The Relationship Between Perceived Challenge and Daily Symptom Reporting in Type A vs. Type B Postinfarct Subjects

By: Ronald P. Schlegel, Jacqueline K. Wellwood, Brenda E. Copps, Harvey W. Gruchow, and Michael T. Sharratt

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Abstract:
Previous studies have suggested that Type A individuals underreport both subjective fatigue and physical symptoms under conditions of ongoing challenge. The present study tests whether postinfarct Type A's also suppress fatigue and, more importantly, whether they underreport MI-related symptoms during the course of their daily activities. Subjects (N = 40) were post-MI middle-aged men participating in an exercise rehabilitation program, and were classified as Type Al, A2, B3, or B4 by the structured interview method on admission to the study. Laboratory fatigue ratings were obtained using the Borg perceived exertion rating scale during bicycle ergometer exercise. A diary method was used to obtain symptom reports and ratings of subjective fatigue, perceived stress, and perceived challenge during usual daily activities over a 2-week period. Results indicate that Type A postinfarct patients did not suppress fatigue relative to Type B's during the bicycle ergometer exercise. However, Type A's who scored high on perceived challenge during the course of daily living did report fewer symptoms than Type B's; clear negative correlation between perceived challenge and symptom reporting was observed for Type A's, in contrast to Type B's, who exhibited a positive relationship.
KEY WORDS: Type A—B; symptom reporting; fatigue suppression; perceived challenge.

Article:

INTRODUCTION

A recent review by Zyzanski (1978) summarizes the evidence for a positive association between Type A behavior pattern and coronary heart disease (CHD) as documented by retrospective and prospective epidemiologic data and angio-graphic validation (Zyzanski *et al.,* 1976). Results from the Western Collaborative Group Study showed that, compared to Type B individuals, Type A's had an over two times greater risk of CHD (2.92/1000 persons/year vs. 1.32, $p< 0.003$), Type A's were 1.6 times as likely to have a fatal myocardial infarction (MI), and the likelihood of a recurrent infarction was five times greater for Type A's (Rosenman *et al.*, 1975). Factor analyses of the structured interview assessment of the A/B behavior pattern (Matthews *et al.*, 1977) and the Jenkins questionnaire (Zyzanski and Jenkins, 1970) have indicated that the Type A behavior pattern can be broken down into several components including hard driving and competitive, speed and impatience, job involvement, and achievement orientation, David Glass and his colleagues (Glass *et al.*, 1974; Krantz *et al.*, 1974; Burnam *et al.*, 1975; Carver and Glass, 1978) have conducted an impressive series of investigations in which various of these components have been experimentally validated using research paradigms from social psychology. Concerning one of the components (excessive competitive achievement striving), Carver *et al.* (1976) hypothesized that hard-driving individuals would suppress subjective fatigue in order to continue performing at a high level and thereby maintain environmental mastery. As predicted, they found that Type A's reported significantly less fatigue on a Balke treadmill test despite having actually worked to a higher maximum oxygen uptake than Type B's. These authors suggested that this fatigue suppression may generalize to such cognitive tasks as recognizing cardiac-related symptoms. If this were true, Type A's would be at risk in two ways — first, in terms of the Type A pattern being a risk factor to the pathology itself, and second, because a person not acknowledging his symptoms would experience delay in seeking treatment, thereby increasing the risk of a progression from infarction to fibrillation.

In order to test whether the Carver *et al.* (1976) findings pertaining to fatigue suppression do extrapolate to reporting of physical symptoms, Weidner and Matthews (1978) recently reported a study in which college women worked on an arithmetic problem while being exposed to aversive noise. Half the *Ss* were instructed to work on the problem for 4 min and half for 8 min, although after 4 min all subjects were stopped. Type A's reported significantly fewer symptoms on a 14-item checklist and less fatigue when they expected the task to continue (i.e., 8-min instructions) as compared to the (4-min) condition where no further problem-solving activity was anticipated. By contrast, Type B's did not differ between the two expected task duration conditions. This investigation provides clear evidence that Type A's in circumstances of ongoing challenge underreport both subjective fatigue and a variety of physical symptoms.

