PHYSICAL FITNESS AND ANXIETY IN POST AORTOCORONARY BYPASS GRAFT PATIENTS

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We hereby recommend that the Thesis prepared under our supervision by Patricia Lynn Slavich entitled "Physical Fitness and Anxiety in Post Aortocoronary Bypass Graft Patients"

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CHAPTER 1

INTRODUCTION

Nursing emphasizes a holistic approach to patient care with a commitment to health promotion and disease prevention (Narayan, 1980). By using a holistic approach, nurses recognize the interrelatedness of the person's body, mind, and spirit. For example, physical illness affects the emotional health of the indiviual, just as emotional problems will have an effect on the person's physical well-being. The work of Selye (1978) supported the idea of a body-mind connection by demonstrating that psychological stress will stimulate physiological response through the sympathetic nervous system. Pollock, Wilmore, and Fox (1978) conversely advocated this idea by suggesting that improved physical fitness levels enhance the individual's tolerance to psychological stress.

When developing a comprehensive health plan for a patient, nurses employ interventions that will strengthen the biological, psychological, and sociological components of the person. The identification and implementation of interventions that strengthen these areas is an important aspect of the nurse's role in assisting the patient

toward a higher level of wellness. Regular physical exercise may enhance the patient's psychological and biological recovery after aortocoronary bypass surgery.

Many aortocoronary bypass patients never attain the level of wellness they are capable of attaining after surgery. The obstacles preventing bypass patients from reaching a higher level of wellness seem to be psychological and physical in nature. Approximately 80% of bypass patients obtain at least some relief of their angina and are able to perform at a higher functional level after surgery (Cannom, Miller, & Shumway, 1974). This information suggests that most bypass patients could return to a more active, satisfying life than they experienced prior to surgery. Unfortunately, many post aortocoronary bypass patients remain debilitated and fail to return to normal activites because of a misperception that their postoperative weakness is directly related to an inadequate cardiovascular system. The majority of the postoperative weakness is directly related to the prolonged bedrest postoperatively (Oberman & Kouchoukos, 1978).

Despite clinical improvement, the psychological problems of anxiety and depression occur at all phases of recovery and present a major barrier to rehabilitation in

at least one-third of bypass patients (Heller, Frank, & Kornfeld, 1974). Several authors have suggested that regular physical exercise is essential in removing the physical and psychological barriers faced by the post aortocoronary bypass patient (Oberman & Kouchoukos, 1978; Pollock et al., 1978; Wenger, 1980). Most research supporting this idea has sampled postmyocardial infarction patients or psychiatric patients but little has been documented regarding the psychological benefits of regular physical exercise in the post aortocoronary bypass patient. The objectives of this study were to identify the relationship between regular physical exercise and anxiety in the post aortocoronary bypass patient and support the concept of a holistic approach to patient care.

Problem of Study

The problem of this study was to determine if, with pretreatment trait and state anxiety controlled, there was a difference between posttreatment state and trait anxiety experienced by sedentary post aortocoronary bypass graft patients who participated in a specified program of aerobic exercise and a similar group of patients who did not participate in a specified program of aerobic exercise.

Justification of Problem

Coronary artery disease remains the nation's number one health problem. The actual cause of the disease is still unknown, but a number of factors have been identified as increasing an individual's risk for development of the disease, i.e., hypertension, smoking, hypercholesterolemia, diabetes, sedentary life-style, and stress. Prevention and control of the disease has been directed, in part, at the modification of these risk factors. The patient who has undergone aortocoronary bypass graft surgery has had palliative treatment for the coronary atherosclerotic lesions, but the disease process itself will continue. Therefore, nursing care after surgery is intended to assist the patient in modifying these risk factors in hopes of slowing the rate of disease progression.

The development of a better understanding of the effects of modifying these risk factors is essential in prescribing accurate nursing interventions. Most of the research regarding alteration of a sedentary life-style has focused on the physiological effect of regular exercise, but little has been documented regarding the psychological effects of regular exercise on the patient with coronary artery disease (Gentry, 1979).

