling the pressure of midterm exams or deadlines for large projects. Students were asked to complete a modified form of the JAS (pages C2 to C5, Appendix C). Participation was voluntary and anonymous.

Two methods of data collection were used: (1) Collection during a class period for those groups who could be identified as part of a particular class, such as first and fourth year students, honors seminar students, and medicine and law students, and (2) collection by departmental or home mail for those students who were not currently

enrolled in identifiable classes, such as graduate and some honors students.

Professors of courses containing the targeted groups of students were contacted for permission to administer the questionnaire during one of their class periods. Administration took place during the last 30 minutes of the class period. Students took from 10-25 minutes to complete the questionnaire. While it was made clear that participation was voluntary, the only students declining to participate were five who had already written the questionnaire as part of another course. A description of the instructions given to students completing the questionnaire during class time appears in Appendix D (page D-1). Students surveyed in this manner were 1st year Arts, Commerce, and Engineering; 4th year Commerce and Engineering; Science honors; MBA; Medicine; and Law students. An exception to the above procedures was first-year Biology students. Because this class met only once a week as a group, the faculty did not feel they could give up class time; consequently, the questionnaires were distributed in the laboratory carrels and collected by the student demonstrator.

All graduate students except MBAs were contacted through their departmental mailboxes. Arts honors students were contacted through their home mail as they did not have common classes or departmental mailboxes. Students who were administered the questionnaire by mail received a letter (pages D2 and D3, Appendix D) containing the same basic instructions that the students received in class administration. They were provided with either a Campus Mail envelope (departmental mail) or a stamped, addressed envelope (home mail) to return the questionnaire. Return rates were as follows: Arts honors students,

58%; Arts graduate students, 50%; Science graduate students, 56% and Engineering graduate students, 44%.

Because students in first year university usually take courses in a variety of areas, including Arts, Science, and Commerce, completed questionnaires were assigned to programs according to the classification stated on the questionnaire by the student rather than the course in which it was written. Many Biology majors completed the questionnaire during a History course, and vice versa.

Instrument

Demographic information. A facesheet to the JAS (page C-1, Appendix C) reminded the student that completion of the questionnaire was intended to be anonymous and the results would be used only for research purposes. The demographic information that was requested included age, gender, student status, program and year of enrollment, major (if appropriate), where the student lived while growing up, GPA last year in school, employment status, financial resources, mother's and father's occupation, and the student's own occupational goal.

Type A/B behavior pattern. The more easily administered and scored JAS was chosen over the SI to measure Type A behavior pattern in this study. Modifications were made to the questionnaire following Krantz, Glass, and Snyder (1974) and Glass (1977) to make it more appropriate for use with a university student population. These modifications involved revising or eliminating items referring to income, job involvement, and job responsibility. Eight items were determined to be entirely job referenced and were eliminated,

resulting in a 44 item questionnaire (pages C-2 to C5, Appendix C). Following Glass, certain word changes were made to make questions more relevant to student activities than employee activities. However, in this case, the essential wording of the item was maintained, whereas Glass often made complete changes in sentences. Nonetheless, the resulting questionnaire was essentially the same as that used by Glass.

These modifications resulted in the elimination of the Job-Involvement scale, while the Type A scale, Speed-and-Impatience scale, and Hard-Driving-and-Competitive scale remained intact. The scoring weights employed were identical to those used with the unmodified version of Form C, and raw scores were converted into standardized scores obtained from tables published in the JAS manual (Jenkins, Zyzanski, & Rosenman, 1979). This enabled comparisons on these three scales to be made between these groups of students and relevant reference groups reported in the JAS manual.

Glass (1977) validated the modified JAS for students and established the construct validity for Type A behavioral characteristics. MacDougall, Demproski, and Musante (1979) found a weak correlation between classifications made using both the student JAS and the SI with male and female university students; however, the authors observe that such low correlation has also been observed between the adult JAS and the SI and should not be attributed to the slight changes in some items on the student version. Wolf and Kissling (1983) observed a test-retest correlation coefficient of .61 for this instrument for a nine-

month interval. Factor analytic studies of the student JAS show that the Type A scale has good internal consistency (DeGregorio & Carver, 1980).

Results

Different analyses were used to evaluate each of the three primary questions of this research. The first question, that of the degree to which university students report Type A behavior, was examined through comparisons of the data obtained in this study to data published for the normative WCGS and relevant occupational groups. The second question, whether university students' JAS scores vary according to their program, level of study, or gender, was examined through Analysis of Variance. The third question, whether university students' JAS scores were significantly related to any demographic variables, was examined by stepwise multiple regression analysis. All data analyses were conducted using programs from the SPSS^X computer package (SPSS, Inc., 1983).

In the analyses, each of the three scales of the JAS (Type A, Speed-and-Impatience, and Hard-Driving-and-Competitive) was analyzed by a univariate analysis. While some researchers (Ditto, 1982; Waldron et al., 1977) have felt it appropriate to analyze the scales of the JAS simultaneously with a multivariate analysis, there is some concern that such analysis of these scales may be confounded since some survey items are common to two or more of the scales (J. Enns, personal communication, July 3, 1984).

The results are presented according to each of the three research questions.

Question 1. The Degree of Type A Behavior Reported by Students.

The first research question addressed was the degree to which the

JAS scores of the students in this study were comparable to those of the normative WCGS and relevant occupational groups. The students' JAS raw scores were converted to standardized scores following procedures published in the JAS manual (Jenkins, Zyzanski, & Rosenman, 1979). This made it possible to compare standard score means of the university student sample to the standard score means and corresponding percentile ranks of the normative WCGS.

Each JAS scale of the normative WCGS has a standard score mean of 0.0 and a standard deviation of 10.0. There is no absolute score which indicates an individual is Type A or Type B. Positive scores indicate more Type A behavior or more of the characteristics described by the particular scale. Negative scores indicate Type B behavior or less of the scale characteristics. A score of 0.0 relates to the mean of the WCGS, equivalent to the 50th percentile, and is not an absence of Type A characteristics. Scores close to 0.0 are in an indeterminate range and difficult to classify as Type A or Type B.

The Type A standard score mean for this university sample was 1.03 (55th percentile), with a standard deviation of 9.17, indicating that these students as a group report a level of Type A behavior comparable to that of the normative group. The standard score mean for the Speed-and-Impatience scale (S-scale) for the university students was -1.49 (45th percentile), with a standard deviation of 9.14, again comparable to the normative group. The standard score mean of the Hard-Driving-and-Competitive scale (H-scale) of -5.80 (SD = 9.31) for the university students represents the 35th percentile, 15 percentile points below the normative groups. Table 3 shows the JAS standard score means and percentile ranks for students by program, level of study, and gender.

Table 3.

JAS Standard Score Means by Program, Level, and Gender

Group	n	Type A		S-Scale		H-Scale	
		mean	percentile	mean	percentile	mean	percentile
All	722	1.03	55	-1.49	45	-5.80	35
Arts	145	0.87	55	-2.22	45	-6.37	30
Science	258	0.28	50	-2.03	45	-5.47	35
Commerce	113	2.83	60	0.68	55	-5.95	30
Engineering	206	1.11	55	-1.50	45	-5.74	35
1st Year	305	-0.29	40	-2.83	45	-7.30	25
4th/Honors	132	0.87	55	-1.04	50	-6.52	30
Graduate	156	2.74	60	0.19	55	-3.13	40
Professional	129	2.27	55	-0.84	50	-4.76	35
Male	471	0.69	50	-1.31	50	-5.91	30
Female	251	1.67	55	-1.84	45	-5.60	35

Table 4 shows the JAS standard score means for each cell in this study.

Jenkins, Zyzanski, and Rosenman (1979) recommend that JAS scores for an individual are best interpreted in relation to the mean for a sample in the same or similar occupation. At present there are no norms available for the university student population. The JAS manual does list standard score means for various occupational samples which were assessed by a JAS form comparable to the one used in this study.