Weidner and Matthews suggest that their results may have considerable importance in terms of the etiology and course of CHD. However, given the nature of their population (i.e., female undergraduate students) and symptoms (i.e., nonspecific to MI even though some pertained to the cardiovascular system), their discussion relating to the reduced likelihood of Type A's seeking medical care and responding to early heart disease symptoms is purely conjecture at this time. If the study population pertained to persons high aterisk for MI and the symptoms assessed were specifically MI related, then similar findings would have a highly meaningful and direct relevance to CHD. For example, failure to report symptoms specific to CHD by an aterisk population would have significant implications in terms of persons making decisions to seek medical attention.

Greene *et al.* (1974) attempted to identify the psychological behavior of persons at the acute prehospital phase of myocardial infarction. Subsequent to reviewing three separate sets of investigations in this area, they indicated that "at least three separate cognitive functions are required to make a decision to seek medical help: one, the perception of the presenting symptoms; two, the appreciation of the meaning and the seriousness of the symptoms, that is recognition; and three, realization that medical care is indicated for the recognized and appropriately interpreted symptoms" (p. 145). These authors found the survival rates to be closely related to the promptness of seeking proper medical care and suggested that patients who delay are characterized by attempts to maintain existing social role obligations, and it is their interpretation that "these behaviors afford means for the patient to deal with helplessness Sometimes it appears that many of the Type A persons who develop myocardial infarction would rather die than face the prospect of helplessness, being sick and being a patient" (pp. 152-155). Thus, in order to maintain environmental mastery, Type A's may be less ready to recognize not only fatigue but also MI-related symptoms. In summary, while the findings per se of the Carver *et al.* (1976) and Weidner and Matthews (1978) studies lack direct clinical meaningfulness for CHD, the conceptual rationale advanced by these authors has substantial relevance to the etiology of CHD insofar as personal behavior is concerned.

The present investigation proposed to extend these previous findings by determining whether post-MI Type A men also suppress fatigue in a laboratory situation and, more importantly, whether they underreport MI related symptoms during the course of daily living. The latter was investigated in a field context in order to achieve greater ecological validity. It was expected that underreporting of fatigue and symptoms by Type A's would occur only in circumstances of challenge since Type A has been defined as "an overt behavior pattern that is elicited in susceptible individuals by appropriately challenging circumstances" (Carver *et al.,* 1976, p. 460). In the laboratory part of the study, a bicycle ergometer task was presented as the challenge. In the field study, challenge was operationalized in two ways — first, in terms of a daily self-perceived challenge rating; and second, a catecholamine metabolite measure, 3-methoxy-4-hydroxymandelic acid (VMA), presumed to represent challenge on a physiological level. The present study should be viewed only as a preliminary endeavor to investigate these questions, in that men participating in an exercise rehabilitation program for CHD were available for study and obviously constitute a biased sample with respect to the cardiac population at large.

METHOD

Subjects

Subjects were part of an ongoing investigation examining the role of exercise as a rehabilitation modality for post-MI patients. This cardiac program was held at a general community hospital on an outpatient basis.

Infarction diagnosis was based on ECG abnormalities and elevated serum enzyme profiles. Patients required the consent of their family physician (as well as signing a personal informed consent form for the exercise intervention). All patients were free of any orthopedic disability which would limit their physical activity, had not had an aortocoronary bypass prior to entry, and also had an absence of cardiac failure. Subjects were classified as Type Al, A2, B3, or B4 by the structured interview method (Rosenman *et al.*, 1964) performed by a trained interviewer from the Ontario Multi-Centre Exercise Heart Study (Rechnitzer *et al.*, 1975). The total available sample numbered 40 men; Al's and A2's were combined to represent Type A's *(N* = 27), and B3's and B4's to represent Type B's *(N*= 13). (Sample sizes vary slightly for the different analyses since not all subjects participated in both the field and the laboratory parts of the study. The actual N's are reported along with the results of each analysis.)