Understanding the psychological as well as the physiological effects of exercise is essential in evaluating an exercise intervention and its applicability to various situations. Physiologically, a regular aerobic exercise program will decrease body weight and fat, blood pressure, serum lipids (mainly triglycerides), and blood sugar. Such a program also increases the efficiency of the cardiorespiratory system. These improvements allow the body to function more efficiently in response to physical stresses (Pollock et al.,1978). The literature suggested that regular aerobic exercise also enhances an individual's tolerance to psychological stress and increases a sense of optimism and joy in living. These relationships have not been studied in the aortocoronary bypass graft population (Pollock et al., 1978).

Wenger (1980) stated that the major psychological problems encountered by the patient with coronary artery disease are anxiety, depression, denial, and dependency. Anxiety and depression are particularly important in contributing to the failure to return to work, to resume sexual relations, and to make a satisfactory life adjustment. If regular aerobic exercise does increase a person's ability to cope with psychological stress and enhances a sense of optimism, an essential component of

the nursing care for the post aortocoronary bypass graft patient would be to include the nursing prescription of a regular exercise routine.

Theoretical Framework

The theoretical framework for this study was Bertalanffy's general systems theory. Bertalanffy (1968) defined a system as sets of elements standing in interaction. Every living organism is considered an open system of interrelated parts. The universe is seen as a tremendous hierarchy from the smallest particle to supra-individual organizations. All levels of organization are open systems linked to each other in this hierarchical relationship so that a change at one level affects a change in the other levels. For example, atoms, molecules, cells, and organs are interrelated components of a person. Alterations in molecular and cellular components will eventually affect the other subsystems and the person as a whole. Likewise, the person is considered an open system and an integral part of the hierarchical levels of the family, the society, and the biosphere (Bertalanffy, 1968).

In the past, science has utilized a reductionist approach in research evaluating the physiological and

psychological aspects of man as separate entities. General systems theory employs a holistic approach, studying the interrelatedness of the psychosocial and biological subsystems in man. Bertalanffy (1968) stated that studying parts and processes in isolation only results in partial understanding, but studying the dynamic interaction of parts leads to a fuller, more accurate understanding of the whole. By beginning to understand some of the psychological effects of physical conditioning, nurses should be able to make more accurate applications of exercise as a nursing intervention.

The physiological effects of exercise in the patient with coronary artery disease have been the focus of much research. Little has been done to evaluate the psychological effects of regular exercise on patients with coronary artery diseaase. In accordance with general systems theory, by improving the body's physiological functioning (more specifically the aerobic capacity) through a physical conditioning program, a change in the psychological state of the person could be expected.

Assumptions

The assumptions basic to this study were:

1. Man is an open system.

2. Systems behave as a whole, changes in every element depending on all others.

3. In the state of wholeness, a disturbance of the system leads to the introduction of a new state of equilibrium (Bertalanffy, 1968).

Hypotheses

For the purpose of this study, the following null hypotheses were tested.

1. With pretreatment trait and state anxiety scores controlled, there is no significant difference between the posttreatment state anxiety scores as measured by the State-Trait Anxiety Inventory (STAI) of sedentary post aortocoronary bypass graft patients who participated in a specified program of aerobic exercise and sedentary post aortocoronary bypass graft patients who did not participate in a specified program of aerobic exercise.

2. With pretreatment trait and state anxiety scores controlled, there is no significant difference between the posttreatment trait anxiety scores as measured by the State-Trait Anxiety Inventory (STAI) of sedentary post aortocoronary bypass graft patients who participated in a specified program of aerobic exercise and sedentary post

aortocoronary bypass graft patients who did not participate in a specified program of aerobic exercise.

Definition of Terms

The following definitions were utilized in this study.

1. State anxiety (A-State)--a transitory condition of perceived tension, apprehension, and increased autonomic nervous system activity experienced by an individual as measured by the A-State portion of the State-Trait Anxiety Inventory (STAI). A high score reflects a high A-State level.

2. Trait anxiety (A-Trait)--a relatively stable condition of anxiety proneness within an individual as measured by the A-Trait portion of the State-Trait Anxiety Inventory. A high score reflects a high A-Trait level.