Therefore, the means for subgroups within the university sample were compared to the published means for occupational samples related to the students' fields of study. For example, law students are compared with lawyers, medical students with physicians, and MBA students with WCGS managers. These comparisons are informal because there is insufficient information available about the data to apply formal statistical tests to the samples from different populations. Table 5 shows JAS standard score means and percentile ranks for published samples whose occupation is related to the field of study of some of the student subgroups:

Comparisons of the student subgroups to occupationally-related samples showed Dalhousie graduate students scoring five percentile points above faculty from an Oklahoma university on the Type A scale and S-scale, but 25 percentile points below on the H-scale. Law students and medical students scored 10 percentile points below practicing lawyers and physicians respectively on the Type A scale and S-scale, and 30 percentile points below these samples on the H-scale. Commerce students scored higher than managers and professional staff of an automobile manufacturing company in Detroit (10 percentile points for Type A scale and five percentile points for S-scale), but they scored lower than WCGS sales staff (five percentile points for Type A scale

Table 4

JAS Standard Score Means by Program, Level, and Gender for all ThreeScales

	Male				Female			
	1st	4th/H	GS	PS	1st	4th/H	GS	PS
Arts								
<u>n</u>	16	12	20	21	42	6	5	23
A	-3.36	-4.72	0.34	3.32	-0.72	5.20	13.26	4.05
S	-5.43	-4.17	-3.10	0.63	-4.00	-1.28	6.20	0.34
H	-8.72	-12.13	-3.57	-4.73	-8.86	-3.03	5.50	-4.57
Science								
<u>n</u>	36	14	38	54	60	11	14	31
A	-2.90	-0.38	-0.39	1.39	-0.25	-1.22	6.77	1.75
S	-4.45	-3.59	-0.96	-0.72	-2.70	-1.54	2.31	-2.93
H	-9.40	-6.81	-2.77	-4.31	-5.81	-7.01	-2.56	-5.73
Commerce								
<u>n</u>	22	24	28		17	18	41	
A	2.06	3.82	5.03		-0.26	1.57	4.55	
S	1.31	2.34	2.47		-2.86	-1.94	1.42	
H	-8.75	-3.20	-4.99		-6.79	-6.56	-7.53	

Table Continued

Table 4 Continued.

	Male				Female			
	1st	4th/H	GS	PS	1st	4th/H	GS	PS
Engineering								
<u>n</u>	99	43	44		13	4	3	
A	0.23	0.99	1.51		3.90	-0.68	16.37	
S	-2.41	-0.82	-0.61		-2.06	0.22	5.60	
H	-6.93	-6.90	-3.74		-2.57	-8.27	10.57	
Total								
<u>n</u>	173	93	130	75	132	39	26	54
A	-0.52	0.78	1.53	1.93	0.00	1.11	8.78	2.73
S	-2.64	-0.85	-0.43	-0.34	-3.07	-1.50	3.30	-1.54
H	-7.84	-6.61	-3.70	-4.42	-6.59	-6.32	-0.26	-5.24

Note. 1st = 1st year; 4th/H = 4th/Honors year; GS = graduate study;
 PS = professional study; A = Type A scale; S = Speed-and-Impatience scale;
 H = Hard-Driving-and-Competitive scale.

Table 5

JAS Standard Score Means and Percentile Ranks for University Subgroups
and Occupational Samples Related to their Field of Study

Group	<u>n</u>	Scale	<u>M</u>	<u>SD</u>	Percentile
Oklahoma University Faculty	109	A	1.9	8.8	55
		S	-0.4	9.5	50
		H	2.2	8.1	65
Dalhousie Graduate Students	113	A	2.74	10.01	60
		S	0.19	9.95	55
		H	-3.13	9.61	40
Virginia Law Firm Attorneys	57	A	5.9	8.1	70
		S	3.8	8.3	65
		H	4.7	9.6	70
Dalhousie Law Students	44	A	3.70	8.78	60
		S	0.48	8.89	55
		H	-4.65	7.92	40
California Physicians	51	A	5.4	8.8	65
		S	4.4	9.9	70
		H	2.0	10.4	60
Dalhousie Medical Students	85	A	1.52	8.41	55
		S	-1.53	8.36	60
		H	-4.83	9.53	35
Managers/ Prof. Staff Detroit Auto Manufacturers	180	A	0.3	9.6	50
		S	-0.8	9.5	50
		H	1.9	9.5	60
WCGS Sales Staff	31	A	4.4	11.0	65
		S	3.2	11.5	65
		H	3.9	8.9	65
Dalhousie Commerce Students	113	A	2.83	8.60	60
		S	.68	9.71	55
		H	-5.95	9.91	30

Table Continued ...

Table 5. Continued.

Group	<u>n</u>	Scale	<u>M</u>	<u>SD</u>	Percentile
WCGS Managerial Employees	1195	A	1.9	9.9	55
		S	1.1	10.0	55
		H	1.0	9.9	60
Dalhousie MBA Students	32	A	4.97	7.89	65
		S	2.34	9.30	60
		H	-5.31	8.97	35

Note. A = Type-A scale; S = Speed-and-Impatience scale; H = Hard-Driving-and-Competitive scale.

and 10 percentile points for S-scale). MBA students scored 25-35 percentile points below their reference groups on the H-scale.

Question 2. JAS Differences Due to Program, Level of Study, or Gender

The second research question addressed was the extent to which the JAS scores of the sampled university students vary according to (1) the program in which they are enrolled, (2) the level at which they are studying, and (3) the gender of the student. Not all of the programs examined in this study could be related to a professional school, e.g., Commerce and Engineering; therefore, two separate Analyses of Variance using independent groups and no repeated measures were performed. Both analyses were carried out through the ANOVA program of the SPSS^X computer package (SPSS, Inc., 1983). The design of the first Analysis of Variance was 4x3x2, with program levels selected as Arts, Science, Commerce, and Engineering; levels of study selected as 1st year, 4th/honors year, and graduate study; and gender equal to male and female. Figure 1 shows the mean JAS scores for the groups included in this analysis. The design of the second Analysis of Variance was 2x4x2, with program levels limited to Arts and Science; levels of study equal to 1st year, 4th/honors year, graduate study, and, additionally, professional study; and gender equal to male and female. Figure 2 shows the mean JAS scores for the groups included in this analysis. Post-hoc protected t-tests, using the error term from the Analysis of Variance, were conducted to determine significant differences among factor levels. Summary tables for both analyses appear in Appendix E.

The first analysis showed significant main effects ($p < .01$) for all three factors on the Type A scale. Post-hoc comparisons confirmed that

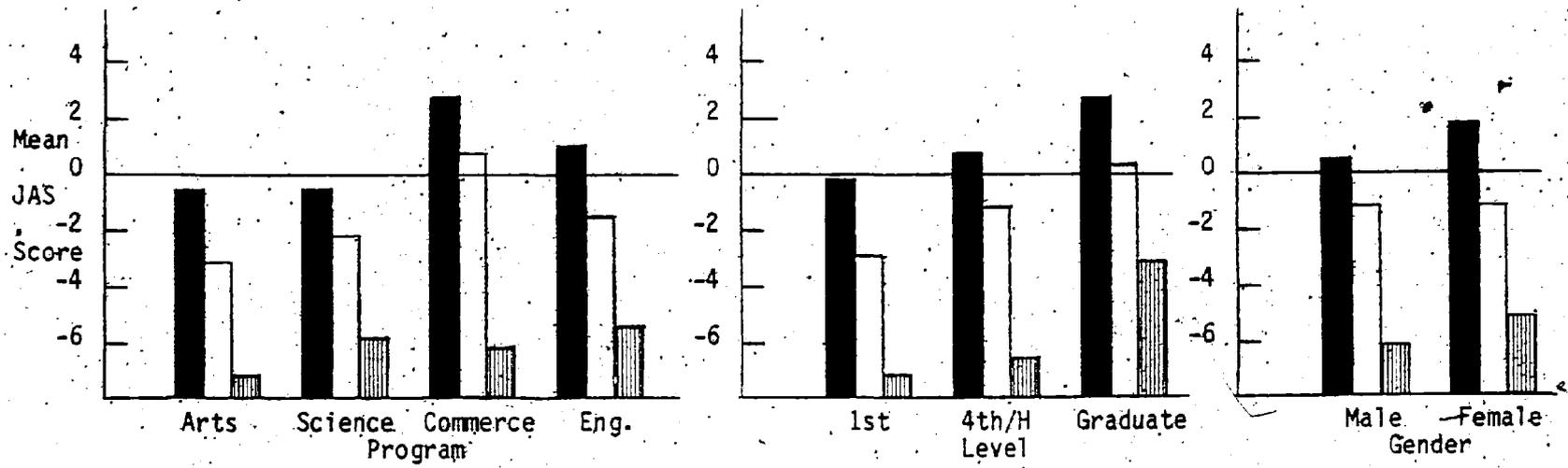


Figure 1. Mean JAS Scores for all Four Programmes by Level and Gender

Note: The mean score for the normative WCGS was 0.0 on all three scales.