Procedures

Laboratory Study

Exercise tests were carried out annually as part of the cardiac rehabilitation program for the purpose of assessing functional maximum capacity levels and revising exercise prescriptions. These tests were administered at the hospital, the same location at which the cardiac program was held. Testing was conducted on a Monarch bicycle ergometer with a physician and technician in attendance. ECG readings were monitored throughout. The subject started the bicycle test at an initial workload of 100 kpm for the first minute, and this was increased by 100 kpm each minute. The patient was instructed to continue as long as possible up to volitional fatigue (or contraindications like angina or significant ST depression had developed, in which case the physician terminated the task). Thus, it must be emphasized that this was a symptom-limited or functional maximum test. (Due to the nature of the sample, i.e., rehabilitating post-MI patients, tests of physiological maximum capacity are not recommended and predictions of MV02 from submaximal performances are inaccurate.) Although the subject was continually given reassurance throughout the test, no attempt was made to encourage or discourage his efforts.

Before beginning the ergometer task, an experimenter (E) explained to each patient that he would be asked to rate his "feelings of fatigue" during the last 15 sec of every workload. *Ss* were blind to the true purpose of this aspect of the procedure, and similarly the *E* was blind to the subject classification. Fatigue ratings were made in terms of the Borg (1962) perceived exertion rating scale, which ranges from 6 ("very, very light") to 20 ("very, very hard"). This 15-point numerical scale along with its verbal descriptors was situated in large print in direct view of the *Ss*. The patient's verbal response was recorded by the *E* alongside the appropriate workload on the standardized progressive exercise test data sheet.

Field Study

Diaries were maintained over a 2-week period for *Ss* to report their symptoms. A cover story was used so that *Ss* would be blind to the fact that Type A—B classification was being specifically related to MI-related symptoms. Participants were told that these data were being collected as part of an investigation into the relationship between physical activity patterns and health status: "in view of the recent outbreak in flu.. .. We are interested in seeing whether your involvement in regular exercise in any way affects the number of symptoms you experience." Ten MI-specific symptoms were randomly embedded within a larger list so that the overall checklist of 22 items pertaining to various health symptoms and illness behaviors would uphold the cover story. The 10 symptoms (scored yes or no) for our purposes included:

1. I was short of breath climbing 8-10 stairs.
2. I became dizzy during physical activity.
3. I experienced pain in my left arm.
4. I felt nauseous.

5. I had a general feeling of uneasiness for no apparent reason.

6. I experienced a tightening in the chest.

7. I felt my heart "skip a beat" one or more times.

8. I perspired heavily for reasons other than exercise and temperature.

9. I felt sudden, sharp chest pain.

10. I sensed a numbness in my jaw.

These symptoms were obtained from a content analysis of medical records of patients who experienced an MI and, furthermore, were reviewed for their clinical relevance to CHD by a cardiologist and cardiovascular physiologist. In addition to the checklist of somatic complaints, each questionnaire contained 15-point rating scales for subjective fatigue, perceived stress, and perceived challenge. More specifically, *Ss* were instructed to rate each daily experience in terms of their feeling "extremely alert" (1) to "extremely tired" (15), "not at all stressful" (1) to "extremely stressful" (15), and "not at all challenging" (1) to "extremely challenging" (15). *Ss* completed this questionnaire every second evening just before retiring to bed and mailed it to the university in preaddressed, stamped envelopes which were provided. Each questionnaire had been previously dated to remind each *S* when it was to be completed, and also a subject code was stamped on it so that all questionnaires could be matched to each specific *S*.

