TYPE A BEHAVIOR, DEPRESSION AND ANXIETY AS MEDIATORS
OF CHEST PAIN IN CORONARY ISCHEMIA PATIENTS

A thesis submitted in partial satisfaction of the requirements for the degree of Master of Arts in Psychology

by

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DEDICATION

This thesis is dedicated to my wife Carie
and my daughter Rachel who give me the joy
and love that make my heart sing.
ACKNOWLEDGEMENTS

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I would like to thank my wife Carie who offered me both love and encouragement during the times I really felt lost.

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Fifty male coronary ischemia patients were administered the Beck Depression Inventory, Spielberger State-Trait Anxiety Questionnaire and Jenkins Activity Survey following routine exercise testing as part of a cardiac evaluation. Subjects were asked to rate the level of pain they experienced during exercise on a 4-point scale, with 1 being mild and 4 being maximally severe. Results indicated that Type A behavior, depression and anxiety were not significantly related to the experience of chest pain in coronary ischemia.

Research in the area of psychological factors and pain is encouraged, but with more careful assessment of patient populations and evaluation procedures.
CHAPTER 1

INTRODUCTION

An animal's heart is the basis of its life . . .
the sum of its microcosm; on the heart all its
activity depends, from the heart all its liveliness and strength arise.

William Harvey, 1628

Coronary ischemia is a condition in which the blood flow to the
heart is restricted by narrowing of the coronary arteries. When
increased demand is put on the heart, symptoms ranging from shortness
of breath, fatigue and chest pain can occur.

It has been estimated that 40 million Americans suffer from some
form of heart disease and this number increases on a yearly basis
(American Heart Association, 1983). There are many forms of heart
disease, two of the most common being coronary ischemia and myocardial
infarction or heart attack.

Certain psychological reactions to illness that appear common in
many disease processes also appear to be common in heart disease
(Woods & Burns, 1984). These psychological factors, which include
anxiety and depression, contribute to non-compliance with medical
regimens in cardiac rehabilitation. Poor compliance generally leads
to exacerbation of symptoms, progression of disease, and can also
contribute to rehospitalization.
CHAPTER 2

HISTORICAL PERSPECTIVES

The history of the phenomenon of cardiac psychoses has been well documented. Meyendorf (1979), in a historical perspective that traces the evolution of psychopathology and coronary disease, notes that some of the earliest philosophers and specialists in psychiatry recognized the relationship between disorders of the heart and that of the mind. Nasse (1818) wrote of the correlation between the severity of heart disease and psychopathological changes in the individual. Mickel (1888) delivered the Goulstonian lectures on insanity in relation to cardiac and aortic disease. In 1897, Osler wrote, "I believe that the high pressure at which men live and the habit of working the machine to its capacity are responsible for arterial degeneration rather than excess in eating and drinking."

More contemporary research by Meyendorf (1979) on the neuropsychiatric complications following cardiac surgery indicates that while non-cardiac surgical procedures pose only a .02% to .04% risk of psychological complications, cardiac surgery has an incidence of 10% to 60%.