- Type A Scale
 - Speed-and-Impatient Scale
 - Hard-Driving-and Competitive Scale

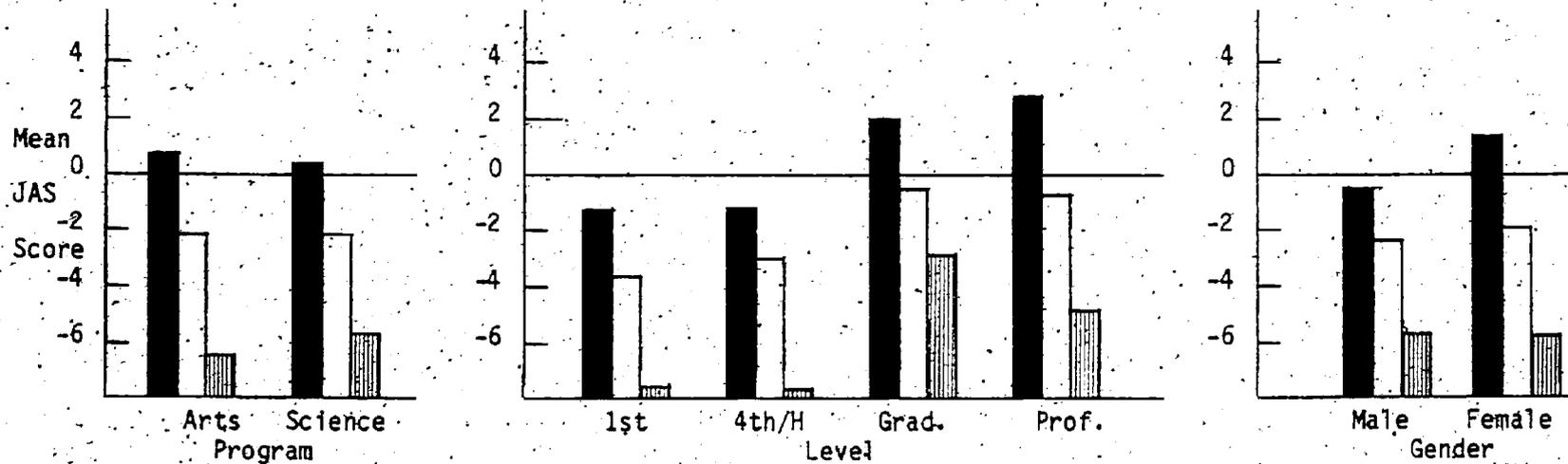


Figure 2. Mean JAS Scores for Arts and Science Students by Level and Gender

Note: The mean score for the normative WCGS was 0.0 on all three scales.

- Type A Scale
 - Speed-and-Impatient Scale
 - Hard-Driving-and Competitive Scale

Commerce students scored significantly higher on the Type A scale than did students in Arts ($t(569) = 3.657, p < .002$), Science ($t(569) = 4.102, p < .002$), and Engineering ($t(569) = 2.299, p < .05$). Engineering students also scored significantly higher than Science students ($t(569) = 2.201, p < .05$) and Arts students ($t(569) = 1.907, p < .10$). Graduate level students scored significantly higher than both 1st year students ($t(569) = 4.818, p < .002$) and 4th/honors level students ($t(569) = 2.475, p < .02$). Type A scores for female students were significantly higher than males' scores ($F(1,569) = 8.645, p < .01$).

A similar pattern was observed in post-hoc comparisons for the S-scale. Again Commerce students scored significantly higher than students in Arts ($t(569) = 4.593, p < .002$); Science ($t(569) = 3.759, p < .002$), and Engineering ($t(569) = 2.871, p < .01$), while graduate students scored higher than 1st year students ($t(569) = 4.729, p < .002$). On this scale, 4th/honors students also scored significantly higher than 1st year students ($t(569) = 2.648, p < .01$), but there was no difference between means for 4th/honors students and graduate students. The main effect for gender was not significant for the S-scale.

For the H-scale, significant main effects were found for level of study ($p < .001$) and gender ($p < .05$). Graduate students once again scored significantly higher than 1st year students ($t(569) = 6.558, p < .002$) and 4th/honors students ($t(569) = 4.436, p < .002$), although it should be remembered that all groups of students scored substantially lower on this scale than the normative mean of 0.0. Female students scored significantly higher than male students on the H-scale.

Analysis of the Type A scale scores revealed two significant

interactions. The first was a disordinal interaction of program x gender ($F(3,569) = 2.882, p < .05$), shown in Figure 3. Post-hoc comparisons indicated significantly higher mean Type A scores for male Commerce students ($p < .002$) than for males registered in Arts, Science, or Engineering. Male Engineering students also scored significantly higher ($p < .01$) than males in Arts and Science. For females, Engineering students scored significantly higher ($p < .05$) than those registered in the other three programs. Female Arts, Science, and Engineering students scored significantly higher ($p < .05$) than their male counterparts, while this relationship was reversed for Commerce students.

Figure 4 shows an ordinal interaction of level x gender ($F(2,569) = 3.937, p < .05$) on the Type A scale. Mean Type A scores for graduate level female students were significantly higher ($p < .002$) than those of both lower level female students and all three levels of male students.

The second analysis showed that when program was limited to Arts and Science, this factor was no longer significant. Type A scores were significantly different for level of study ($F(3,387) = 6.935, p < .002$). Post-hoc comparisons showed that graduate students and professional students scored significantly higher on the Type A scale than did 1st year students ($t(387) = 3.737, p < .002$, and $t(387) = 4.740, p < .002$, respectively) and 4th/honors level students ($t(387) = 2.5, p < .02$ and $t(387) = 2.953, p < .01$, respectively). Also, females exhibited higher Type A scores than males ($F(1,387) = 9.920, p < .002$).

The main effect of level of study was also significant for the S-scale ($F(3,387) = 4.153, p < .01$) and the H-scale ($F(3,387) = 7.615, p < .001$). For the S-scale both graduate and professional level students scored

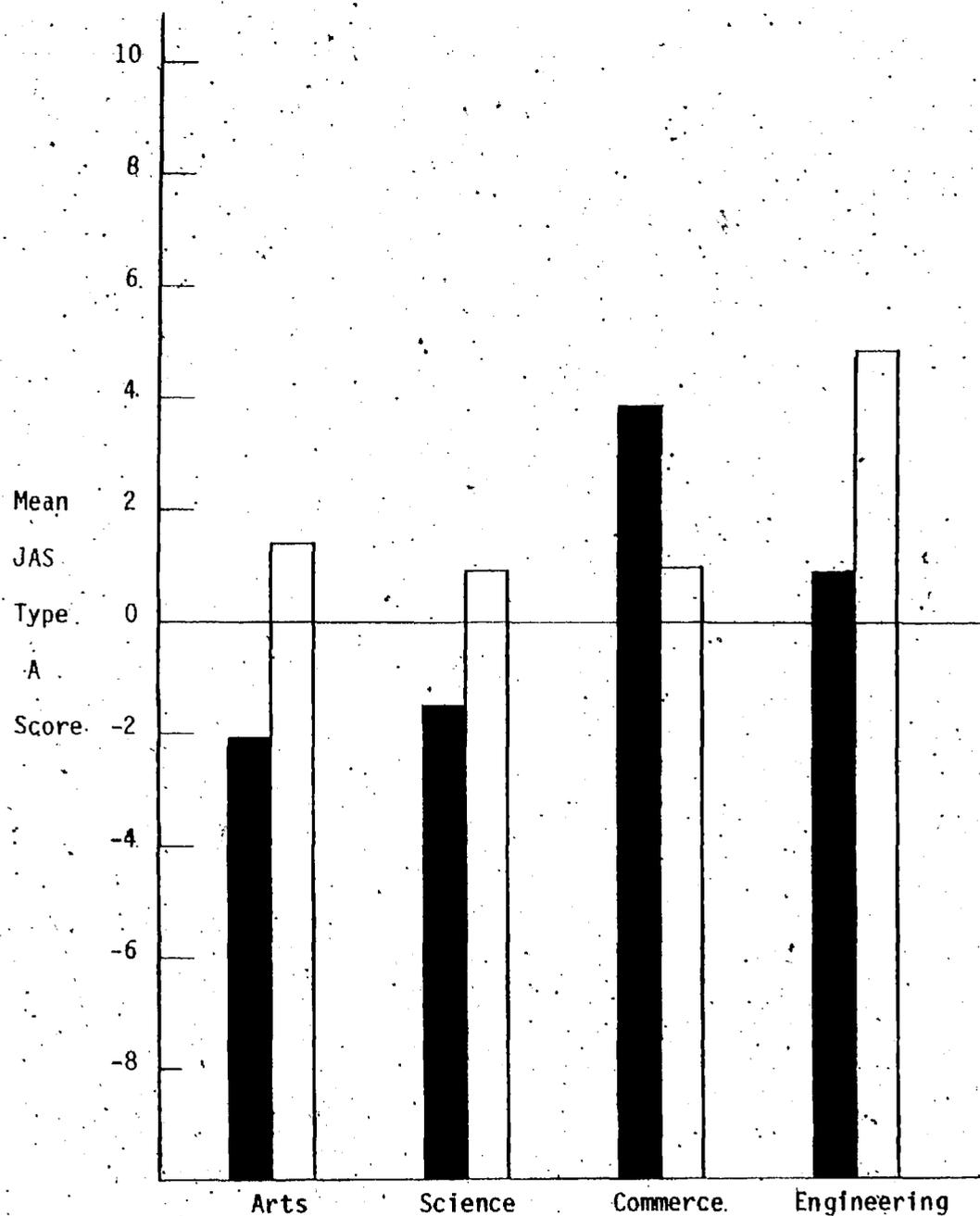
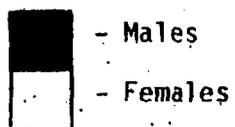