Ss were asked to obtain individual urine specimens the following morning immediately after awakening. This was done to make the specimens as com-parable as possible with respect to the time of collection. Specimen assay and handling methods followed previously established procedures reported for field investigations (Gruchow, 1976). More specifically, predated specimen bottles (60 cm) containing 0.5 g sulfuric acid crystals to prevent bacterial growth and to stabilize catecholamine metabolites were provided for the subjects. *Ss* were requested to refrigerate the specimens until they were picked up and trans-ported to the laboratory. Specimens were stored frozen in the laboratory prior to analysis. Since neither specimen volumes nor collection intervals could be controlled in this study, urine specimens were analyzed for both VMA and creatinine concentrations to compensate for possible individual variation in renal function. The method of Pisano *et al.* (1962) was used for VMA determinations, while creatinine determinations were made using the alkaline picrate method of Folin and Wu (Frankel *et al.*, 1970). All further references in this paper are to creatinine-corrected VMA values.

VMA was selected as the physiological measure rather than free catecholamines, because it is a more stable measure of catecholamine activity, and because the collection of urine specimens is less refractory than obtaining blood samples for serum measures of catecholamine activity. A primary disadvantage of utilizing VMA measurements is that sympathetic nervous activity and adrenal medullary activity cannot be differentiated.

Analyses

For the laboratory study, each subject's fatigue ratings were analyzed in two ways — (a) the average of all fatigue ratings obtained over the entire duration of the bicycle ergometer task and (b) the fatigue ratings from the last three individual workloads. A t-test analysis for independent samples was done to compare Type A's vs. Type B's on these scores. For the field symptom reporting, the total number of MI-related symptoms was tallied for each *S* over the 2- week period and this total was divided by the number of days to obtain a "number of symptoms per day" score. Similarly, scores were computed from the 14 daily ratings for average subjective fatigue per day, average perceived stress per day, and average perceived challenge per day. On the perceived challenge rating score, *Ss* were divided into high vs. low challenge groupings on the basis of a median split. A 2 X 2 factorial analysis of variance (ANOVA) was completed on the average daily symptom scores as the dependent variable, with high/low challenge as one factor and Type A/B as the other factor.

VMA scores were determined for each *S* for two randomly selected week-days over the 2-week period and one randomly selected day during a weekend. (Only three urine specimens were actually analyzed due to costs involved.) The three VMA determinations were averaged for each person to obtain an average daily VMA score, and *Ss* were classified as high vs. low VMA on the basis of a median split. A 2 X 2 ANOVA was again completed on the average daily symptom scores, with high/low VMA and Type A/B as the independent factors in the design.

Table I. A Comparison of Fatigue Ratings for Type A vs. Type B Postinfarct Men on a Bicycle Ergometer Task

	Type A (N = 25)	Type B (N = 13)
$\overline{X}$ over all workloads	11.94	12.03
3rd last workload	13.00	13.54
2nd last workload	14.44	15.23
Last workload	15.72	17.08

RESULTS

Laboratory Study

The mean age, preexercise heart rate, and blood pressure of the men were 48 years, 78 beats per minute, and 130/83 mm Hg, respectively. Table 1 indicates the comparison of Type A vs. Type B *Ss* on their fatigue ratings taken during the bicycle ergometer task. No significant differences were found for the overall average of the fatigue ratings over the entire duration of the task or for any of the individual fatigue ratings from the last three workloads. Since the exercise test was symptom limited for this particular population, however, a variety of workload levels was achieved by the men. It could be possible that the Type A's worked harder than the Type B's, as Carver *et al.* (1976) found in their study, and thus actually did underreport fatigue given an equivalent level of work performed. However, the mean number of workload increments was not statistically different between Type A's (X = 7.64) and Type B's (X = 8.00). Nonetheless, to obtain some standardization *on an individual basis* in this regard, each individual fatigue rating was divided by the number of workload increments achieved by each person in order to obtain a "fatigue rating per number of workload increments" score. Analyses identical to those reported for Table I were repeated, but still no significant differences were found. Thus, these results indicate that Type A postinfarct patients did not suppress fatigue as compared to Type B's when challenged by a bicycle ergometer task in a clinical laboratory setting.