**Depression and Anxiety**

A significant body of research has been compiled which relates specifically to the relationship between psychological factors and heart disease. Much of this work occurred in the past 15 years. A
substantial amount of the early research in this area concentrated on
the psychological ramifications of having a heart attack and the
recovery process that ensued. Wishnie, Hackett & Cassem (1971) found
that emotional problems during the recovery from a heart attack ser-
iously hampered physical rehabilitation and return to work. Further-
more, those patients that did return to work often experienced anxiety
and return of ischemic symptoms (primarily chest pain). Hackett and
Cassem (1971) also focused their research efforts on the psychological
reactions to a heart attack. They believe the three most common
psychological reactions to a heart attack are anxiety, depression and
behavioral disturbances, primarily seen in denial of illness. These
disturbances also included sleep disorders, failure to return to a
normal activity level and failure to follow physicians' instructions
to stop smoking and to stop excessive alcohol consumption. Wishnie,
Hackett and Cassem (1971) evaluated the relationship of the actual
hospital setting (the coronary care unit) to occurrence of psycholog­
ical problems. Results from this research were inconclusive and
failed to aid the development of a theory of the contributory factors
of environment to a patient's state of mind. One of the most exten-
sive research investigations detailing the psychological hazards of
cardiac rehabilitation came from Alan Wynn (1967). In a study of 400
male ischemic patients, Wynn found that unwarranted emotional distress
and invalidism were present in half the population that was evaluated.
Wynn found that in the majority of patients who remained unemployed
for 6 months or more, the primary causal factor was psychosocial and
not physiological in nature. Wynn's research addressed a problem that
still occurs with cardiac patients today, the need for more thorough
psychological management. Hackett, Cassem and Wishnie (1969) suggested that the distress the patient encounters might be reduced by increasing levels of sedative medications. They noted that this method is limited because of the difficulty in balancing the anti-anxiety and anti-depressant medications to achieve a stability in the patient's psychological state. This treatment question appears to accurately reflect the problems with medication rather than therapy as a means of assisting patients with emotional problems.

Despite the utilization of sedation as a method of dealing with psychological distress, it became evident that the pharmacological approach alone was unsatisfactory. Hackett et al. (1971) proposed the need for psychiatric consultation in the coronary care unit. In this study, of 441 patients admitted for evaluation in the coronary care unit, 145 were referred for counseling. Patients presented problems specifically related to anxiety, depression and inappropriate behaviors. These behaviors included denial of illness, hostility, and inappropriate sexual euphoria. As these patients were evaluated, it became clear that a "normal" sequence of emotions follows a heart attack. This sequence was seen to follow a progression beginning with denial and culminating in depression. Psychiatric intervention included medication, environmental changes, confrontation and hypnosis. Mortality for the psychiatrically treated group was 3 times less than expected for this particular coronary care unit.

Research studies have also investigated the role that an individual's psychological status plays in the physical recovery from a heart attack. Zheutlin and Goldstein (1977) studied 38 patients suffering from major cardiac injury (heart attack) and found that the
MMPI Depression Scale and a cardiac status indicator accounted for more than 70% of the variance in patient recovery. Bruhn, Chandler & Wolfe (1969) found that 17 patients with myocardial infarctions who subsequently died had significantly higher MMPI Depression scores than did survivors. Froese, Cassem, Hackett, & Silverberg (1975) utilized Galvanic Skin Potential (GSP) as a predictor of mental status, anxiety and depression in acute heart attack patients. Overall, they found that GSP showed no relationship to anxiety, mean depression or denial in these patients. Froese suggests that psychophysiological measures such as GSP may not be reliable predictors of an individual's mental state following a heart attack.

The importance of developing an association between psychosocial factors and heart disease was important because of the fact that depression following a heart attack often contributed to a patient's death. Often, though, a patient would not suffer a physiologic death but an emotional one in that the degree of depression was so significant and the inability to return to normal functioning so marked that the patient was virtually immobilized. Lloyd and Cawley (1978) documented psychiatric morbidity during the first week following an acute heart attack. They found that patients who had a higher "pre-infarction" morbidity (defined as a depressive mood), or who possessed morbidity prior to their heart attack, had a wider range of psychopathology than did patients whose psychological symptoms were precipitated by their heart attack.

A number of studies have attempted to evaluate the efficacy of different forms of rehabilitation following a heart attack. Naismith, Robinson, Shaw, & Macintyre (1979) found that patients with a positive
attitude toward their illness could benefit from psychological rehabilitation but that patients who had a negative attitude would not benefit. Rahe, Ward, & Hayes (1979) found that patients who received group therapy had significantly less follow-up coronary morbidity and mortality and returned to work in significantly higher numbers than controls. It is important to note that the group therapy patients meaningfully altered their cardiac-prone behaviors during therapy. It was concluded that the supportive aspect of the group therapy experienced was the primary determinant for the rehabilitation advantages seen for patients. Fielding (1980) also found that a combination of behavioral counseling and relaxation training spread out over a period of 12 weekly counseling sessions produced a significant reduction in the subjects' self-report of anxiety. In addition, in comparison with controls, more experimental subjects returned to work.