Figure 3. Program x Gender Interaction - Type A Scale

Note: The mean Type A score for the normative WCGS is 0.0



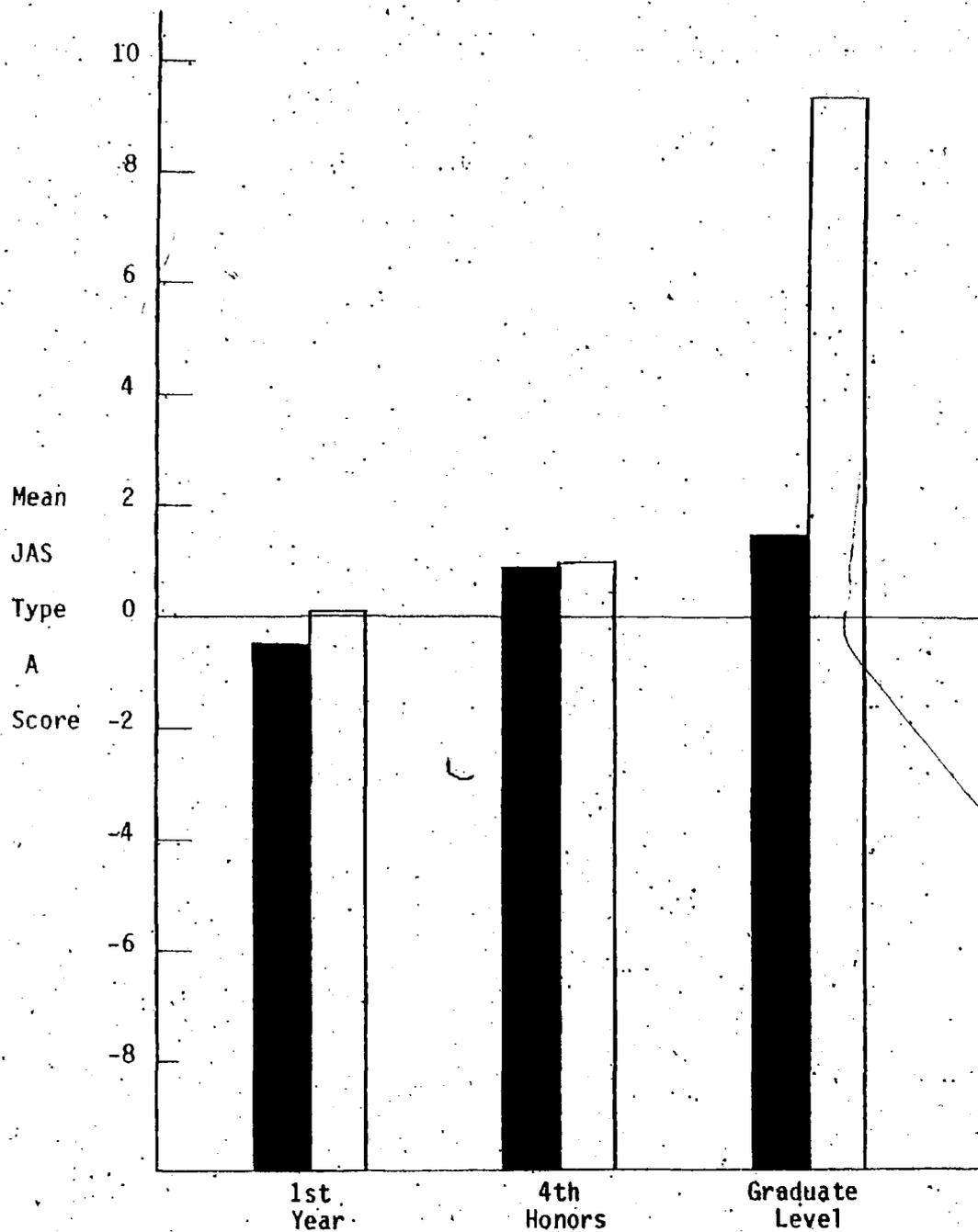


Figure 4. Level x Gender Interaction - Type A Scale

Note: The mean Type A score for the normative WCGS is 0.0

-  - Males
-  - Females

higher than 1st year students ($t(387) = 3.762, p < .002$ and $t(387) = 3.879, p < .002$, respectively). For the H-scale, graduate students scored significantly higher than students in 1st year ($t(387) = 5.899, p < .002$), 4th/honors year ($t(387) = 4.357, p < .002$), and professional study ($t(387) = 2.508, p < .02$). Professional students also scored higher than students in 1st year ($t(387) = 3.872, p < .002$) and 4th/honors year ($t(387) = 2.659, p < .01$).

Analysis of the Type A scale revealed an ordinal interaction of level x gender ($F(3,387) = 2.902, p < .05$), shown in Figure 5. Mean Type A scores for graduate level females were significantly higher ($p < .002$) than those of all male students and other levels of female students.

Question 3. Predictors of Type A Behavior

The third research question addressed was whether the JAS scores of sampled university students were significantly related to any of the demographic variables which had been collected. A stepwise multiple regression analysis was conducted using the STEPWISE procedure of the REGRESSION program of the computer package SPSS^X (SPSS, Inc., 1983). In this procedure variables are entered and removed from the regression equation according to statistical criteria which involve the amount of variability accounted for by each predictor variable.

The variables examined for entry into the multiple regression equation were age, gender, program of study, year of study, nationality (Canadian, non-Canadian), childhood residence (city, town, rural), employment status, father's occupational status, mother's occupational status, occupational status of own goal, and means of paying for

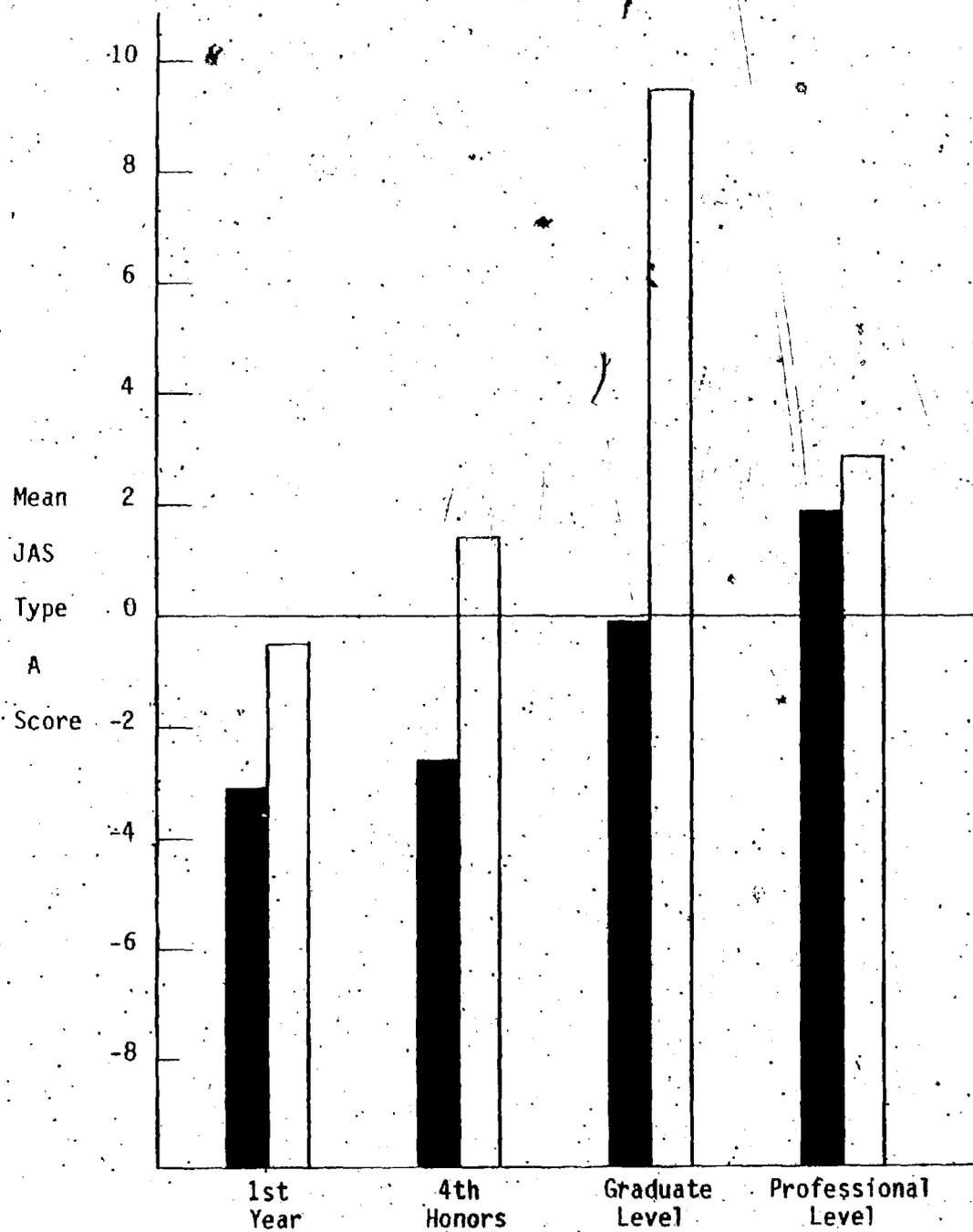
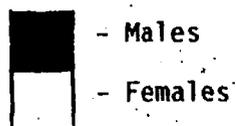


