THE TYPE A BEHAVIOR PATTERN:

Relationship to Personality and Psychopathology

by

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Abstract

Controversy exists around whether the Jenkins Activity Survey (JAS), a questionnaire measuring the Type A coronary-prone behavior pattern, correlates with measures of pathology. The present study investigated this question by administering the JAS (form T) and the MMPI (Minnesota Multiphasic Personality Inventory) to 2 samples of University students, summer and fall. Experiment 1 served as a pilot study with the administration of Form R of the MMPI (399 items) and the JAS with a group of summer students. Although some significant correlations were obtained, the results of Experiment 1 indicate that traditional measures of psychopathology are generally unrelated to the JAS. A more rigorous examination of the relationship between the MMPI and the JAS was sought in the second experiment using the long form of the MMPI (566 items) and a much larger sample size. Contrary to Experiment 1, the results of Experiment 2 indicate a strong relationship between the Speed and Impatience subscale of the JAS and psychopathology, particularly for females. In addition, the large number of significant correlations and the large number of Type A's evidencing elevated MMPI scales (T-scores ≥ 70), suggests that the Type A behavior pattern may be associated with psychopathology.

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There has been a great deal of recent interest in the relationship between personality, behavioral characteristics and the onset of cardiovascular disease. Numerous studies have found that cardiac patients share common behavioral characteristics, most of which make up the Type A behavior pattern (Bruhm et al., 1969; Gillum et al., 1980; Mai, 1968).

The best researched and validated theory of the Type A behavior pattern defines this behavioral syndrome as an

> action emotion complex exhibited by individuals engaged in relatively "chronic" and excessive struggles to obtain a usually unlimited number of things from the environment in the shortest period of time or against the opposing efforts of other things and persons (Rosenman and Chesney, 1982, p. 4).

The Type A pattern is characterized by a hard driving, impatient restless person under time pressure and driving for achievement. On the other hand, the non-A or Type B individuals are more easy-going, less time urgent and work oriented. This behavior pattern can be thought of as an overt behavioral syndrome or style of living with which individuals confront life situations perceived to be a challenge (Jenkins and Zyzanski, 1980). Similarly, Rosenman and Chesney (1982) suggest that the emotional and personality traits

of Type A's i.e. aggressiveness, competitiveness, hostility etc., emerge only when they are activated by the individual's perception of environmental challenges or stressors.

In essence, the behavioral syndrome is characterized by competitiveness, striving for achievement, aggressiveness which may be repressed, impatience, restlessness, hyperalertness, facial musculature tension, and a chronic sense of time urgency leading to accelerated thought and action. In addition, Matthews (1982) suggests that this struggle overtly manifests itself through explosive accelerated speech, a heightened pace of living, impatience with slowness, concentrating on more than one activity at a time, self preoccupation, dissatisfaction with life, evaluation of the worthiness of one's activities in terms of numbers, a tendency to challenge and compete with others even in noncompetitive situations, and a free floating hostility (p. 1). In order to identify these components of the Type A behavior pattern, several psychometric instruments have been developed.

Psychometric Instruments

The numerous psychometric devices which have been utilized to measure Type A behavior include The Bortner Test Battery (Bortner & Rosenman, 1967), The Bortner Scale (Bortner, 1969), The constructed Interview (Papageouriou, Anthopoulos, Mitsimbounas, Kontou, Vrouchos,

Benrubi & Moulopoulous 1981), The Coronary Behavior Profile Questionnaire (Rahe, Arajarvi, Arajarvi, Punsar & Karvanen, 1976; Rahe, Hervig, Romo, Sitanen, Punsar, Karvanen & Rissanen, 1978), The Structured Interview (Rosenman, 1964), Rating of Statements List (van Dijl, 1978; 1982), The Jenkins Activity Survey (Jenkins, Rosenman & Friedman, 1967), The Framingham Type A Behavior Scale (Haynes et al., 1978), The Barratt Impulsiveness Scale (Chesney et al., 1981), Gough Adjective Checklist (Ahnve, de Faire, Orth-Gomer & Theorell, 1979; Chesney, Black, Chadwick & Rosenman, 1981; MacDougall, Dembroski & Musante, 1979; Rahe, Hervig & Rosenman, 1978), Eysenck Impulsiveness Scale (Chesney et al., 1981), The Thurstone Temperment Schedule (Chesney et al., 1981; MacDougall et al., 1979; Rahe et al., 1978), Symptom Distress Checklist (Chesney et al., 1981), The Smith's Need Achievement Scale (Irvine, Lyle & Allon, 1982), and The California Psychological Inventory (Rahe et al., 1978). Of these measures, the most frequently utilized methods are the Structured Interview and the Jenkins Activity Survey.

The first formal assessment technique developed to determine the existence of Type A behavior is the Structured Interview (SI) (Rosenman, Friedman, Straus, Wurm, Kostchek, Hahn & Werthessen, 1964). The SI evolved over a period of years and was primarily based on consistent observation of patients with coronary heart disease (CHD) and from earlier personality trait descriptions of

CHD patients by cardiologists (Rosenman, 1978). Although the coronary-prone behavior pattern is spoken of as an overt syndrome, the structured interview was designed as an empirical instrument to elicit the characteristics of the Type A syndrome (Chesney et al., 1980). The modified version of the SI requires about ten minutes to administer. Although specific answer content is useful, the SI is in fact based more upon the subjects' mannerisms and general stylistics. Thus, observation of non-verbal and overt behavior characteristics are both encompassed in this assessment procedure.

The Structured Interview allows one to categorize individuals into either Type A - 1 (exhibited by persons with impatience, a chronic sense of time urgency, enhanced competitiveness, aggressive drives and hostility), Type B (characterized by a paucity of the aforementioned characteristics) and Type X (those individuals exhibiting some of the characteristics of both Type A and B). Categorical agreement of behavior assessment (inter-rater reliability) has ranged from .64 to .84 (Caffrey, 1968; Friedman, Hellerstein & Jones, 1968; Friedman, Rosenman, Straus, Wurm & Kositchek, 1968; Jenkins, Rosenman & Friedman, 1967; Matthews, Glass, Rosenman & Bortner, 1977).

Although the SI is considered the best predictor of CHD and Type A behavior assessment, it has been criticized for its lack

of objectivity and numerical quantification (Rosenman, 1978). In addition, it requires training for effective administration and assessment, it requires time and expense, and an observer of adequate intelligence and with certain obvious abilities.