The bulk of research in the field of psychosocial reactions to coronary disease has focused on the patient who has actually suffered a heart attack. While heart attack patients present more complications, both physically and psychologically from the point of the severity of their problem, they comprise just a part of the population of individuals with heart disease.

The coronary ischemia patient may or may not have suffered from a heart attack. Several studies in fact indicate that coronary ischemia patients experience more intense psychological reactions from this chronic angina than do those who actually suffer a myocardial infarction. Jenkins (1976) found that the symptom of anxiety is generally more strongly associated with angina (chest pain related to
the narrowing of the coronary arteries) than with myocardial infarction. Merrill (1982) compared 139 patients with anginal syndrome alone (AS), anginal syndrome with coronary artery disease (AS+CAD), or myocardial infarction (MI). Results from the Beck Depression Inventory and the Spielberger State-Trait Anxiety Questionnaire indicated that anxiety, depression and reported symptoms were higher in the group with AS alone. The group with combined AS and CAD and the group with MI did not differ significantly. In fact, many physical symptoms (e.g., shortness of breath, chest pain) correlated negatively with coronary artery disease.

Vetter, Cay, Philips, & Strange (1977) measured the degree of anxiety shown by patients with acute ischemic heart disease upon admission to the coronary care unit. They found that myocardial ischemia patients were more psychologically disturbed than those who had an infarction. Vetter and associates' study implies a relationship between coronary ischemia and psychological reactions.

**Type A Behavior Pattern**

Another factor that is directly related to the process of heart disease is the issue of the Type A or coronary-prone behavior pattern as it relates to an individual's mental and physical state. Current research in the area of "coronary proneness" is particularly focused on the extension of the idea of Type A behavior pattern (Radley, 1982). According to Friedman and Rosenman (1969) who originally identified this pattern it is:

A characteristic action-emotion complex which is exhibited by those individuals who are engaged in a relatively chronic
struggle to obtain an unlimited number of poorly defined things from their environment in the shortest period of time and, if necessary, against the opposing efforts of other things or persons in this same environment.

It is ... an overt behavior syndrome or style characterized by extreme competitiveness, striving for achievement, aggressiveness (sometimes stringently repressed), haste, impatience, restlessness, hyperalertness, explosiveness of speech, tenseness of facial musculature and feelings of being under pressure of time and under the challenge of responsibility. Persons having this pattern are often so deeply committed to their vocation or profession that other aspects of their lives are relatively neglected. Not all aspects of this syndrome or pattern need be present for a person to be classified as possessing it. The pattern is neither a personality trait nor a standard reaction to a challenging situation, but rather, the reaction of a characterologically predisposed person to a situation that challenges him. Different kinds of situations evoke maximal reactions from different persons (From Jenkins, 1971, p. 244).

Jenkins (1975) and others made a distinction between Type A behavior and stress. Stress was usually seen as a negative stimulus or situation, or reactions (discomfort, pain, etc.) to such a stimulus. Despite a large body of research (Burnam, Pennebaker, & Glass, 1975; Glass, 1977; Jenkins, 1971, 1976; Roskies, 1979; Rowland, 1977) the Type A behavior pattern is still a topic of great controversy. One study in particular indicates how coronary-prone behaviors can
affect coronary artery occlusion. Young, Barboriak, Hoffman, & Anderson (1984) found that angina pectoris (chest pain) is an important intervening variable between coronary-prone behaviors and coronary artery occlusion. Young et al. felt that an evaluation of the degree of angina pectoris in a population should be carefully considered before a relationship could be drawn between coronary prone behaviors and coronary artery occlusion. Dimsdale, Hackett, Block and Hutter (1978) studied the relationship between Type A behaviors associated with coronary illness (e.g., excessive stress, perfectionism) and several other emotional factors including depression, denial of cardiac illness and accumulation of stressful life events. Among the measures utilized in this study was the Jenkins Activity Survey. Results indicated that Type A behavior is rooted in a psychosocial matrix. DeGregorio and Carver (1980) evaluated the Type A behavior pattern, sex role orientation and psychological adjustment among male and female undergraduates. A test battery including the Bem Sex Role Inventory, the Jenkins Activity Survey and the Beck Depression Inventory indicated that Type A behavioral style and a sex-role orientation low in masculinity were associated with low self-esteem, high social anxiety and depression.