Figure 5. Level x Gender Interaction - Type A Scale

Note: The mean Type A score for the normative WCGS is 0.0.



education (scholarship, loan, job, bursary, savings, parents).

Occupational status was coded according to the class intervals of the socio-economic index for occupations in Canada published by Blishen and McRoberts (1976)....

The results of this procedure showed no predictor variables qualifying for entry into the equation for the Type A scale and H-scale (PIN = 0.05, POUT = 0.1, and TOLERANCE = 0.01). One predictor variable--mother's occupational status--entered the equation for the S-scale; however, this variable accounted for only three per cent of the variance (adjusted $R^2 = .033$, $F(1,204) = 7.925$, $p < .01$).

Discussion

The results of this study have indicated that university students score similarly to the normative WCGS and relevant occupational groups on the JAS Type A scale and S-scale, but not on the H-scale. In this study, Commerce students obtained the highest JAS scores, followed by Engineering students. In general, JAS scores increased as students advanced from 1st year to graduate and professional study. Female students scored higher than male students in all programs but Commerce. Demographic variables did not significantly relate to students' JAS scores.

These results will be discussed as they relate to the three questions addressed by this study. This discussion will be followed by an examination of the limitations of the study and a discussion of its implications for future research.

Question 1. The Degree of Type A Behavior Reported by Students

The first research question in this study was the degree to which the JAS scores of these university students were comparable to those of the normative WCGS and relevant occupational groups. The results of this study show that as a group the university students scored similar to the WCGS sample on the Type A scale and S-scale, but averaged 15 percentile points below that sample on the H-scale.

The comparison of university subgroups to relevant occupational groups yielded varied results. On the Type A scale and S-scale, the university students scored within ten percentile points of their reference groups. University graduate students, Commerce students,

and MBA students scored higher than their reference groups, while Law and Medical students scored lower than practicing lawyers and physicians. On the H-scale, all student groups were 25 to 35 percentile points lower than their reference groups.

Interpretation of these comparisons of university student subgroups to relevant occupational samples must be limited because of the imprecise match of the groups. Students' specializations or choice of employment settings were unknown. Students in Canadian universities were being compared to American employees who function under different business, educational, and medical systems. For example, the Canadian socialized medical system may attract and develop a different kind of individual than does the private American system. Also, the students have not yet been exposed to the environmental influences of the workplace.

Unfortunately, it was not possible to compare this sample to previous Type A studies involving university students (Ditto, 1982; Glass, 1977; Krantz, Glass, & Snyder, 1974; Ovcharchyn, Johnson, & Petzel, 1981; Palladino & Tryon, 1980; Waldron et al., 1980; Wolf & Kissling, 1983) because the methods of scoring and reporting JAS scores in those studies were not as precise as those used in this study. Previous to the present study, two methods were typically used to report JAS scores. The first method simply correlated predictor variables with Type A scores, but did not specify the mean or standard deviation for the sample. The second classified students as Type A or B according to the median split of the sample distribution of JAS scores. With this procedure the median score may in fact lie within the Type B range, as was the case for the study conducted by Ditto (1982), but this was not usually reported. What these studies did report is that students

who scored higher on the JAS scales actually demonstrated behaviors consistent with the theme of the scales, while those who scored lower demonstrated fewer of those behaviors.

The consistently low H-scale scores in this sample are supported by the findings of Waldron et al. (1977) who reported lower H-scale scores for younger subjects and an inverse relationship between H-scale scores and education. However, this discrepancy between the Type A, S-scale, and H-scale means is not evident in the samples reported in the JAS manual (Jenkins, Zyzanski, & Rosenman, 1979). Further studies should be conducted to determine if this finding might be related to cultural factors characteristic of Canada or the Maritime region of Canada, or if it is specific to the students attending the universities in this sample.

Question 2. JAS Differences Due to Program, Level of Study, or Gender

The second research question in this study addressed the extent to which the JAS scores of these university students vary according to the program in which they are enrolled, the level at which they are studying, or the gender of the student. The results of this study indicate higher Type A scale scores for Commerce and Engineering students than for Arts and Science students. Graduate level and professional students had higher Type A scale scores than 1st or 4th/honors level students. And, the most surprising finding of the study, female students had higher Type A scale scores than male students. This finding was consistent across programs and levels with the exception of the MBA program. S-scale results followed the pattern of the Type A scale for program and level, while H-scale scores were significantly higher only

for graduate level and professional students.

Early studies of the Type A behavior pattern such as the WCGS were conducted primarily with white-collar businessmen because that was the population experiencing a large proportion of CHD and a relationship was hypothesized between the stress of business management and Type A (Friedman & Rosenman, 1974). In the WCGS, managerial and sales staff scored higher on the JAS than did professional/technical staff, clerical staff, foremen, and skilled/unskilled laborers respectively (Jenkins, Zyzanski, & Rosenman, 1979). In the present study, the higher Type A mean scores for Commerce students, particularly males, indicates that for this population, the behavior pattern is already evident before the students move into the university or the workforce. This was true even for 1st year students who had only briefly been exposed to the stress of university coursework. This finding raises two important questions: (1) To what extent do Type A individuals actively choose occupations known to reinforce their behavior pattern, and (2) to what extent is the behavior pattern shaped by environmental contingencies. These questions should be the focus of subsequent study. The results of the ongoing Health in Youth Project at Stanford University (Thoresen, Eagleston, & Kirmil-Gray, 1982) which is studying chronic stress, including Type A behavior, in grade 5, 7, and 9 children to determine how stress affects their health, academic, social, and personal functioning should be of interest in this context.

The high Type A scale mean for Engineering students seems to be skewed by the extremely high scores of the few female students; however, male Engineering students did score significantly higher than male Arts and Science students. The proportion of 90% male and 10% female

Engineering students in this study reflects the enrollment figures at TUNS of 88% males and 12% females. There are only six females enrolled in the graduate program at TUNS, three of whom are included in the sample.

The mean Type A, S-scale, and H-scale scores for female graduate students in the Arts program are also substantially higher than those of their male counterparts. Again the number of female students in that cell is small ($n = 5$). The proportion of male and female graduate Arts students in this sample was 80% male and 20% female; the estimated proportion of male and female graduate students for all faculties at Dalhousie University is 62% male and 38% female.

This discrepancy between mean scores for male and female students does not hold for professional students in Law and Medicine, where there has been a long-standing mandate to include more female students in these programs. This raises the question of whether female students in Arts and Engineering must exhibit greater achievement-oriented, hard-driving behavior in order to be admitted to the male-dominated graduate programs. Waldron et al. (1980) found that JAS scores for female students increased over the school term while those of male students did not. She attributed this finding to higher career aspirations reported by the females.

The literature would lead one to expect no difference between male and female JAS scores in this educationally matched sample. The finding that females consistently had higher JAS scores than males, except for the MBA program, is interesting and in need of replication. The saying that a woman needs to be "twice as good" as a man to achieve entrance and success in male-dominated fields may be reflected here. Females scored dramatically higher in Engineering and graduate study, which have

traditionally been male domains. Enrollment figures in these groups show these women to be a very select group. These results suggest that these non-traditional female students may have special needs which might be addressed by a program designed specifically for them.

The significantly higher JAS scores for graduate and professional students in this study are consistent with the literature which has shown a positive correlation between JAS scores and educational level in adults, and between JAS scores and career aspirations in university students. Sixty percent of Type A students surveyed by Glass (1977) said they would go on to graduate or professional study after graduation, while 70% of the Type B students said they intended to get a job.