In response to these criticisms, more objective assessment devices were developed. Out of these, the most well documented is the Jenkins Activity Survey (JAS) (Jenkins, Rosenman & Friedman, 1967). The content of the JAS is based on items which were found to significantly discriminate between Type A's and Type B's during the Structured Interview and items derived from clinical observation (Chesney, Black, Chadwick & Rosenman, 1981). The JAS yields an overall A/B score and 3 subscales or conceptually independent behavior syndromes: Hard-Driving, Job Involvement and Speed and Impatience (Zyzanski & Jenkins, 1970). The low level of agreement between the JAS and SI classifications (approximately 70 to 73 %), (Jenkins & Zyzanski, 1980), may be partially due to the lack of self insight exhibited by Type A's and/or Type B's tendency to answer Type A items in a socially desirable direction (Rosenman, 1978). The test-retest reliability coefficient of .66 was obtained on the JAS A/B scale over a period of one year (Jenkins, Zyzanski & Rosenman, 1971). Test-retest correlations over a period of several years have ranged from .64 to .74 on the "Speed and Impatience" and

"Job Involvement" subscales of the JAS (Jenkins, Rosenman & Zyzanski, 1974).

Two versions of the JAS exist: one designed for the adult population (Matthews, 1982) and the other for use in academic settings (JAS Form T) (Krantz, Glass & Synder, 1974). The student version yields an overall A/B score and includes the "Speed and Impatience" and "Hard Driving" subscales. Although little data regarding the reliability and validity of the student JAS is available, it is assumed to be comparable to that of the adult JAS since modifications were minimal (Glass, 1977).

Construct Validity

Time Urgency

One component of the Type A behavior pattern is a chronic sense of time urgency. Matthews, Glass, Rosenman and Bortnèr (1977) describe those individuals as impatient with slowness in others, involved in multiple activities with deadlines, and as enjoying working at a rapid pace. In line with this description, Price and Clarke (1978) found a significant interaction between behavior type and time estimation. Type A individuals consistently estimated the passage of time faster than Type B's. Similarly, Burnam, Pennebaker and Glass (1975) found that Type A's signalled the passage of time significantly sooner than Type B's while simultaneously reading a passage outloud. Yarnold and Grimm (1982) replicated this study

while controlling for reading rate. The same results were obtained with Type A's perceiving the passage of time more quickly.

Becker and Suls (1982) investigated the Hard Driving and Speed components of the Type A coronary-prone behavior pattern through administration of the dependent variable. Subject were told that the purpose of the study was the standardization of the JAS. As expected, a positive relationship was found between scores on the Speed and Impatience subscale of the JAS and test time completion. In other words, the higher the score on the Jenkins Activity Survey subscales, the faster the student completed the test.

Another study investigated the relationship between blood pressure reactivity, verbal response style and perception of time. The dependent measures were obtained while 45 attorneys engaged in a frustrating cognitive task (Manuck, Corse & Winkleman, 1979). As predicted, subjects showing the highest blood pressure elevations responded with greater speed, volume and emphasis. In addition, these subjects experienced time passing more rapidly.

As can be seen from the aforementioned studies, consistent and strong support for the time urgency component of the Type A behavior pattern exists.

Achievement Striving

Striving for achievement is another essential component of the Type A behavior pattern. Type A students have been found to participate in more extracurricular college activities, earn more academic honours in college, receive more athletic awards in high school, and spend more time in class and studying (Glass, 1977). In addition, Type A's have also been found to report higher career aspirations than Type B's (Pennebaker & Glass, 1977), spend more time participating in religious services and less time socializing with friends (Ditto, 1982).

Burnam et al. (1975) tested the hypothesis that Type A individuals exhibit an excessive drive to achieve even in the absence of objective or deadlines. Subjects were required to solve a number of math problems under one of two conditions: no deadline condition (ND) or deadline condition (D). As expected, Type A's attempted more problems under the ND condition and worked at near maximum capacity regardless of group assignment. On the other hand, Type B's work coincided more closely with the task requirements.

In a similar study, the behavior and cardiovascular responses of Type A's and B's to a difficult cognitive task were evaluated under one of two conditions: monetary reward or a no incentive condition. As predicted, Type A's performed better and reported less state anxiety than Type B's under the no incentive condition. Furthermore, Type A and Type B individuals showed no differences

in task performance or self reported anxiety in the incentive condition (Manuck, Craft & Gold, 1978).

While the previous studies seem to indicate that Type A's are not influenced by task incentive, conflicting results have been reported (Blumenthal, Lane, Williams, McKee, Haney & White, 1983). The results of this study indicated an interaction between task incentive and Type A behavior with the occurrence of more rapid responding under monetary reward conditions. Despite the conflicting results, these findings are consistent with Rosenman and Chesney's (1982) assertion that the emotional and personality traits of Type A's are activated by the individual's perception of environmental challenges.

The achievement striving component of the coronary-prone behavior pattern received further validation in a study utilizing the Balke Tread-Mill Test (Carver, Coleman & Glass, 1976). Type A's were found to exert greater effort and show greater suppression of subjective fatigue than the Type B subjects. Furthermore, fatigue suppression was conceptualized as an instrumental response for attaining mastery over the environment. This conceptualization received support in a study in which subjects were required to listen to unpredictable, predictable, and ambient noise (Weidner & Matthews, 1978). It was found that Type A's who expected to continue working obtained lower symptom scores than either Type A's who had completed their

work or Type B's in either task duration condition. This suppression of fatigue and lack of reported symptomology have been implicated in the onset of CHD (Carver, Coleman & Glass, 1976). This component of the behavioral syndrome also has implications for treatment intervention in terms of a lack of reported distress and hence, a lower likelihood of seeking therapeutic assistance (Weider & Mathews, 1978).

Further construct validity was obtained from the Ratings of Statements List (van Dijl, 1978). In this study, Type A men exhibited more ambition/dominance as compared to Type B men. Similarly, Type A's scored significantly higher in achievement as measured by the Adjective Checklist (Chesney, Black, Chadwick & Rosenman, 1981).