Type A behavior also appears to be related not only to coronary problems but to many other types of illness. Woods and Burns (1984) found relationships between Type A behavior and the Speed and Impatience factors from the Jenkins Activity Survey and various physiological indicators of illness (e.g., blood pressure, bleeding ulcers and patients' reports of symptoms). More physical symptoms were reported by those scoring high on both these factors than by
those scoring low. The Speed and Impatience factors showed up more strongly than the Type A, being related to gastrointestinal symptoms, respiratory symptoms, sleep disorders and chest pains. The findings suggest that coronary-prone Type A behaviors are present in illnesses beyond the realm of the cardiovascular system.

The relationship between Type A coronary-prone behaviors and coronary artery disease has been well researched. However, even among the strongest of these investigations the causal nature of the relationship remains to be demonstrated (Razin, 1982). One aspect of the relationship between Type A behavior and coronary artery disease that has been demonstrated but not adequately researched is whether angina pectoris (chest pain) related to a coronary ischemic condition can be modified by such psychological factors as Type A coronary-prone behavior, depression and anxiety. Merrill (1982) has demonstrated that patients with angina pectoris have significantly higher self reports of depression and anxiety as well as reports of other symptomatology such as shortness of breath and nausea.

Cay, Vetter, Philip, and Dugard (1972a, b) studied myocardial ischemia patients and found them to be more anxious than those who had actually suffered a heart attack. An important variable in this anxiety was the degree of angina the individual patient experienced. Vetter et al. (1977) suggested that the ischemic patients who experienced anginal pains were more anxious from the beginning of their illness. Vetter notes that this finding may reflect the patient's anxiety over whether or not he had actually suffered a heart attack.
Present Investigation

Based on previous research (Dimsdale et al., 1978; Merrill, 1982; Vetter et al., 1977) which has demonstrated separate relationships between depression, anxiety, Type A behavior, and heart disease, the purpose of this investigation was to determine if a stronger relationship exists between the aforementioned psychological variables and the patient's experiences of chest pain as a result of coronary ischemia. The question of whether or not a relationship exists was not the issue, but rather the direction of the relationship and the degree to which these psychological factors mediate or modify the experience of pain.

The basis for this study was originally suggested by Dr. James McCreary at the Veterans Administration Medical Center in Sepulveda, California. The intent was to develop a more comprehensive understanding of the coronary ischemia patient's psychological reaction to his physical condition (i.e., chest pain). Although this investigation was not a replication of a previous research study, the assumptions to be evaluated are based on previous research studies that have established relationships between the psychological factors of depression, anxiety, Type A behavior, and heart disease.

The hypotheses for this investigation were derived from two previous research studies and from observations made about patients with Type A behavior patterns. Merrill (1982) found that among coronary ischemia patients with angina pectoris (chest pain) there were higher self-reports of anxiety and depression. The present investigation hoped to replicate these findings among subjects who report chest pain. The relationship between Type A behavior and the
experience of chest pain is still quite controversial (Razin, 1982). Razin notes that even the best studies that have attempted to evaluate the relationship between Type A behavior and coronary artery disease cannot demonstrate a causal relationship between these factors. Dimsdale et al. (1978) found that Type A behavior is associated with the denial of cardiac illness and symptomatology (specifically chest pain). The present investigation hoped to elaborate on this by finding a relationship between Type A behavior and denial of chest pain in a population of patients who have previously acknowledged they experienced chest pain.

The hypotheses for the present investigation were:

1. Patients who report lower levels of chest pain will score higher on the Type A survey. These patients were also expected to score lower on depression and anxiety scales.