Table II. Mean Number of Daily Cardiac Symptoms by Type A vs. Type B Under Conditions of High and Low Challenge

	Perceived challenge	
	Low	High
Type A (N)	1.21 (12)	0.68[a] (12)
Type B (N)	0.28 (5)	0.86 (5)

[a] Interaction significant at $p < 0.05$.

Field Study

A total of 40 men was included for the field study; of these, 4 did not return any questionnaires (2 due to hospitalization and 2 for holiday reasons), and 2 others were eliminated from the analyses since these *Ss* had checked all 24 somatic symptoms (including the 10 MI related), thus suggesting that they did not understand instructions. The results for symptom reporting from the 2- week diary did indicate a significant interaction ($p < 0.05$) in the expected direction.[3] Table II indicates that Type A men who perceived themselves as highly challenged reported fewer symptoms than when they felt less challenged. In contrast to the Type A's, Type B postinfarct men reported more symptoms under the condition of high challenge than low challenge.

A limiting factor of this ANOVA analysis is that the continuous variable of perceived challenge had been dichotomized and this "loss of information" has the effect of underestimating true differences. Consequently, a Pearson product — moment correlation was computed between perceived challenge (using the entire scale of response) and reported symptoms for Type A and Type B subsamples separately. The correlation was -0.45 ($p < 0.03$) for Type A men and +0.45 ($p < 0.19$) for Type B men (see Table IV). A Fischer Z-transformation test for the significance of differences between correlations from independent samples resulted in a significant difference of $Z = 2.09$, $p < 0.04$. Thus using all of the information available in terms of the perceived challenge rating scale, the data indicate a clear negative relationship between perceived challenge and symptom reporting for Type A's, as contrasted with a positive relationship for Type B's.

Table III. Mean Number of Daily Cardiac Symptoms by Type A vs. Type B Under Conditions of High and Low VMA

	VMA	
	Low	High
Type A (N)	1.03 (10)	0.88 (9)
Type B (N)	0.90 (3)	0.50 (6)

Table IV. Correlations of Challenge, Perceived Stress, and Symptom Reporting for Type A and Type B Men Separately

	Challenge	Stress	Symptoms
Challenge		$0.79^{a,c}$ (24)	-0.45^{d} (24)
Stress	0.03^{b} (11)		-0.41^{d} (24)
Symptoms	0.45 (10)	0.57^{e} (10)	

[a] Type A subsample above diagonal.
[b] Type B subsample below diagonal.
[c] $p < 0.001$.
[d] $p < 0.05$.
[e] $p < 0.10$.

No difference was observed between the mean VMA values for Type A's vs. Type B's. The correlation between average daily VMA and average daily perceived challenge was only +0.05 (N.S.), and thus our assumption that VMA represents perceived challenge on a physiological level did not hold. Furthermore, the VMA scores did not significantly relate to symptom reporting for Type A's or B's (Table III). This is not surprising in view of the low correlation between VMA and perceived challenge. However, to ensure that relationships on an individual daily basis were not being overlooked by reporting only the results for mean values, the aforementioned relationships were investigated separately for each of the 3 days for which VMA determinations had been completed. None of the correlations exceeded 0.09 for Type A's and -0.30 for Type B's ($p > 0.05$ for all correlations). Thus the catecholamine metabolite, VMA, did not correlate with the field self-report measures of fatigue, stress, challenge, or symptoms whether these measures were correlated as averaged scores or on a more specific day by day basis.