Question 3. Predictors of Type A Behavior

The third research question in this study addressed the extent to which students' JAS scores were significantly related to demographic variables. The results of the study indicated that none of the variables examined accounted for a significant portion of the variance.

This finding is difficult to interpret; however, speculation leads to three factors which might have influenced the results. The first of these is the homogeneous nature of the sample. University students represent a small portion of the general population, with graduate and professional students an even more select group. This sample of students was homogeneous in age, general academic interest, and socio-economic background. In the sample, 55% of the students came from families where the father was employed in one of the top two socio-economic categories designated by Blishen and McRoberts (1976) which represent managerial and professional employment.

The second factor which may have influenced these results is the precision and relevance of the variables examined. Variables such as whether an individual grew up in the city or the country may not be as relevant as they once were because of the influence of mass media. Information on financial resources was collected as an indicator of socio-economic status; however, the results did not seem to reflect that variable.

The third factor influencing these results may be that overall cultural variables may be more important in the development of Type A behavior than individual demographic variables. Roskies (1980) has contrasted the extreme competitiveness fostered in the North American work environment with the lack of individual competition in the Japanese system, even though Japan is equally industrialized and productive. Studies of the relationship between Type A behavior and social/environmental factors should be undertaken.

Limitations of the Present Study

This study clearly does not reflect a random sample. While the return rate from students contacted by mail was high, there is no way to determine what difference there may be between those who replied and those who did not. If anything, the literature would imply that strongly Type A students would be too busy, impatient, or hostile to reply. If that were true, the results for honors and graduate students in this study would be especially conservative.

The wide variation in cell size, with the most dramatic results being in groups with a small n , make the results difficult to interpret. Unfortunately, enrollment data broken down by gender was not available

for all groups. The data that was available showed the sample proportion of males and females similar to the enrollment proportion for the universities.

The use of the JAS to assess Type A behavior, while convenient and efficient, presents several concerns. Most serious of these is whether this instrument is valid for unemployed students, young people, and women. While the JAS is frequently modified for use with these populations, it is questionable whether these modified instruments yield results that can be compared with results for adult men. While the modifications to the JAS in this study were consistent with those suggested in the literature, it may be more valid to employ the JAS form that has recently been developed by Jenkins for use with unemployed persons. Normative data is not yet available for the form. Prospective studies will need to be conducted in order to confirm a relationship between high JAS scores in this population and CHD.

The purpose of this study was to describe a particular population of students and there is no basis for generalizing these results to university students in general. The sample reflects students from one area of Canada which is known to have a distinct culture; therefore, caution should be taken in relating these results to the American studies reviewed in the literature.

Implications of the Present Study

The purpose of this study was to describe the occurrence and distribution of the Type A behavior pattern in the Dalhousie University and TUNS student populations. It was hoped that this information would be useful in determining the need for preventative programs and in

identifying appropriate target groups for such programs. The results of the study indicate that sufficient numbers of students are reporting Type A behaviors to merit the development of such programs. While it is assumed that individual students reporting extremely high JAS scores are at risk for early CHD, longitudinal studies following these students for an extended time are required to verify this prediction.

The study identifies four groups of students who report significantly higher levels of Type A behavior than other students. These are Commerce students, female students, graduate students, and professional students. The high Type A scale scores for Commerce students across levels indicate that these students may be entering university with an already developed pattern of Type A behavior; however, this study does not provide sufficient information to address that hypothesis for all faculties. A prospective study where students are reassessed as they progress through university is required to examine this question. The results of such a study could help to determine the degree to which Type A students are actually selecting themselves into particular programs, i.e., whether certain programs are attracting a concentration of Type A students.

The higher JAS scores for female students is an interesting finding which requires replication. Whether the explanation for this finding lies in self-selection, environmental shaping, or some interaction of the two may be difficult to determine. Waldron et al. (1980) have reported higher career aspirations and higher JAS scores for 1st year female students than for males, reflecting a recent cultural change. In the present study, females who had gained access to the non-traditional fields of Engineering and graduate study reported the most elevated JAS scores, including the only positive H-scale scores for the sample. Women in

non-traditional fields of study should be examined to determine how extensive this finding is. The fact that women in affirmative action programs such as law and medicine did not report higher JAS scores than males in those programs may have implications for admission policies in non-traditional fields of study.

Higher Type A scores for graduate and professional students raise the question of the relationship (real or imagined) between Type A behavior and academic success in university. It will be difficult to influence students to change behaviors, however unhealthy, which lead to perceived success despite the long-term risk of early CHD. An examination of the actual behaviors which relate to academic success should be made. The results of such a study may influence program structure and policies in the university.

Two factors which have been highlighted in this discussion--high levels of Type A behavior in entering students and a perceived relationship between Type A behavior and academic success--have implications for the type of intervention programs which are likely to be effective with high risk students. It would seem that programs focusing on stress or time management alone may not be sufficient for these groups of students. Thoresen, Friedman, Gill and Ulmer (1982) have reported a Type A treatment program which has shown particular promise with post-coronary patients. This program, based on cognitive-social learning theory, emphasizes the importance of altering personal meanings and beliefs in order to change Type A behavior. A relevant focus of future research would be the relative efficacy of educational, stress management, and cognitive-social learning treatment groups for students with high levels of Type A behavior.

Summary

This study examined the occurrence and distribution of the Type A behavior pattern in students at two Maritime Universities. The results showed that the students as a group were reporting Type A behavior as measured by the JAS at a level comparable to the normative WCGS sample. When compared to relevant occupational samples, graduate students and Commerce students scored higher than a sample of university faculty and businessmen respectively, while law students and medical students scored lower than practicing lawyers and physicians. H-Scale scores were consistently lower than the normative mean for all student groups.

Four subgroups of students scored higher on the JAS than other students and, consequently, may be appropriate targets for preventative programs. Of the programs examined, Commerce students obtained the highest JAS scores. Higher JAS scores were also obtained by students who had advanced to graduate and professional study. An unexpected finding was that female students scored higher than male students in all programs but Commerce. This result was particularly significant for women in the non-traditional areas of Engineering and graduate study. Demographic variables did not significantly relate to the students' JAS scores.

Replication studies should be conducted in other areas of Canada and the the U.S., to determine whether these findings are unique to the Maritime region. Subsequent study should also focus on two questions: (1) To what extent do Type A individuals actively choose occupations known to reinforce their behavior pattern, and (2) to what extent is the behavior pattern shaped by environmental contingencies. Answers

to these questions may have implications for both university admission policies and selection of Type A treatment strategies. The dramatically high scores for females in non-traditional, competitive fields should be examined further to determine if women entering these fields are at increased risk and in need of special preventative programs.

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Appendix A

Structured Interview Protocol

"I would appreciate it if you would answer the following questions to the best of your ability. Your answers will be kept in the strictest confidence. Most of the questions are concerned with your superficial habits and none of them will embarrass you." (Begin taping now.)

Your code number is (state subject's code number).

1. May I ask your age?
2. What is your job here at (state company name)?
 - (a) How long have you been in this type of work?
- + 3. Are you SATISFIED with your job level?
 - (a) Why? Why not?
- + 4. Does your job carry HEAVY responsibility?
 - (a) Is there any time when you feel particularly RUSHED or under PRESSURE?
 - (b) When you are under PRESSURE does it bother you?
- + 5. Would you describe yourself as a HARD-DRIVING, AMBITIOUS type of person in accomplishing the things you want, OR would you describe yourself as relatively RELAXED and EASY-GOING person?
 - (a) Are you married?
 - (b) (If married) How would your WIFE describe you in those terms - as HARD-DRIVING and AMBITIOUS or as relaxed and easy-going?
 - (c) Has she ever asked you to slow down in your work? Speed up?
 - (d) (If no) NEVER?

- (e) How would SHE put it in HER OWN words?
- (f) Do you like to get things done as QUICKLY as possible?
- + 6. When you get ANGRY or UPSET, do people around you know about it?
 - (a) How do you show it?
 - (b) Do you ever pound on your desk? Slam a door? Throw things?
- + 7. Do you think you drive HARDER to ACCOMPLISH things than most of your associates?
- 8. Do you take work home with you?
 - (a) How often?
 - (b) Do you really do it?
- 9. Do you have children? (If no children) (Have you ever played with small children?) With your children, when they were around the ages of 6 and 8, did you EVER play competitive games with them, like cards, checkers, Monopoly?
 - (a) Did you ALWAYS allow them to WIN on PURPOSE?
 - (b) Why or why not?
- 10. When you play games with people YOUR OWN age, do you play for the FUN of it, or are you really in there to WIN!
- 11. Is there any COMPETITION in your job?
 - (a) Do you enjoy it?
- * 12. When you are in your automobile, and there is a car in your lane going FAR TOO SLOWLY for you, what do you do about it?
 - (a) Would you MUTTER and COMPLAIN to yourself? Honk your horn? Flash your lights?
 - (b) Would anyone riding with you know you were ANNOYED?
- 13. 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-get-up?