2. Patients who report higher levels of chest pain will score lower on the Type A survey. These patients were expected to score higher on both depression and anxiety since these factors have previously been associated with reports of chest pain (Merrill, 1982; Vetter et al., 1977).
CHAPTER 3

METHOD

Subjects

The subjects were 50 male coronary ischemia patients between the ages of 40-68 ($\bar{X} = 54.3$) from a private cardiac rehabilitation center, a local hospital, and a cardiologist's office. All subjects were currently participating in a cardiac rehabilitation program and were engaged in walking on a treadmill machine for exercise or assessment as prescribed by their personal physician. All subjects had a history of heart disease, specifically the diagnosis of coronary ischemia, and had at some time previous to the study experienced chest pain as a result of this condition. The duration of heart disease in this group ranged from 6 months to 12 years with a mean duration of 6.2 years. Seventy-six percent of the subjects were married, 24% were divorced, separated or widowed. Fifty-four percent were employed full or part time while 46% were retired. Forty-eight percent had prior myocardial infarctions. Twenty-three percent reported diabetes as a complicating medical problem. In respect to ethnicity, the group was markedly homogeneous with all subjects describing themselves as adult, white males. The response rate was 100%.

Materials

The Type A Scale from the Jenkins Activity Survey (JAS) (Jenkins, Rosenman, & Zyzanski, 1979) was used to assess Type A or coronary-
prone behavior. The JAS (Form C) is a self-report, multiple-choice questionnaire consisting of 52 items designed to measure the Type A behavior pattern found to be strongly associated with the risk of coronary heart disease. The test is scored on four scales: Type A, Speed and Impatience, Hard Driving, and Competitive. For the purpose of this investigation, only the Type A scale was utilized because of its specific design as a measure of the Type A construct. Test-retest reliability of the JAS is quite good. Reliability coefficients range from .76 for 4-6 months, .66 for 1 year and .74 for 3 years.

The Trait and State scale forms (X1 and X2) of the State-Trait Anxiety Inventory (STAI) were used to evaluate the patient's manifestation of anxiety (Spielberger, Gorsuch & Lushene, 1968). The State-Trait inventory measures two types of anxiety. Trait anxiety refers to stable individual differences in anxiety proneness while state anxiety is transitory and related to a changing situation which may fluctuate over time (Spielberger et al., 1968). The STAI (A-Trait and A-State) consists of 20 statements each of which ask subjects to describe how they "generally feel." For each statement, there are four response choices: (1) almost never, (2) sometimes, (3) often, and (4) almost always. Scores range from 20 (low anxiety) to 80 (high anxiety). These scales were chosen because of their proven reliability in assessing anxiety in a medical population as well as their good test-retest reliability. Research on the A-Trait scale demonstrates a stable trait with correlations ranging from .73-.86. On the A-State scale studies demonstrate the fluctuation of the anxiety state as situational, with coefficients ranging from .33-.54.
The Beck Depression Inventory (BDI) is a 21-item survey used to evaluate depression in both general medical populations and psychiatric populations (Beck & Beamesderfer, 1974). Subjects were asked to respond to statements which increase in severity based on the degree of depression (i.e., (0) I do not feel sad, (1) I feel sad, (2) I am sad all the time and can't snap out of it, and (3) I am so sad or unhappy that I can't stand it). Scores range from a low of 0 to a high of 63 with 0-9 indicating normal range and 30-63 indicating severe depression. Because the BDI is unpublished, test-retest reliability coefficients were obtained from a research study which evaluated depression measures with medical outpatients. Berndt, Berndt, and Byars (1983) evaluated several depression inventories including the BDI on a group of 200 medical outpatients ranging in age from 18-90. The BDI was found to have a reliability coefficient of .88. Although no period of time was given for the enduring stability of the coefficient, Berndt and associates indicate that this coefficient (.88) probably is reflective of a short term stability.

All of the materials utilized in this investigation were chosen primarily because of their established use in previous research with medical populations (DeGregorio & Carver, 1980; Merrill, 1982; Woods & Burns, 1984).