An interesting finding distinguishing Type A's from Type B's pertained to the correlation between the average perceived challenge and the average perceived stress ratings. For the Type A subsample, perceived stress and challenge were highly correlated ($r = 0.79$, $p < 0.001$), as contrasted with a nonsignificant correlation ($r = 0.03$) for the Type B subsample. Both stress and challenge had shown a similar pattern in their correlations with symptoms for the two subsamples (Table IV). In stepwise multiple regressions of symptoms on these predictor variables for each of the subsamples, only perceived challenge entered for Type A's, whereas both stress and challenge entered for Type B's. In the latter regression, a multiple R of 0.72 was obtained between the two predictor variables and symptom reporting ($p < 0.05$).

DISCUSSION

Glass and his associates (Carver *et al.*, 1976) found that Type A college males challenged with a treadmill exercise task underreported fatigue as com-pared to Type B's. For the present investigation, however, in which postinfarct middle-aged males were studied, there was no evidence of a similar finding. Some explanations are possible, however, which perhaps could account for not finding a Type A—B difference on fatigue suppression in our study. The first pertains to possible demand effects inherent in the laboratory procedures for obtaining the fatigue ratings. The Borg perceived exertion scale has been shown to have a linear relationship with heart rate; also, it is polar as compared to Glass' bipolar scale ranging from "as fresh as I've ever been" to "as tired as I've ever been." Also, the exertion ratings coincided with the workload increments so that failure to report additional fatigue might have appeared to the *Ss* as inconsistent with an increased work demand. Consequently, 11 *Ss* returned to the laboratory for another ergometer test with a revised protocol for obtaining fatigue ratings. This protocol consisted of the Glass scale which was inverted (i.e., the highest position on the scale indicated "as fresh as I've ever been"). The scale consisted entirely of verbal descriptors with no numerics; also, fatigue ratings were obtained every 90 sec, whereas workload increases occurred every 60 sec. This protocol was devised in an attempt to disassociate as much as possible the cognitive task of rating subjective fatigue from the objectively apparent work-load increases (e.g., even numerics were eliminated so that *Ss* would be less inclined to think in terms of quantitative increases). However, a comparison of these subsamples of seven Type A's and four Type B's revealed no significant difference between the means of their fatigue ratings ($t < 1.00$).

A second explanation possibly accounting for the lack of difference in fatigue suppression pertains to task novelty. Since most *Ss* underwent the ergometer test yearly, they may have perceived this task as a routine maneuver rather than a challenge to be mastered. To test this possibility further, the responses of 14 men in the study were analyzed for their first graded exercise test (at initial entry to the program). A comparison of nine Type A's and five Type B's again revealed no significant differences, thereby reducing the plausibility of this explanation. However, the possibility remains that the *Ss* sense of control was not adequately challenged. In the Carver *et al.* study (1976), each *S* was told that a predetermined length of time was set for the treadmill test in addition to being told "to do his best — but not to overdo it" (p. 462). In our study, the instructions did not specify the "predetermined length of time" component, and this difference may well be of critical importance. Further research with post-MI populations should include the complete Carver *et al.* instructions and also some manipulation checks pertaining to a "loss of control" challenge.

A third explanation involves the circumstances and setting in which the tests were administered, namely, a comprehensive exercise rehabilitation program conducted in a hospital environment. The setting would tend to sensitize per-sons to their feelings (i.e., one tends to pay close heed to how one feels while "hospital tests" are being performed), and second, the cardiac patients were continually encouraged to report any traces of symptoms and excessive fatigue as part of the exercise rehabilitation program. Comments such as "any time you feel symptoms, let us know," or "if you feel really tired, stop and take your heart rate" were made repeatedly. Thus, it is quite possible that this verbal conditioning was successful in teaching both Type A's and Type B's not to ignore any potentially serious signals of a pending MI recurrence. To investigate this possibility further, one would need to repeat this study with "naive" post-MI's.