In a mixed motive game where subjects were able to either cooperate, compete, punish, reward or withdraw, Type A's were found to be more competitive, to have larger heart rate responses during this period, and to exhibit greater conflicts of interest (van Egeren, 1979a; 1979b). Furthermore, Type A partners competed and punished more, cooperated and rewarded less, showed more distrust, expressed more anger, sent more threatening communications, and attempted to dominate each other more than Type B partners (p. 15). Type A's have also been found to report greater task involvement, less satisfaction with their own performance, and to be less willing than Type B's to believe they could not successfully complete a task (Manuck & Garland, 1979).

In conclusion, strong and consistent support has accumulated for the competitive and achievement striving components of the coronary-prone Type A behavior pattern.

Hostility

The last essential component in the coronary-prone behavior pattern is hostility. Again, the construct validity provides strong support for the existence of this behavioral component.

Hicks and Hodgson (1981) investigated the validity of the clinical observation of excessive levels of covert hostility in Type A individuals. It was found that Type A students expressed higher levels of hostility than Type B's as measured by the Buss-Durkee (1957) Hostility Inventory. Interestingly, the groups did not differ in their levels of covert hostility. Thus, it remains to be seen that Type A's differ in the level of repressed hostility.

Chesney et al. (1980) suggest that Type A's may be selectively predisposed to enhanced reactions to hostile interactions. In an experiment testing the effects of harrassment and competition, Type A's hostility was found to elicit greater increases in systolic blood pressure, heart rate and plasma epinephrine during competition. In contrast, Type B's were relative unaffected by the presence of a hostile opponent.

In a laboratory investigation of the aggression component of Type A behavior, Type A's were found to be more willing to deliver

shocks to a confederate following harrassment than Type B's (Carver & Glass, 1982). In the second experiment, Type A's were found to exhibit aggression following both derogation and frustrated effort.

Dembroski, MacDougall, Herd and Shields (1979) examined the hostility and competitive components of Type A's under different levels of experimental challenge. Utilizing a cold-pressure test and a reaction time task, Type A's were found to be high in hostility and competitiveness under both high and low challenge conditions. This adds further validity to the assertion that it is Type A's perception of environmental challenge that is crucial in the activation of this behavioral components as opposed to the actual stressors present in the environment .

In a reanalysis of data from the Western Collaborative Group Study (Rosenman, Brand, Sholtz & Friedman, 1976), four items were found to reliably discriminate between CHD cases and matched controls: explosive voice modulation, vigorous answers, potential for hostility and irritation at waiting in line. A secondary analysis provided further comfirmation for the discriminatory ability of anger-relevant variables for myocardial infarction cases and controls (Jenkins, Zyzanski & Rosenman, 1978).

Lastly, Williams, Haney, Lee, Kong, Blumenthal and Whalen (1980) found the hostility level in Type A's, as measured by a scale derived from the MMPI, more strongly associated with anteriographically

documented atherosclerosis than a global measure of Type A behavior. Furthermore, it was suggested that the combination of these measures may provide a more complete assessment of the likelihood of developing a significant coronary occlusion than either measure alone. It was also noted that the risk of coronary disease may profitably be reduced through a reduction of the anger and hostility components of this syndrome.

Correlates of the Type A Behavior Pattern

Given the vast amount of research now linking the Type A behavior pattern with the subsequent development of coronary heart disease (Blumenthal et al., 1978; Friedman & Rosenman, 1971; Friedman et al., 1968; Haynes et al., 1978; Jorgensen & Housten, 1981; Kornitzer et al., 1981; Rosenman et al., 1975; Rowland & Sokol, 1977), investigators are now trying to identify a set of attributes which underlie the coronary-prone behavior pattern. Recently, a host of studies have investigated the possible association between various psychosocial, demographic, social, psychological and emotional factors and the Type A behavior pattern. These factors have included social class and status, educational level, religion, ethnic background, marital status, work overload, social and geographic mobility, status incongruity, anxiety, neuroticism, life events and changes, life satisfactions and dissatisfactions, emotional loss and deprivation (Burnam, Pennebaker & Glass, 1975).

Psychological Correlates

Chesney, Black, Chadwick and Rosenman (1980) investigated the differences between Type A's and B's on a number of psychological scales including measures of aggression, autonomy, extroversion, impulsiveness, and psychological distress. It was found that Type A's scored significantly higher on measures of aggression, autonomy, exhibition, self confidence, change, dominance, achievement and lability (as measured by the Adjective Checklist), extroversion and impulsiveness (measured by the Eysenck Personality Inventory), and on liveliness, total impulsiveness and narrow impulsiveness (as measured by the Eysenck Impulsiveness Scale). As expected, Type A's scored significantly lower than Type B's on personal adjustments, nurturance, abasement, counseling readiness, deference and self control. No differences were found between groups on measures of psychological distress.

Another unique study looked at the relationship between Type A behavior and two measures of self relevant cognitions (Smith & Brehm, 1981). Type A behavior was found to be negatively related to a belief in the value of avoiding problems and responsibilities. In males, a significant correlation was obtained between Type A's and an irrational belief in self standards for achievement and perfection. For females, Type A correlated significantly with private self consciousness and beliefs involving overreaction to frustration and

anxious over-concern about potential problems (p. 221). It was suggested that these cognitive variables play an important role in the production of specific components of the Type A behavior pattern and, hence, could potentially serve as targets for treatment intervention.

The association between Type A behavior and several emotional factors has also been investigated (Dimsdale, Hackett, Block & Hutter, 1978). This study examined such variables as tension, depression, anger, vigor, fatigue, and confusion (measured by the Profile of Mood States), denial of cardiac illness (measured by the Hackett-Cassem Semi Structured Interview for Denial) and accumulation of stressful life events (measured by the Schedule of Recent Events). The results revealed an association between Type A behavior and stress, tension and depressed mood.

Another study examining the personality correlates of the coronary-prone behavior pattern utilized the Eysenck Personality Inventory, the Personal Deviance Scale, and a measure of achievement need (Irvine, Lyle & Allon, 1982). Significant correlations were found between Type A, Speed and Impatience, and neuroticism. The Type A scale was also significantly correlated with dominance and extrapunitiveness, while the Speed and Impatience subscale correlated with extrapunitiveness.