3. Sedentary--performing aerobic exercise less than 20 minutes 3 times per week.

4. Post aortocoronary bypass graft patients--patients recovering from aortocoronary bypass graft surgery who have an ejection fraction of greater than 40% and/or a left ventricular end-diastolic pressure of less than 20mm Hg.

5. Aerobic exercise program--an 8-week program that meets for a minimum of 3 nonconsecutive days per week for approximately 70 minutes each visit. At each visit, the patient does 10 minutes of warm-up calisthenics, 30-40 minutes of treadmill walking or stationary biking at 75-85% of his/her maximum heart rate, followed by 10 minutes of cool-down calisthenics, and 10 minutes of rest.

Limitations

The following may have limited the conclusions of this study.

1. The population to which the research findings of this study can be generalized was limited by the use of a relatively small sample that was nonrandomly selected.

2. The amount of exercise in the control group varied.

3. The level of exercise instruction in the control group varied.

4. There was no attempt to control other dimensions (social-cultural, teaching, etc.) that also may have altered anxiety levels.

Summary

The problem of this study was to determine if, with state and trait anxiety controlled, there was a difference

in state anxiety and trait anxiety experienced by sedentary post aortocoronary bypass graft patients who participated in a specified program of aerobic exercise when compared to a similar group of patients who did not participate in a specified program of aerobic exercise. Pretreatment data were collected after the maximal treadmill test. Posttreatment data were collected 8 weeks later.

General systems theory as described by Bertalanffy (1968) served as the theoretical framework to guide the study. The research hypotheses were tested using the analysis of covariance. It was anticipated that the findings of this study would add information to the nursing knowledge that governs the care of the post aorto-coronary bypass graft patients.

CHAPTER 2

REVIEW OF LITERATURE

A review of literature examined current information regarding the relationship of anxiety and physical fitness in the patient after aortocoronary bypass surgery. The topics included in the review were general systems theory; aortocoronary bypass graft surgery (ACBGS); psychosocial responses to ACBGS; coronary artery disease and physical activity; exercise and fitness; and anxiety and physical fitness.

General Systems Theory

Since Descartes, the separation of mind and body (Cartesian dualism) has strongly influenced the development of modern medical and psychological approaches to health care. Medicine has focused on altering the psychological responses of the body to disease and commonly left the emotional well-being of the patient to the psychiatrist, psychologist, and other health professionals (Peper, Ancoli, & Quinn, 1979). Cartesian dualism has proven very useful in allowing scientific researchers to keep assumptions and procedures as simple as possible when

seeking to identify cause and effect relationships in the disease process.

However, not all phenomena can be understood within the Cartesian framework. Two of the leading causes of death in the United States, coronary artery disease and cancer, seem to be linked to numerous biological, psychological, and sociological factors. A simple cause and effect relationship in coronary artery disease and cancer has not been identified. The biological, psychological, and social interactions occurring in these diseases and their treatment cannot be understood in a Cartesian framework where mind and body are considered as separate entities (Berliner & Salmon, 1980; Denenberg, 1980).

General systems theory arose from the need for a theoretical framework that extends beyond the limitations of Cartesian dualism and explains the interrelationships of the biopsychosocial systems in man (Bertalanffy, 1968). General systems theory describes man as an open system of interrelated parts. Changes or adaptations in any part of the individual result in alterations in the person as a whole. The parts of the whole are arranged in a hierarchial order. For example, atoms, molecules, cells, organs, and biopsychosocial systems are interrelated

components of the person. Changes in the system occur as information flows to the components of the system by means of feedback loops. The information flow through the feedback loops helps maintain a steady state of equilibrium within the system. In addition, information exchange between the system and the environment results in internal adaptations within the system (Bertalanffy, 1968; Blattner, 1981; Brody & Sobel, 1979).