Subjects were asked to fill out a brief self-report questionnaire that required them to report age, sex, current medical condition, other medical problems not related to cardiac disorders, whether or not they had ever experienced angina (chest pain), amount of exercise per week, and a self-rating scale for amount of perceived anginal pain while engaged in their routine exercise as part of a cardiac
rehabilitation regimen or medical evaluation on the treadmill machine. This scale is based on a 1-4 rating of the severity of experienced chest pain and uses the following guidelines: (1) mild, (2) moderate, (3) moderately severe, and (4) maximally severe. This scale is a standard and frequently used method of assessing the severity of a patient's discomfort during exercise testing. The entire packet takes approximately 45 minutes to 1 hour to complete.

Procedure

Subjects were drawn from patients already participating in cardiac treadmill exercise or exercise testing. Subjects whose primary diagnosis (coronary ischemia with prior experience of anginal pain) were asked if they would fill out the questionnaire following their cardiac rehabilitation exercise or testing. The study was presented to the subjects by either the nurse who assisted in the examination or by the cardiac technician who administered the procedure. Subjects were asked to complete the questionnaires and return them to either the nurse or cardiac technician who had requested their participation in the study. Subjects were instructed to fill out the questionnaires completely and not to take them home or discuss their answers with anyone. Subjects were asked for their phone number and address so that they might receive information on the results of the study they participated in. Subjects were also contacted and asked additional questions regarding marital status and ethnicity as these were not included in the original self-report packet.
CHAPTER 4

RESULTS

A single multiple regression analysis was performed on the data from this study. The multiple regression was performed between the dependent variable of pain or no pain (PAIN) and the following independent variables, Type A behavior (TYPE A), state anxiety (STATE), trait anxiety (TRAIT), depression (DEPRES), and age (AGE). Analyses were performed using the SPSS Hierarchical Regression program. The program evaluated the hypotheses in two separate procedures. First, the program tested the dependent variable of pain with each independent variable alone to determine if there were any significant relationships. Next, the program evaluated the dependent variable of pain and the independent variables combined together in an attempt to assess if the independent variables acted together to produce a significant relationship with the dependent variable.

Table 1 displays the correlations between the variables, the unstandardized regression coefficients ($\beta$), the standardized regression coefficients ($B$), the semi-partial correlations ($sr^2$) and $R$, $R^2$ and adjusted $R^2$.

Evaluation of the data revealed that none of the $R$'s met statistical significance. With all I.V.'s in the equation, only 3.8% of the total variance in the experience of pain was accounted for.
Table 1
Summary Table for Hierarchical Multiple Regression

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</table>
CHAPTER 5

DISCUSSION

The purpose of this investigation was to establish among coronary ischemia patients a significant relationship between the experience of anginal symptoms and psychological factors of Type A behavior, depression and anxiety. The psychological factors were expected to act as mediators for this experience of pain.

The results of this study indicate that in this heterogeneous patient population, no significant relationship exists between these psychological factors and the experience of angina pectoris. Although many previous studies have documented the strong relationship between coronary ischemia and psychological conditions, this study failed to demonstrate such a relationship. The results failed to replicate previous findings that indicated that coronary ischemia patients scored high on depression and anxiety on self-report measures as compared to previous scores (Merrill, 1982; Vetter et al., 1977). The results also fail to support the contention by Dimsdale et al. (1978) that a relationship exists between Type A behavior and denial of symptoms such as chest pain.

Several issues appear to have had an impact on the results of this investigation. From the standpoint of statistical analysis, the combination of independent variables accounted for an insignificant portion of the variance in pain. Further, as each variable was
entered into the equation, it did not increase the variance accounted for by the succeeding variable. Although this method of analysis (multiple regression) did not yield significant results, by the nature of the variables, it was the analysis of choice.