Zyzanski, Jenkins, Ryan, Flessas and Everist (1976) investigated the relationship between several scales of the MMPI (anxiety, depression,

and neuroticism) and coronary angiographic findings. The results revealed that patients with greater atheromatous obstruction scored significantly higher on all four scales of the Type A coronary-prone behavior pattern test. Significantly higher depression and anxiety scale scores were found for those subjects who were more seriously diseased. Finally, those subjects with more frequent and intense pain, were found to score significantly higher on hypochondriasis (Hy), depression (D) and admission of symptoms than those with less pain. It was suggested that there may be utility in investigating the personality profiles which correspond to the Type A behavior pattern in terms of prevention. Conversely, no relationship was found between the JAS (adult form) and psychopathology as measured by the MMPI (Wadden et al., 1983) but the Speed and Impatience scale was found to be postiviely correlated with both state and trait anxiety.

Another area of investigation which has received some recent interest has been looking at the differences between survivors and nonsurvivors of cardiovascular disease.

Correlates of Cardiovascular Disease

Gillum et al. (1980) collected longitudinal MMPI data in an investigation of the utility of the MMPI in predicting the onset of cardiovascular disease and mortality, but no attempt was made to differentiate between Type A and B individuals. A host of other studies have also examined the usefulness of the MMPI in predicting

psychological adjustment and response to open heart surgery (Heinrichs & Waters, 1972); Lair & King, 1976; Kilpatrick et al., 1975). In addition to the fact that these studies have failed to identify Type A's and B's, the results reveal highly inconsistent trends.

While no predictive value was found in the MMPI for identifying the onset of cardiovascular disease in one study (Gillum et al., 1980), significant differences have been found between successful and expired open heart surgery patients (Bruhn et al., 1969; Gilberstadt & Sako, 1967; Lair & king, 1976). Gilberstadt and Sako (1967) found that survivors demonstrated more denial as indicated by significantly higher L (lie) and K T-scores, while nonsurvivors showed more agitation, withdrawal, and organic disability as indicated by significantly higher F, Pa, Ma and Si T-scores. When compared by sex, males survivors were found to be significantly less anxious and female survivors to have significantly less denial, emotional overcontrol and physical complaints (Heinrichs et al., 1969). In contrast, Lair and King (1976) found no significant differences between males who survived or expired following open heart surgery. On the other hand, females who expired had significantly higher Hs and Hy (hysteria) scale elevations relative to the successful female group, and in turn, significantly lower Pa (paranoia) scale scores. In addition, significantly lower L scale scores were found in the successful group. Interestingly, when a scale 6 cutting T-score of 57 or lower was used

to predict mortality for the Hs/Hy profile patients, a 100% hit rate for identifying those who expired was obtained. Although replication is needed, these results suggest that a Hs-Hy conversion profile for females is predictive of mortality during or shortly after surgery.

In a retrospective study of myocardial infarction, survivors were found to have significantly lower K T-scores and significantly higher F, A and R T-scores relative to the matched controls (Bruhn et al., 1969). In addition, angina and nonangina patients differed on the K, Hs, Hy, A, R and Es scales upon entry into the project and on the L, Hs, D and Hy scales at the end of the study.

As can be seen, although there is considerable controversy about the role of specific personality and behavioral characteristics in the development of coronary heart disease, there is substantial agreement about the association between the Type A behavior pattern and CHD.

Present Study

In light of the lack of research examining the personality profiles characteristic of Type A and Type B individuals as measured by the JAS (Student form - form T), the present study will be aimed at systematically examining their corresponding MMPI personality profiles. The importance of linking Type A behavior with the MMPI is obvious given that it's the most widely used research personality inventory in use today. Currently, almost 6000 references on the

clinical and research applications of the MMPI exist (Dahlstrom, Welsh & Dahlstrom, 1975). In addition, over 5000 citations on the MMPI are present in Buro's (1978) Eighth Mental Measurements Yearbook.

The purpose of the present study is to identify a potential set of personality characteristics that will provide a better understanding of the Type A behavior pattern as well as assist in the prediction and modification of this behavioral syndrome.

Experiment 1

Method

Subjects. Subjects were 46 females and 31 males attending summer school at Lakehead University (Thunder Bay). All participants were volunteers. Subjects ranged from 17 to 57 years of age (M=32.7). Females ranged from 19 to 53 years of age (M=35.3) and males from 17 to 57 (M=28.4). Of the initial 91 subjects, 14 were excluded due to profile invalidity using the F-K$\geq$7 and F-K$\leq$-11 criteria (Grow et al., 1980).

Procedure. All 77 subjects completed the JAS (Form T) and Form R of the MMPI (399 items). MMPI responses were scored by hand and expressed as K-corrected T-scores on the 13 standard validity and clinical scales. The 13 MMPI scales and the 3 JAS scales were analyzed by means of MANOVA'a and correlations.

Results

A multivariate analysis of variance (MANOVA) revealed a significant main effect of sex, F (13, 61)= 7.90, p = .001, with significant differences on the Hs, F (1, 73) = 8.04, p = .006, D, F (1, 73) = 14.07, $p < .001$, Hy, F (1, 73) = 9.80, p = .002, MF, F (1, 73) = 77.29, $p < .001$, and Pt, F (1, 73) = 6.73, p = .011 scales of the MMPI. Overall sex differences were also observed on the JAS, F (3, 373) = 3.52, p = .019. Hence, the subsequent analyses were performed seperately for males and females.

The primary indices of the relationship between the JAS and the MMPI are correlations. Only 5 of the 84 correlations between the JAS and the MMPI achieved significance (see Table 1). For females,

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Insert Table 1 about here

Ma (Hypomania) correlated positively with Type A and the Speed and Impatience scale (S), whereas K was negatively related to the S scale. For males, the L scale was negatively correlated with Type A and the Speed and Impatience scale.