14. If you make a DATE with someone for, oh, two o'clock in the afternoon, would you BE THERE ON TIME?
- (a) Always? Never?
 - (b) If you are kept waiting, do you RESENT it?
 - (c) Would you SAY anything about it?
 - (d) Why or why not?
15. If you see someone doing a job rather SLOWLY and you KNOW that you could do it faster and better yourself, does it make you RESTLESS to watch him?
- (a) Would you be tempted to STEP IN AND DO IT yourself?
 - (b) Have you ever done that?
 - (c) What would you do if someone did that to you?
16. Do you OFTEN do two things at THE SAME TIME - like reading while watching TV, shaving while taking a shower, writing or reading while talking on the telephone?
- (a) Never? Always?
17. Do you OFTEN find that while you are listening to ONE thing you are also THINKING about something ELSE?
- (a) Never? Always?
18. What IRRITATES you most about your work, or the people with whom you work?
- (a) Why is this so bad?
19. Do you EAT rapidly? Do you WALK RAPIDLY? After you've FINISHED eating, do you like to sit around the table and chat, or do you like to GET UP AND GET GOING?
- * 20. When you go out in the evening to a restaurant and you find eight or ten people WAITING AHEAD OF YOU for a table, will you wait?
- (a) Most of the time, how long will you wait?

- (b) What will you do while you are waiting?
- (c) Are you impatient while you are waiting?
21. What would you do if you had made a reservation at a restaurant and upon arriving the hostess tells you that there will be a 20-minute wait?
- (a) What if after waiting 20 minutes the hostess says that it will be another 20 minutes?
22. Would you EVER ask another person in a restaurant to stop smoking?
- (a) What would you say? How would you do it?
- (b) If no, What if your companion asked you to ask a man smoking a cigar to stop? How would you do it?
- (c) If no, Why not?
23. How do you feel about WAITING in lines - bank lines, supermarket lines, post office lines?
- (a) How long would you wait?
- (b) What will you do while you are waiting?
- (c) Are you frustrated while waiting?
- * 24. Do you have the feeling that TIME is passing too RAPIDLY for you to ACCOMPLISH all the things that you THINK you should GET DONE in one day?
- (a) Do you OFTEN feel a sense of TIME URGENCY or TIME PRESSURE?
26. Do you HURRY in doing most things?

That completes the interview. Thank you very much.

Closure: "This completes the interview of Subject (give code numbers)."

+ = interruptions, including "meaningless question"; * = challenges

Note. From "The Type A Structured Interview: A Behavioral Assessment in the Rough" by M.A. Chesney, J.R. Eagleston, and R.H. Rosenman, 1980, Journal of Behavioral Assessment, 2, pp. 264-265.

Appendix B

The copy of the Jenkins Activity Survey referred to in the text of this thesis has been deleted from Appendix B due to copyright restrictions intended to maintain test security.

Appendix C

Please complete the following information. Do not put your name on this questionnaire; all answers will be anonymous and the results used for research purposes only.

1. Age: _____
2. Sex: male _____
female _____
3. Student Status: Full-time (3+ classes) _____
Part-time (1 or 2 classes) _____
Thesis Only _____

4. Circle the programme and year in which you are currently enrolled. Indicate your major where appropriate.

Programme	Year				
Bachelor of Arts (major: _____)	1	2	3	Honours	
Bachelor of Science (major: _____)	1	2	3	Honours	
Bachelor of Commerce	1	2	3	4	
Health Professions (specify: _____)	1	2	3	4	
Engineering	1	2	3	4	
Master of Arts (major: _____)	1	2			
Master of Science (major: _____)	1	2			
Master of Business Administration	1	2			
Doctor of Philosophy (major: _____)	1	2	3	4	5
Medicine	1	2	3	4	
Dentistry	1	2	3	4	
Law	1	2	3		

Other: Please specify: _____

5. Where did you live the majority of the time you were growing up?
a. city _____ town _____ country _____
b. Canada _____ Other: Please specify country _____
6. What was your grade point average your last year in school? _____
7. a. Are you currently employed? Yes _____ No _____
b. If yes, how many hours do you work a week? _____
8. How are you paying for your education?
scholarship _____ loan _____ job _____ bursary _____
savings _____ parents _____ Other: please specify _____
9. Mother's occupation _____
Father's occupation _____
10. What is your occupational goal following graduation from university?
Be specific, e.g., medical doctor, lawyer, personnel director, teacher.
If you don't know yet, write "undecided".
-

JENKINS ACTIVITY SURVEY

FORM C: Modified For University Students

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

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

1. Do you ever have trouble finding time to get your hair cut or styled?
 - A. never
 - B. occasionally
 - C. almost always
2. How often do university courses "stir you into action"?
 - A. less often than most university students
 - B. about average
 - C. more than most university students
3. Is your everyday life filled mostly by:
 - A. problems needing a solution
 - B. challenges needing to be met
 - C. a rather predictable routine of events
 - D. not enough things to keep me interested or busy
4. Some people live a calm, predictable life. Others often find themselves facing unexpected changes, frequent interruptions, inconveniences, or "things going wrong." How often are you faced with these minor (major) annoyances or frustrations?
 - A. several times a day
 - B. about once a day
 - C. a few times a week
 - D. once a week
 - E. once a month or less
5. When you are under pressure or stress, what do you usually do?
 - A. do something about it immediately
 - B. plan carefully before taking any action
6. Ordinarily, how rapidly do you eat?
 - A. I'm usually the first one finished
 - B. I eat a little faster than average
 - C. I eat at about the same speed as most people
 - D. I eat more slowly than most people
7. Has your spouse or a friend ever told you that you eat too fast?
 - A. yes, often
 - B. yes, once or twice
 - C. no, never
8. How often do you find yourself doing more than one thing at a time, such as working while eating, reading while dressing, or figuring out problems while driving?
 - A. I do two things at once whenever practical
 - B. I do this only when I'm short of time
 - C. I rarely or never do more than one thing at a time
9. When you listen to someone talking, and this person takes too long to come to the point, how often do you feel like hurrying the person along?
 - A. frequently
 - B. occasionally
 - C. almost never

Go on to the next page

10. How often do you actually "put words in the person's mouth" in order to speed things up?
 A. frequently
 B. occasionally
 C. almost never
11. If you tell your spouse or friend that you will meet somewhere at a definite time, how often do you arrive late?
 A. once in a while
 B. rarely
 C. I am never late
12. How often do you find yourself hurrying to get places even when there is plenty of time?
 A. frequently
 B. occasionally
 C. almost never
13. Suppose you are to meet someone at a public place (street corner, building lobby, restaurant) and the other person is already late. What will you do?
 A. sit and wait
 B. walk about while waiting
 C. usually carry some reading matter or writing paper so I can get something done while waiting
14. When you have to "wait in line" at a restaurant, a store, or a post office, what do you do?
 A. accept it calmly
 B. feel impatient but not show it
 C. feel so impatient that someone watching can tell I am restless
 D. refuse to wait in line, and find ways to avoid such delays
15. When you play games with young children about 10 years old (or when you did so in past years), how often do you purposely let them win?
 A. most of the time
 B. half the time
 C. only occasionally
 D. never
16. Do most people consider you to be:
 A. definitely hard-driving and competitive
 B. probably hard-driving and competitive
 C. probably more relaxed and easygoing
 D. definitely more relaxed and easygoing
17. Do you consider yourself to be:
 A. definitely hard-driving and competitive
 B. probably hard-driving and competitive
 C. probably more relaxed and easygoing
 D. definitely more relaxed and easygoing
18. Would your spouse (or closest friend) rate you as:
 A. definitely hard-driving and competitive
 B. probably hard-driving and competitive
 C. probably more relaxed and easygoing
 D. definitely more relaxed and easygoing
19. Would your spouse (or closest friend) rate your general level of activity as:
 A. too slow-should be more active
 B. about average-busy much of the time
 C. too active-should slow down
20. Would people you know well agree that you take your work too seriously?
 A. definitely yes
 B. probably yes
 C. probably no
 D. definitely no
21. Would people you know well agree that you have less energy than most people?
 A. definitely yes
 B. probably yes
 C. probably no
 D. definitely no