Given the fact that this particular population of cardiac patients may have been encouraged to acknowledge their symptomatology and also the small sample sizes that were available, it is rather surprising that the field test was able to demonstrate a differential response (to reporting cardiac symptoms) for Type A's vs. Type B's under the two conditions of high vs. low perceived daily challenge. The question may be raised as to whether Type A's and B's actually had a comparable number of symptoms. However, there was no significant main effect (Type A vs. Type B) difference for number of symptoms reported as determined from the ANOVA (Table II). Furthermore, an examination of the medical records revealed that Type A's and B's did not differ significantly in the percentage that experiences angina, has hypertension, or takes heart-related medications. Also, another potential explanation for these results involves differential fitness levels. In the laboratory part of the study, it was reported that subjects did not proceed to a physiological maximum effort on the bicycle test. (Graded exercise testing followed the protocol of the "Multi-Centre Exercise Heart Study.") Thus, although a maximal aerobic capacity index of fitness was not feasible, the laboratory task was a test of functional maximum capacity (i.e., highest workload performed to potential onset of MI-related symptoms). Thus the ANOVA of Table II was repeated with "number of workloads achieved" as the dependent variable. No significant main effects or interactions were observed, thereby ruling out functional capacity differences as an explanation for the differential symptom reporting results.

An earlier study found higher catecholamine levels in Type A's com-pared to Type B's (Friedman *et al.*, 1960). However, a more consistent finding is that resting catecholamine levels of A's and B's are similar, but that A's have higher levels following physical or emotional stress (Nestel *et al.*, 1967; Simpson *et al.*, 1974; DeBacker *et al.*, 1979). Although there existed no a priori empirical basis for considering VMA as a physiological analogue for perceived challenge, it was decided (on an intuitive basis) to include this measure of sympathetic nervous system arousal for study. While previous research has compared Type A's and B's in their resting catecholamine levels, the present study was principally concerned with whether Type A (vs. Type B) men would acknowledge their health symptomotology differentially depending on "chronic states" of high vs. low sympathetic nervous system arousal. The VMA determinations completed from the overnight samples represented an integrated or baseline measure of sympathetic arousal, yet this metabolite was found to be unrelated to any of the previous day's self-reported feelings or cardiac symptoms. We did not measure catecholamine activity in the laboratory study; future research should address the relationship between catecholamines and self-report feelings under more controlled conditions.

In conclusion, it seems safe to suggest that Type A postinfarcts who perceive themselves as highly challenged do not report as many MI-specific symptoms as those Type A's who feel less challenged in their average daily living. Conversely, Type B postinfarct persons report a positive relationship between perceived challenge and symptom reporting. This finding holds rather important implications for Type A persons who are at high risk for heart attack (and specifically a recurrence). Type A's who adopt a chronic pattern of intense and challenging activity in their daily living may be seriously compromising their vigilance to the early warnings of a heart attack. As Greene *et al.* (1974) have suggested, this cognitive function is the first step in making a decision to seek medical help.

This study should be regarded only as a preliminary investigation of this important question. Future research will need to obtain larger sample sizes of postinfarct persons (both men and women) and should sample from the cardiac population at large rather than one restricted to participants in a rehabilitation program. Notwithstanding these limitations of the present investigation, however, the results of this study appear sufficiently promising to warrant further work and replication. Also, it would appear that while the specific results from the work by Glass (Carver *et al.*, 1976) and Matthews (Weidner and Matthews, 1978) do not necessarily generalize to MI-specific symptoms in a high aterisk population, the conceptualization advanced by these investigators can be of considerable importance in focusing meaningful questions with specific clinical relevance. Future replication of our results could also include further investigation of the mediating mechanisms underlying the relationship of Type A—B and perceived challenge with symptom reporting. Do physiological mediating variables exist (cf. Dembroski *et al.*, 1978) or is the relationship explained primarily by cognitive factors (cf. Matthews, 1978)? In any event, factors affecting illness behaviors (such as attending to cardiac symptoms) are areas no doubt just as important for further investigation as factors affecting the pathology itself.

Notes:

[3] The data were checked for homogeneity of variance and it was found that this assumption for the ANOVA analysis was not met. Consequently, an adjustment for heterogeneity of variance was made using the method developed by Box (Myers, 1972).

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