Intercorrelations of the JAS scales ranged from .60 to .77 for females, and from .61 to .76 for males (see Table 2). All

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Insert Table 2 about here

TABLE 1 — CORRELATIONS JAS SCALES WITH MMPI

	Females (N = 46)				Males (N = 31)			
Scale	M*	Type A	Speed & Impatience	Hard Driving	M*	Type A	Speed & Impatience	Hard Driving
L	(48.8)	.02	-.25	-.16	(50.4)	-.42*	-.36*	-.05
F	(54.6)	.06	.14	.20	(56.9)	-.13	-.08	-.18
K	(56.0)	-.06	-.36*	-.25	(54.3)	-.23	-.02	-.21
Hs	(50.2)	.15	.10	-.05	(54.9)	-.15	-.13	-.10
D	(53.0)	.06	.10	.24	(63.5)	.04	.10	.12
Hy	(53.7)	-.17	-.14	-.21	(59.2)	-.11	-.18	.02
Pd	(59.4)	.13	.07	.11	(59.6)	.12	-.05	-.06
Mf	(46.5)	.10	.16	.09	(67.6)	.02	.10	.05
Pa	(56.4)	-.05	.06	.19	(59.5)	-.01	.09	.10
Pt	(54.4)	-.16	-.05	.13	(61.1)	-.04	.09	.07
Sc	(58.4)	-.11	-.01	.02	(62.9)	-.25	-.09	.21
Ma	(60.8)	.35*	.37*	.23	(64.7)	.18	.18	.17
Si	(57.1)	-.23	-.14	.13	(58.3)	-.12	.18	.17
Age	(35.3)	.01	-.22	-.15	(28.4)	.03	.29	-.04

M* All means (M) presented as standardized (T) scores.
* $p < .05$
** $p < .01$
*** $p < .001$

*TABLE 2 — INTERCORRELATIONS OF JAS SCALES

Scale	Type A	Speed & Impatience	Hard Driving
Type A		.76	.66
Factor S	.77		.61
Factor H	.60	.62	

* Entries above the diagonal are for males; entries below the diagonal are for females.

intercorrelations are significant at $p < .001$.

Experiment 2

While the results of Experiment 1 revealed a few significant relationships between the MMPI and the JAS, these findings must be interpreted with caution since the number of significant correlations obtained was that predicted by chance alone. These findings are also somewhat tentative given the small sample size utilized and the short form of the MMPI which was used. A more rigorous examination of the relationship between the MMPI and the JAS was sought in the second experiment using the long form of the MMPI (566 items) and a much larger sample size.

Method

Subjects. Subjects were 235 female and 114 male students enrolled in an introductory psychology course at Lakehead University during the regular academic year. Subjects volunteered to participate in return for bonus credit points. Participants were assured that test results were completely confidential. Subjects ranged in age from 17 to 68 (M=22.1).

Of the initial 361 subjects, 12 were excluded due to profile invalidity i.e. F-K$\geq$7 and F-K$\leq$-11 (Grow et al., 1980). Out of these subjects, 11 F's exceeded 13 with the other remaining profile having an elevated K scale score of 25.

Procedure. All 349 subjects completed the group booklet form

of the MMPI and the JAS (form T). As in Experiment 1, the same procedure was utilized in scoring the MMPI's and in the expression of scores. Furthermore, all MMPI and JAS scales were analyzed by the same techniques with the addition of a t-test, chi-square and discriminant analyses. Although the primary index of the relationship between the MMPI and the JAS is the correlation coefficient, median splits were used for graphical representation, chi-square analyses, as well as for categorization of subjects through discriminant analyses. Using the median of the AB, Hard Driving (H), and Speed and Impatience (S) scale scores, subjects were divided into 2 groups on each of these scales: Type A and B, High and Low H, and High and Low S scale groups respectively.

Results

A MANOVA revealed a significant sex by median AB split interaction, F (13, 333) = 1.76, p = .049. Although the eigenvalue problem failed to converge on the main effect of sex, a multivariate an analysis of covariance revealed a significant overall main effect of sex, F (13, 334) = 13.19, $p < .001$. Significant sex differences were found on the F, F (1, 346) = 8.21, p = .004, Hs, F (1, 346) = 8.10, p = .005, D, F (1, 346) = 14.29, $p < .001$, Mf, F (1, 346) = 130.34, $p < .001$, Pt, F (1, 346) = 21.38, $p < .001$, Sc, F (1, 346) = 18.71, $p < .001$, and Ma, F (1, 346) = 6.56, p = .011, scales of the MMPI. Overall sex differences were not obtained on the JAS. Given the overall sex by AB and main effect differences obtained on the MMPI, subsequent

analyses were performed separately for males and females.

The primary index of the relationship between the Jenkins Activity Survey and the MMPI revealed 17 significant correlations (see Table 3). The Pd (psychopathic deviate) scale correlated positively with Type A and the Speed and Impatience scale for females, whereas for males, only the latter relationship achieved

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Insert Table 3 about here

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significance. For females, a positive relationship was found between the S scale of the JAS and the Hs, Pa, Pt, Sc and Si scales of the MMPI. In addition, the MF scale was positively correlated with the AB scale of the JAS for females, and the L scale negatively related to the S scale for both sexes. The K scale was negatively related, and the F scale was positively related to the Speed and Impatience subscale. For males, the K scale was negatively correlated with the Hard Driving scale. Lastly, a positive relationship was found between Ma and the S and H subscales of the JAS. Figure 1 provides a graphical representation of the large number of significant

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Insert Figure 1 about here

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differences obtained between females high and low on the S scale of the JAS. Consistent with the correlational analysis,