Go on to the next page

22. Would people you know well agree that you tend to get irritated easily?
- A. definitely yes
 B. probably yes
 C. probably no
 D. definitely no
23. Would people who know you well agree that you tend to do most things in a hurry?
- A. definitely yes
 B. probably yes
 C. probably no
 D. definitely no
24. Would people who know you well agree that you enjoy a "contest" (competition) and try hard to win?
- A. definitely yes
 B. probably yes
 C. probably no
 D. definitely no
25. Would people who know you well agree that you get a lot of fun out of your life?
- A. definitely yes
 B. probably yes
 C. probably no
 D. definitely no
26. How was your temper when you were younger?
- A. fiery and hard to control
 B. strong but controllable
 C. no problem
 D. I almost never got angry
27. How is your temper nowadays?
- A. fiery and hard to control
 B. strong but controllable
 C. no problem
 D. I almost never get angry
28. When you are in the midst of studying and someone interrupts you, how do you usually feel inside?
- A. I feel O.K. because I work better after an occasional break
 B. I feel only mildly annoyed
 C. I really feel irritated because most such interruptions are unnecessary
29. How often are there deadlines in your courses?
- A. daily or more often
 B. weekly
 C. monthly or less often
 D. never
30. These deadlines usually carry:
- A. minor pressure because of their routine nature
 B. considerable pressure, since delay would upset things a great deal
31. Do you ever set deadlines or quotas for yourself at school or at home?
- A. no
 B. yes, but only occasionally
 C. yes, once a week or more
32. When you have to work against a deadline, what is the quality of your work?
- A. better
 B. worse
 C. the same (pressure makes no difference)
33. At school, do you ever keep two jobs moving forward at the same time by shifting back and forth rapidly from one to another?
- A. no, never
 B. yes, but only in emergencies
 C. yes, regularly
34. Do you maintain a regular study schedule during vacations such as Thanksgiving, Christmas, Study Break?
- A. yes
 B. no
 C. sometimes
35. How often do you bring your work home with you at night, or study materials related to your courses?
- A. rarely or never
 B. once a week or less
 C. more than once a week

Go on to the next page

36. How often do you go to the university to study when you are not expected to be there (such as nights or weekends)?
- A. it is not possible
 B. rarely or never
 C. occasionally (less than once a week)
 D. once a week or more
37. When you find yourself getting tired while studying, what do you usually do?
- A. slow down for a while until my strength comes back
 B. keep pushing myself at the same pace in spite of the tiredness
38. When you are in a group, how often do the other people look to you for leadership?
- A. rarely
 B. about as often as they look to others
 C. more often than they look to others
39. How often do you make yourself written lists to help you remember what needs to be done?
- A. never
 B. occasionally
 C. frequently
40. In amount of effort put forth, I give:
- A. much more effort
 B. a little more effort
 C. a little less effort
 D. much less effort
41. In sense of responsibility, I am:
- A. much more responsible
 B. a little more responsible
 C. a little less responsible
 D. much less responsible
42. I find it necessary to hurry:
- A. much more of the time
 B. a little more of the time
 C. a little less of the time
 D. much less of the time
43. In being precise (careful about detail), I am:
- A. much more precise
 B. a little more precise
 C. a little less precise
 D. much less precise
44. I approach life in general:
- A. much more seriously
 B. a little more seriously
 C. a little less seriously
 D. much less seriously

For questions 40-44, compare yourself with the average student at your university and mark the most accurate description.

40. In amount of effort put forth, I give:
- A. much more effort
 B. a little more effort
 C. a little less effort
 D. much less effort
41. In sense of responsibility, I am:
- A. much more responsible
 B. a little more responsible
 C. a little less responsible
 D. much less responsible

Thank you for your cooperation!

Appendix D

Instructions for Classroom Administration of the JAS

1. I am conducting research for my Master's thesis.
2. This survey is looking at some personal habits of students in different areas of the university. However, like most research, I can't tell you much about it at this time so as not to bias your response.
3. The questionnaire is anonymous; don't put your name on it. I am looking for responses by group rather than individuals. The results will be used for research purposes only.
4. Your participation is voluntary. If after you look at it, you decide you don't want to complete the questionnaire, just return it to me. However, your participation will be greatly appreciated so that the study will include a good cross-section of the university.
5. It is important to complete all demographic information on the first page. On the remaining items you may leave an item blank if you wish, but it is best to try to give an answer even if you are not sure of your choice or whether the statement really applies to you.
6. It should take from 15 to 20 minutes to complete the questionnaire. When you are finished, return it to me and it is OK to leave.
7. If you are interested in more information about what I am looking for in the study and the final results, this information should be available in the Spring and you can get it from me at the Counselling Services in the SUB.

Students who had questions about individual items were encouraged to interpret the item for themselves and answer accordingly.



Counselling and Psychological Services

Room 422, S.U.B., Dalhousie University, Halifax, Nova Scotia, Canada, B3H 4J2 (902) 424-2081

October, 1983

Dear Graduate Student:

The enclosed questionnaire is part of a research project I am conducting to examine the reactions of students to different situations. As you may guess, this research is part of my own thesis and I am hoping that you will contribute to its completion.

I am sampling students at different stages of university, i.e., first year, honours year, and graduate study. Because there are so few of you, it is important to include as many graduate students as possible in the sample for the study to be valid. The questionnaire should take fifteen minutes or less to complete, and should be returned anonymously. I am looking for responses by group rather than individuals.

In completing the questionnaire, it is important to include all the demographic information on the first page. On the remaining pages you may leave an item blank if you wish, though it is best to try to give an answer even if you are not sure of your choice or whether the statement really applies to you.

The attached envelope has already been stamped with my return address so that you can easily return the completed questionnaire via Campus Mail. Your Departmental Secretary can forward it or you can leave it at the SUB Enquiry Desk.

Your participation in this project is greatly appreciated. If you have any questions, please call me at 424-2081.

Sincerely,

Sandra Hodson

Sandra Hodson
Counsellor



Counselling and Psychological Services

Room 422, S.U.B., Dalhousie University, Halifax, Nova Scotia, Canada, B3H 4J2 (902) 424-2081

November 2, 1983

Dear Honours Student,

The enclosed questionnaire is part of a research project I am conducting to examine the reactions of students to different situations. As you may guess, this research is part of my own thesis and I am hoping that you will contribute to its completion.

I am sampling students at different stages of university, i.e., first year, honours year, and graduate study. Because there are so few of you, it is important to include as many honours students as possible in the sample for the study to be valid. The questionnaire should take fifteen minutes or less to complete, and should be returned anonymously. I am looking for responses by group rather than individuals.

In completing the questionnaire, it is important to include all the demographic information on the first page. On the remaining pages you may leave an item blank if you wish, though it is best to try to give an answer even if you are not sure of your choice or whether the statement really applies to you.

Your participation in this project is greatly appreciated. If you have any questions, please call me at 424-2081.

Sincerely,

Sandra Hodson
Counsellor

Appendix E

Table E-1

Summary Table for Analysis of Variance for Program, Level of Study, and Gender - All Programs

Source	df	Type A Scale		S-Scale		H-Scale	
		MS	F	MS	F	MS	F
Program (A)	3	379.493	4.647**	292.381	3.473 *	109.587	1.313
Level of Study (B)	2	636.628	7.796**	445.822	5.296**	1095.213	13.119**
Gender (C)	1	705.946	8.644**	64.040	0.761	434.688	5.207 *
A x B	6	36.880	0.452	13.452	0.160	127.933	1.532
A x C	3	235.326	2.882 *	205.439	2.440	108.301	1.297
B x C	2	321.474	3.936 *	104.960	1.247	49.672	0.595
A x B x C	6	77.709	0.951	16.556	0.197	161.208	1.931
Error	596	81.663		84.182		83.485	

Note. Program = Arts, Science, Commerce, and Engineering; Level of Study = 1st Year, 4th/Honors Year, and Graduate Study; Gender = Male and Female.

* $p < .05$. ** $p < .01$.

Table E-2

Summary Table for Analysis of Variance for Program, Level of Study, and Gender - Arts and Science Only

Source	df	Type A Scale		S-Scale		H-Scale	
		MS	F	MS	F	MS	F
Program (A)	1	31.705	0.394	1.483	0.188	52.751	0.618
Level of Study (B)	3	558.489	6.935**	328.133	4.153**	650.320	7.615**
Gender (C)	1	798.864	9.920**	138.996	1.759	177.374	2.077
A x B	3	67.812	0.842	75.699	0.958	62.880	0.736
A x C	1	101.642	1.262	46.324	0.586	47.121	0.552
B x C	3	233.679	2.902 *	153.576	1.944	85.409	1.000 *
A x B x C	3	91.714	1.139	28.987	0.367	170.861	2.001
Error	387	80.529		79.014		85.398	

Note. Program = Arts and Science; Level of Study = 1st Year, 4th/Honors Year, Graduate Study, and Professional Study; Gender = Male and Female.

* $p < .05$. ** $p < .01$.