One of the more significant events that influenced the study was both a statistical and methodological occurrence which had not been expected or predicted. The dependent variable, pain, was supposed to have been evaluated on a 4-point scale with pain rated from mild to maximally severe. In the course of data collection, a somewhat disturbing trend emerged that changed the direction and impact of the evaluation of pain. Instead of indicating their experience of pain on a low to high scale, the subjects altered the scale in such a way that made analyzing the data difficult and jeopardized the design of the study. Subjects either indicated pain (written in as pain, but with a yes answer only, not degree of pain) or they wrote that they had not experienced pain at all (even if they had in the past which was a requirement for participation in the study). This proved to be a problem for the statistical analysis due to the fact that yes/no answers yield very little variance (i.e., restriction of range) compared to a 4-point scale. Since this trend was present in all the data collected, it was decided that the altered data would be utilized and evaluated to establish if any relationship did exist between the experience of pain and the psychological variables.

The marked heterogeneity of the population contributed significantly to the outcome of this investigation. While the subjects were similar in ethnicity, they were not alike in any other way. The subjects involved in this study were all involved in cardiac
rehabilitation. For the most part, cardiac rehabilitation patients are on a wide variety of medications specifically designed to regulate their pain. The medications the subjects were taking were not held constant and therefore most likely contributed to the negative findings. Further, each subject was in a different state of recovery or healing and they all had different levels of conditioning. Optimally, all subjects should have been evaluated before and after cardiac rehabilitation since the stage of their rehabilitation is a significant factor in their recovery. In addition, some subjects had previous cardiac surgery (coronary bypass) which also acted as a regulator of anginal pain. The group could have been broken up into subgroups (i.e., prior myocardial infarction (M.I.), chronic angina with no prior M.I., coronary bypass surgery) and then evaluated as to which subgroup if any correlated with the psychological variables. This method might have been successful in counteracting the heterogeneity of the group.

The issue of pain is another factor that complicated the outcome of this investigation. The subjective experience of pain is a complicated and highly complex physiological process. Beecher (1959) made one of the earliest arguments for the difficulty in assessing pain. Beecher felt that the pain threshold could not be compared from one person to another, or from one time to another in any specific individual. Webb (1983) in a review of chronic pain describes the current definition of pain as follows: "it is (pain) a central perception (not just a primary sensory modality) based on a complex system of psychological, neurochemical, and neurophysiologic influences functioning as systems and subsystems that interact to
activate and modulate the experience of pain." Therefore, in the present investigation the complexity involved in the experience of pain was not adequately controlled for or properly assessed, and these defects clearly contributed to the negative outcome of this study.

Research in the area of anginal pain confirms this concept of individuality in the perception of pain. Jenkins, Stanton, Klein, Savageau, and Harken (1983) found that the severity of coronary artery obstruction was not positively correlated with frequency or severity of any type of angina. In this study, patients with the same degree of coronary artery obstruction experienced different levels of angina. Behavioral and psychological factors such as sleep disturbance, physical inactivity, response to life crises, duration of cardiac illness and age were all better predictors of angina than was the degree of coronary artery occlusion. In another study, Parker, Doerfler, Totten, and Hewett (1983) utilized a multiple regression analysis to investigate the relationship between self-report measures of depression including the Beck Depression Inventory and subjective measures of pain. Parker and associates found no statistically significant correlations between subjective measures of pain and depression. Results of this study suggested that measures of depression such as the Beck Depression Inventory correlate with so many types of distress that they make no unique contribution to understanding of the experience of pain. Many variables involved in the experience of pain were not controlled for and most likely contributed significantly to the negative outcome of the present investigation.
Another related issue is that of basic research design. The variables utilized were chosen on the basis of previous demonstrated research (DeGregorio & Carver, 1980; Dimsdale et al. 1978). Although the measuring instruments utilized in this study were used individually in previous research, the present investigation did not use a pilot study to determine the feasibility of using these instruments together in an experimental design. If a pilot study had been run, the design of this study might have been altered. While the assumption that these variables could accurately and reliably measure psychological states within a population of coronary ischemia patients may have been justified, the assumption that they could demonstrate a relationship between the psychological variables and pain may be flawed. Although a subjective measurement of pain is common in cardiac rehabilitation, the previously stated confounding factors of medication and conditioning were not considered at the outset of this investigation. Additionally, the rating scales did not work as had been expected. Clearly, methodological problems prevented accurate assessment of the relationship of pain to these psychological variables.