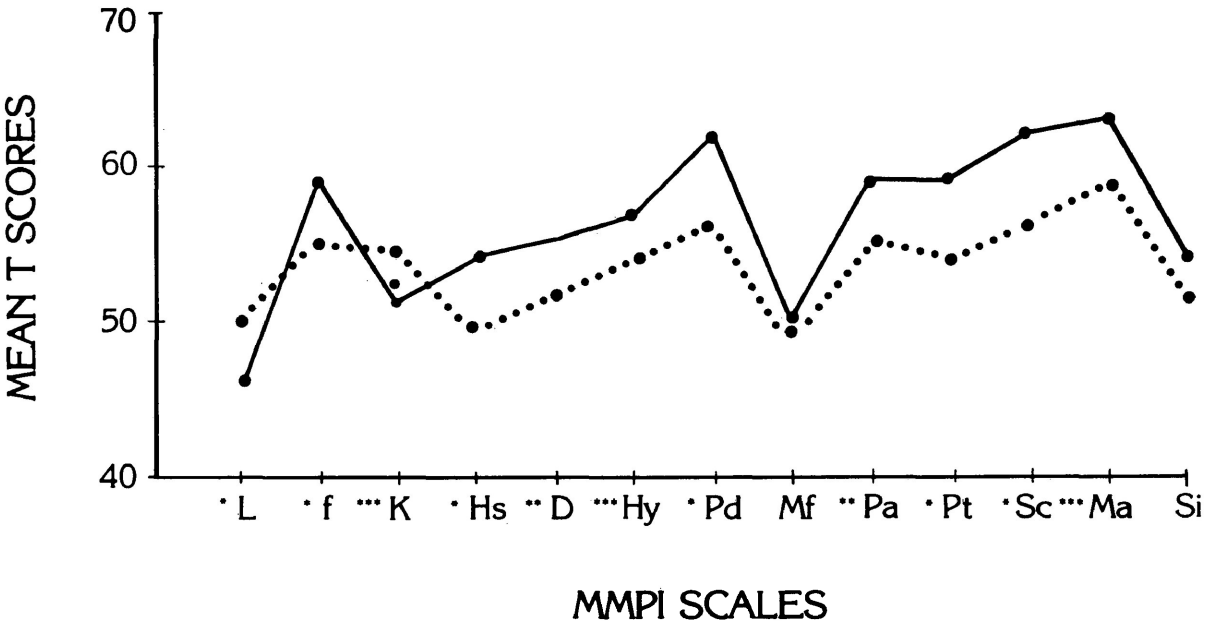
TABLE 3 — CORRELATIONS JAS SCALES WITH MMPI

	Females				Males			
Scale	M*	Type A	Speed & Impatience	Hard Driving	M*	Type A	Speed & Impatience	Hard Driving
L	(48.2)	-.05	-.35***	-.07	(47.5)	-.01	-.17	-.05
F	(56.9)	.07	.27***	.10	(59.7)	.09	.29**	.17
K	(52.2)	-.06	-.27***	-.09	(52.0)	-.11	-.30**	-.21*
Hs	(51.8)	.04	.19**	.06	(55.1)	.02	.03	.02
D	(53.7)	.00	.26	.14*	(58.5)	-.17	.09	-.00
Hy	(55.2)	.06	.10	-.05	(56.9)	-.05	-.02	-.03
Pd	(59.2)	.19**	.22***	.13	(60.8)	.10	.23*	.12
Mf	(49.6)	.15*	.07	.07	(62.5)	-.12	-.03	-.08
Pa	(57.5)	.09	.22***	.12	(58.4)	-.07	.02	.07
Pt	(56.5)	.03	.27***	.09	(62.6)	-.11	.10	.10
Sc	(59.1)	.05	.22***	.05	(65.5)	-.03	.12	.02
Ma	(61.2)	.09	.12	.06	(64.5)	.18	.21*	.22*
Si	(53.3)	-.06	.18**	.11	(52.6)	-.08	.11	.03
Age	(22.0)	-.01	.07	-.01	(22.1)	-.14	-.04	-.12

M* All means presented as standardized (T) scores.
* $p \leq .05$
** $p \leq .01$
*** $p \leq .001$

Figure Caption

Figure 1. Median Split on the S Scale of the JAS for females (—— High S; n = 116) (- - - Low S; n = 119) t-test.


70
60
50
40
MEAN T SCORES
· L
· f
··· K
· Hs
·· D
··· Hy
· Pd
Mf
·· Pa
· Pt
· Sc
··· Ma
Si
MMPI SCALES

· p.<.001
·· p.<.01
··· p.<.05

significant differences were obtained on all of the MMPI scales except Mf and Si for females high and low on the Speed and Impatience scale as determined by a median split (see Table 4).

Insert Table 4 about here

Results of 3 discriminant analyses on the AB, S and H scales of the JAS are displayed in Tables 5, 6 and 7 respectively. For females, 66.67% of the cases were classified correctly into Type

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Insert Tables 5, 6 and 7 about here

A's and B's, $\underline{x}^2$ (1) = 12.64, $\underline{p}$ = .005, and 60.85% were correctly classified for males, $\underline{x}^2$ (1) = 10.89, $\underline{p}$ = .005. On the Speed and Impatience scale, 65.79% of the females, $\underline{x}^2$ (1) = 11.37, $\underline{p}$ = .005, and 63.40% of the males, $\underline{x}^2$ (1) = 16.90, $\underline{p}$ = .005, were classified correctly into High and Low S scale groups. Furthermore, the MMPI scales differentiated significantly among those high and low on the Hard Driving scale with 64.91% of the females, $\underline{x}^2$ (1) = 10.08, $\underline{p}$ = .005, and 63,40% of the males, $\underline{x}^2$ (1) = 16.69, $\underline{p}$ = .005, being correctly classified. Despite the significance obtained, it is important to note that only 5.42% and 21.46% of the variance between Type A's and B's is accounted for by the MMPI scales for females and males respectively. Similarly, 16.48% (females) and 19.39% (males)

TABLE 4 — MEDIAN SPLIT ON THE SPEED AND IMPATIENCE SCALE
MMPI MEANS, SD'S, T-TESTS

MMPI Scale	High S (n = 116) $\bar{X}$	SD	Low S (n = 119) $\bar{X}$	SD	t	P
L	46.40	(5.32)	49.99	(7.99)	-4.05	.000
F	59.06	(9.56)	54.76	(6.65)	4.02	.000
K	51.27	(7.56)	53.74	(7.84)	-2.46	.015
Hs	54.03	(9.99)	49.61	(7.44)	3.85	.000
D	55.42	(9.72)	51.95	(10.69)	2.69	.010
Hy	56.55	(8.55)	53.92	(8.00)	2.44	.015
Pd	62.11	(13.10)	56.45	(12.19)	3.43	.001
Mf	50.18	(9.27)	48.94	(9.97)	0.99	N.S.
Pa	59.28	(9.32)	55.87	(9.27)	2.81	.005
Pt	59.00	(11.27)	54.13	(9.621)	3.56	.000
Sc	61.72	(12.93)	56.56	(10.09)	3.42	.001
Ma	62.93	(11.00)	59.53	(11.09)	2.36	.019
Si	54.47	(10.21)	52.19	(9.37)	1.78	N.S.

Note — Means are K corrected T scores for females in fall session.

TABLE 5 — ACTUAL VS. PREDICTED GROUP MEMBERSHIP IN THE HIGH AND LOW TYPE A GROUPS

		Predicted Group Membership				
		Females			Males	
Actual Group	N	Type A	Type B	N	Type A	Type B
Type A	96	59 61.5%	37 38.5%	58	40 69.0%	18 31.0%
Type B	139	55 39.6%	84 60.4%	56	20 35.7%	36 64.3%

TABLE 6 — ACTUAL VS. PREDICTED GROUP MEMBERSHIP IN THE HIGH AND LOW S SCALE GROUPS

		Predicted Group Membership				
		Females			Males	
Actual Group	N	High S	Low S	N	High S	Low S
High S	116	74 63.8%	42 36.2%	57	38 66.7%	19 33.3%
Low S	119	44 37.0%	75 63.0%	57	20 35.1%	37 64.9%

TABLE 7 — ACTUAL VS. PREDICTED GROUP MEMBERSHIP IN THE HIGH AND LOW H SCALE GROUPS

		Predicted Group Membership				
		Females			Males	
Actual Group	N	Type A	Type B	N	Type A	Type B
High H	112	69 61.6%	43 38.4%	55	35 63.6%	20 36.4%
Low H	123	43 35.0%	80 65.0%	59	20 33.9%	39 66.1%

of the variance between those high and low on the S scale is accounted for by the MMPI. Lastly, the MMPI accounts for 9.64% (females) and 12.88% (males) of the variance between those high and low on the Hard Driving scale.

Results of a chi-square analysis on the frequency of elevated MMPI scales (T-score $\geq$ 70) for Type A's and B's, is displayed in Table 8. The results reveal that while the percentage of elevated

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Insert Table 8 about here

MMPI scales were higher for Type A females, as opposed to Type B's, on all of the 13 MMPI scales, only the Pd and Ma scales achieved significance, $\underline{x}^2$ (1) = 5.24, $\underline{p} < .05$ and $\underline{x}^2$ (1) = 4.27, $\underline{p} < .05$ respectively. Although significance was not obtained, a greater percentage of Type A males also displayed elevated Pd and Ma scales, 20.69 and 34.48 percent respectively. For Type B males, 12.20 and 29.27 percent evidenced elevated Pd and Ma scales. In addition, a greater number of elevations were found on the F, D, Hy and Pt scales for Type A males. Furthermore, a greater number of Type B's were found to evidence no elevations on any of the 13 clinical scales for males or females. This finding only achieved significance for females, $\underline{x}^2$ (1) = 5.11, $\underline{p} < .025$.

Intercorrelations of the JAS scales ranged from .45 to .65 for females, and from .55 to .66 for males (see Table 9). All inter-

TABLE 8 — ELEVATED MMPI SCALES FOR TYPE A'S AND B'S ($T \geq 70$)

MMPI Scale	Females					Males				
	Type A (n = 96)		Type B (n = 102)			Type A (n = 58)		Type B (n = 41)		
	n	%	n	%	x^2	n	%	n	%	x^2
L	1	1.04	1	.98	.00	0	-	0	-	-
F	7	7.29	5	4.90	.50	6	10.34	4	9.76	.01
K	1	1.04	1	.98	.00	0	-	0	-	-
Hs	6	6.25	3	2.94	1.25	2	3.45	3	7.32	.75
D	6	6.25	5	4.90	.17	10	17.24	7	17.07	.00
Hy	8	8.33	5	4.90	.95	5	8.62	3	7.32	.06
Pd	22	22.92	11	10.78	5.24**	12	20.69	5	12.20	1.22
Mf	2	2.08	2	1.96	.00	10	17.24	13	31.71	2.82
Pa	11	11.46	7	6.86	1.26	3	5.17	8	19.51	5.00**
Pt	10	10.42	8	7.40	.40	10	17.24	13	31.71	2.82
Sc	15	15.63	16	15.69	.06	18	31.03	14	34.15	.11
Ma	23	23.96	14	13.73	4.72*	20	34.48	12	29.27	.30
Si	7	7.29	7	6.86	.01	1	1.72	3	7.32	1.94
None	42	43.75	61	59.80	5.11*	15	25.86	12	29.27	.14

* $p < .05$
** $p < .025$

Insert Table 9 about here

correlations are significant at $p < .001$.

Discussion

Although the results of the first experiment must be interpreted with caution, some of the findings obtained are consistent with that of the previous research. The results suggest that Type A females, as opposed to Type B's, have a higher level of energy, enthusiasm and self confidence. Similarly, Type A's have been found to exert greater effort, suppress fatigue (Carver et al., 1976) and score significantly higher than Type B's on measures of achievement, exhibition, autonomy and self confidence (Chesney et al., 1980). The significant negative correlations obtained between the Lie scale and the Type A and S JAS scales, suggests that males who obtain higher AB and S scale scores, tend to be relatively independent or self reliant, but still able to admit to minor social flaws. While the direction of these findings are consistent with the results of Experiment 2, the only significant relationship was obtained between the Lie and Speed and Impatience scales for females. The relative independence and self reliance found in Type A's, is consistent with the greater amount of autonomy previously found (Chesney et al., 1980). For females, the negative relationship between the K scale and Speed and Impatience, suggests that high S scale scorers may be more likely to deny serious psychopathology. Again, these findings are consistent

*TABLE 9 — INTERCORRELATION OF JAS SCALES

Scale	Type A	Speed & Impatience	Hard Driving
Type A		.66	.66
Factor S	.58		.55
Factor H	.65	.45	

* Entries above the diagonal are for males; entries below the diagonal are for females.

with the denial previously found in Type A individuals (Dimsdale et al., 1978; Smith & Brehm, 1981).

Consistent with the results obtained by Wadden et al. (1983), no relationship was found between Type A and the MMPI measures of neuroticism (Hs, D, Hy, Pt) in Experiment 1 or 2. Contrary to Irvine et al's. (1982) findings of a significant relationship between neuroticism and the Type A scale, it appears that Type A scale elevations are not associated with neurotic functioning, but rather adaptive behaviors. This is evident in Experiment 1 for both sexes, and Experiment 2 for males, with the negative correlations between Hy, Pt and Type A. While positive relationships were obtained between the other scales measuring neuroticism and Type A, the magnitude of the correlations are minimal. Conversely, Hs and Pt were found to be significantly, and positively, related to Speed and Impatience.

The results of Experiment 2 suggest that there is a strong relationship between the Speed and Impatience scale of the Jenkins Activity Survey and psychopathology. Although this relationship is clearly more applicable to the females in this study, with 9 of the 13 correlations achieving significance, this relationship also holds true for the males. It appears that for females, higher S scale scores are associated with greater denial (F), physical illness or concern over bodily functions (Hs), interpersonal and social conflicts (Pd), sensitivity (Pa), worry (Pt), feelings of alienation (Sc), social

introversion (Si), independence or self reliance (L) and denial of psychopathology (K). The positive relationship between worry, sensitivity, denial and high S scale scores, is consistent with the findings of Smith and Brehm (1981). In this study, Type A females were found to overreact to frustration and to worry about potential problems. Thus, further confirmation for the worry, frustration and denial components of the Type A behavior pattern have been obtained.