While the previously mentioned factors, in and of themselves, could present a problem with the results, there were some additional methodological issues that need to be addressed. The study was carried out in three different locations and patients in each of these locations were not only treated differently, but medically were exposed to different environments. Similarly, the method and presentation of the study were achieved by three different people, and the method of presentation was not adequately monitored. Another
feature of this population, the heterogeneity of the medical backgrounds of the subjects, also contributed to the difficulty in assessing the results. Although the study was to be completed immediately after completion of exercise, several subjects did indeed take the packet of questionnaires home with them and returned the materials completed within a one-week period. This factor alone could account for possible external influences on the subjects while filling out the questionnaires.

From a research point of view, other factors present themselves as potentially confounding to the results of the study. Floderus (1981) feels that neurotic traits predispose to angina. Several research studies contradict this notion and suggest that the evidence for it is weak (Friedman & Rosenman, 1974; Goldbourt, Medalie; & Neufeld, 1975; Medalie & Goldbourt, 1976). Further, the relationship to angina may be seen as non-specific in that neurotic individuals are more likely to report symptoms of any kind which would therefore include their heart problems.

Even the methods used to evaluate Type A personality are subject to scrutiny. Leak and McCarthy (1984) evaluated subscales of the Jenkins Activity Survey and found that the scales are composed of heterogeneous items and as a result, tend to attenuate correlations with other measures of psychological traits. While this finding applies only to the JAS as a whole, further research is suggested with specific subscales. This finding could account for the diminishing effect demonstrated as each of the other independent variables were to the equation following the JAS.
It is safe to assume that none of the factors mentioned acted solely as a confound for this investigation. Rather, it would seem to be a combination of methodological errors and faulty assumptions that contributed to the outcome.

Future Research

While the results of this investigation are discouraging, research in the area of the relationship of psychological factors to pain is clearly warranted. Clearly, future studies in this area will need to be much more sophisticated in their methodology and design. The measurement of anginal pain is very difficult and needs both subjective and objective methods to adequately assess it. Similarly control of the subject population as well as the size of the population need to be carefully considered. A larger population would provide a more diverse subject population. Also, more control, specifically related to medical observations and diagnosis of patient conditions need to be considered.

Additionally, physiological differences in individual subjects (e.g., medication, physical condition, duration of illness) need to be controlled for. Within strict methodological guidelines, future research in this area could yield potentially valuable information on the process of the perception of pain in coronary ischemia.
REFERENCES


APPENDIX A

PARTICIPANT INFORMATION

1. Name: ____________________________________________________________
2. Address: __________________________________________________________
3. Phone: ____________________________________________________________
4. Age: __________ Date of Birth: ______________________________
5. Occupation: ______________________________________________________
   If retired, previous occupation ______________________________________
6. Do you have a history of heart disease or heart problems? 
   Yes _______ No ________
7. Do you experience angina? Yes _______ No ________
8. Do you have any other medical problems? 
   Please list: ________________________________________________________
9. How many times a week do you exercise? _____________________________
10. Please rate yourself on the following scale in respect to the discomfort (angina; chest pain) you experience while walking on the treadmill: Mark only one space below
   1. _________ Mild
   2. _________ Moderate
   3. _________ Moderately Severe
   4. _________ Maximally Severe

Please turn the page and answer the questionnaires.

Thank You
APPENDIX B

CONSENT FORM

I, ____________________________, agree to participate in an evaluation of my attitudes about my participation in a cardiac rehabilitation program. I understand that the surveys that I will be filling out will be used only for research purposes and my responses will be kept confidential. I understand that I may withdraw from the study at any time without penalty, and that my status in my cardiac rehabilitation program will not be affected if I choose to withdraw from this study. I agree to participate in this study willingly and have not been forced or coerced to participate. I understand that any questions I have will be answered by David Appleton or Michael Burnam, M.D.

I have read the statement above and understand it fully.

Subject Name

Date

Witness