For males, high S scale scores are associated with greater denial (F), interpersonal and social conflict (Pd), energy, enthusiasm and self confidence (Ma). Clearly, the Speed and Impatience subscale of the JAS is more closely associated with psychopathology as measured by the MMPI than either Type A or the Hard Driving scales.

While no relationship was found between Type A males and the MMPI, only two significant correlations were obtained for females. Consistent with previous findings (Burnam et al., 1975), Type A females may be described as experiencing greater social and interpersonal conflicts (Pd) and as interested in more masculine activities (Mf). Similarly, the Hard Driving scale does not appear to be related to psychopathology in general. The only significant correlations obtained suggest that high H scale scores may be related to depression for females and to denial of psychopathology and high energy levels for males.

While a large number of significant differences were obtained in

Experiment 2, they serve little practical clinical utility as the mean profiles of A's and B's, high and low H and S scale scorers, are within the normal range. On the other hand, the greater number of Type A females evidencing pathology (T-score $\geq$ 70) on the 13 MMPI scales, suggests that the Type A behavior pattern may be associated with psychopathology. In addition, these differences achieved significance on the Pd and Ma scales. Although not significant, a greater number of elevated scores were found on the F, D, Hy, Pd, Pt and Ma scales for Type A males. Consistent with previous descriptions of Type A's, individuals who score high on the Pd scale may be characterized as intelligent, self confident, hostile, aggressive, energetic, having a wide range of interests, extroverted, insensitive to others, interested in others in terms of how they can be used, self centered, immature, impatient, having limited frustration tolerance, experiencing marital problems, engaging in antisocial behavior, prone to worry and rebelliousness (Graham, 1982). In addition, individuals with elevated Ma scale scores may be described as manifesting excessive purposeless activity, energetic, having a wide range of interests, involved in many activities, easily bored, restless, having a low frustration tolerance, having episodes of irritability, hostility and aggressiveness, an exaggerated sense of self worth and importance, unable to see their own limitations, outgoing, friendly, enthusiastic, self confident, manipulative, harboring feelings of dissatisfaction, tense, nervous,

anxious and prone to worry. While the findings of Experiment 1 support Jenkins et al's. (1978) claim that the factors assessed by the JAS scales are generally unrelated to factors measured by traditional psychological tests, Experiment 2 clearly suggests this is not the case.

Contrary to the assumed comparability of the student and adult JAS forms (Glass, 1977), Experiment 1 and 2 suggests a high degree of association between the JAS subscales. While the subscales of the adult form of the JAS have been found to be relatively independent, the student form was found to be highly interrelated (see Tables 2 and 9). With the vast differences in the intercorrelations of the JAS subscales obtained on the adult and student forms, there may be no reason to necessarily assume that these two forms are equivalent.

Of the three subscales, the Speed and Impatience scale appears to be most strongly related to psychopathology. It is interesting to note that despite the strong intercorrelations between the JAS subscales, the Speed and Impatience scale is the only one which is related to psychopathology. While the reason for this is unclear, an investigation of the utility of each of the three subscales in predicting or identifying individuals who subsequently develop CHD may clarify this issue. The Speed and Impatience scale of the JAS form T, may be more closely related to CHD or able to identify Type A individuals than the AB scale of the JAS form T in a sample of university students.

The conflicting results obtained between Experiment 1 and 2 may be due to a number of factors. The different forms of the MMPI which were utilized, may account for some of the inconsistencies. Although scores on the 13 clinical scales can still be derived from the first 399 items on the MMPI, greater reliability is obtained through the use of the full test form (566 items). In addition, significant differences have previously been found between students attending school in the spring and fall (Gerbus & Travis, 1973). In this study, significant differences were found on the Hs, Hy, Pd and Ma scales of the MMPI. Although speculative, it is likely that the summer students are more time urgent and work oriented than those attending the fall session. Also indicative of this is the fact that a higher median AB score was obtained for the summer sample (8) as opposed to the fall students (7). Many of those in summer school were already involved in their careers and were coming back to university to upgrade or to complete degrees. Thus, it is likely that the summer sample was generally more serious and concerned about their work performance than the fall students, many of whom were just beginning their university careers. In addition, the JAS student form may very well not have been appropriate for many of the students in the summer sample given the high mean age and the fact that many of the students were already involved in their careers.

In summary, although the significant results obtained in Experi-

ment 1 did not exceed that which could have been obtained by chance, the findings are consistent with the previous research characterizing Type A's as energetic, confident, independent, and more likely to deny psychopathology. Conversely, the results of Experiment 2, which involved a more rigorous investigation of the relationship between the JAS and the MMPI, revealed a strong relationship between the JAS (form T) and the MMPI, in particular the Speed and Impatience subscale. Despite the large number of significant correlations obtained in Experiment 2, the amount of variance accounted for between A's and B's, high and low H and S scale scorers by the MMPI, indicates that the MMPI has little clinical utility in the prediction of this behavioral syndrome. On the other hand, other studies have used the MMPI to predict the onset of cardiovascular disease (Gillum et al., 1980) and differences between expired and successful open heart surgery patients (Bruhn et al., 1969; Gilberstadt & Sako, 1967; Lair & King, 1976) but have failed to differentiate between Type A and B individuals. The results of Experiment 2 suggest that there may be some utility in collecting longitudinal MMPI data with an older sample of identified Type A and B individuals because of the association between this behavioral syndrome and CHD. Clearly the large number of significant correlations obtained and the larger percentage of Type A's evidencing elevated Pd and Ma scales, raises the question of whether Type A's and B's who subsequently develop CHD may not also evidence such significant differences on the MMPI. If this is the case, targets for early

treatment intervention may be identified. With the importance of modifying the Type A behavior pattern because of its association with coronary heart disease, identifying a set of personality characteristics amenable to treatment intervention is crucial. With significant differences obtained between A's and B's, high and low H and S scale scorers in a normal sample of university students in the present study, such differences should certainly be more evident in an older sample of subjects, who as a result are more likely to develop coronary heart disease.

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