General systems theory provides a theoretical framework for investigating the psychophysiological effects of exercise training. According to the general systems theory, adaptation in the physiological level should result in alterations at the psychological and social levels of the person through information flow and feedback. Therefore, the physiological adaptations resulting from exercise training should alter the psychological and social components of the person (Folkins & Sime, 1981). Understanding the effects of various interventions on the person as a whole is inherent for nurses assisting patients achieve and maintain higher levels of wellness.

Aortocoronary Bypass Graft Surgery

Coronary artery disease (CAD) remains the nation's number one health problem and is the leading cause of

death in middle-aged men (Bruce, 1981). Coronary atherosclerosis is a disease that begins early in life and progresses at an unpredictable rate. The major part of the progression of the disease is asymptomatic and can be detected only by coronary arteriography or postmortum examination. Eventually CAD becomes ischemic heart disease with recognizable symptoms such as electrocardiographic changes at rest or with exercise, exertional hypotension, angina pectoris, myocardial infarction, dysrhythmia, congestive heart failure, or premature death (Kimbiris & Segal, 1981; McIntosh & Garcia, 1978).

The actual cause of CAD is still unknown, but a number of factors have been identified as increasing an individual's risk for development of the disease, i.e., a family history of the disease, hypertension, hypercholesterolemia, smoking, "type A" behavior pattern, sedentary life-style, stress, and diabetes. Ideally, treatment should begin with early identification of persons with a high CAD risk factor profile. Modification of the risk factors would hopefully retard or prevent disease progression (Bruce, 1981; SaVille, Blonder, Kerin, Goldberg, Scherf, Parker, Kalavathy, & Rubenfire, 1977).

Because CAD is usually asymptomatic until it reaches advanced stages, the majority of treatment is initiated

after signs and symptoms of ischemic heart disease develop. Treatment of ischemic heart disease can be medical and/or surgical in nature. Medical management of ischemic heart disease involves risk factor modification, control of associated diseases, and the use of nitrates, beta-blocking agents, and, more recently, calcium antagonist to control symptoms. Surgical management involves bypassing the coronary atherosclerotic lesion by implanting a saphenous vein graft from the aorta to the coronary artery below the blockage. The goal of aorto-coronary bypass graft surgery (ACBGS) is to increase myocardial blood flow to the ischemic myocardium in order to eliminate symptoms of ischemic heart disease, improve ventricular function, and increase work capacity (Harrison, 1981; McIntosh & Garcia, 1978; Miller & Dodge, 1977; Rahimtoola, 1982). Both medical and surgical approaches are palliative and not curative, and neither treatment affects the underlying process of CAD (Harrison, 1981).

The first reported ACBGS was performed in 1964 at Methodist Hospital, Houston. The second reported ACBGS was done at the Cleveland Clinic in 1967. In 1970 several ACBGS were performed, and by 1974, over 30,000 surgeries had been performed. This number has grown each year and

now ACBGS is one of the most frequently performed surgical procedures in the United States today (Bruce, 1981; Harrison, 1981; McIntosh & Garcia, 1978; Ramshaw & Stanley, 1981). Over 100,000 bypass surgeries were done in 1981 at a cost of over $1.5 billion (Harrison, 1981).

The widespread use of ACBGS in the treatment of CAD remains controversial. The surgery is expensive and involves risk, and critics question the ability of the surgical procedure to increase longevity, improve quality of function, and prevent myocardial infarction, dysrhythmia, or congestive heart failure when compared to less expensive medical management of the disease (McIntoch & Garcia, 1978; Miller & Dodge, 1977; Rahimtoola, 1982; Soloff, 1978).

Researching the benefits of surgical management compared to medical management has been difficult because neither treatment modality has remained the same during the past decade. Initially studies compared surgically-treated patients of the early 1970s with medically-treated patients of the 1960s. Current medical therapy for CAD is likely to be superior to that of the 1960s due to the current availability of long-acting nitrates, beta-blocking agents, and calcium antagonists. Surgical techniques have also improved dramatically over the past

10 years resulting in reduced surgical mortality, improved graft patency, more complete revascularization, decreased perioperative infarction, and improved late survival rate of 4 years or more (Harrison, 1981; Miller & Dodge, 1977; Rahimtoola, 1982).

Several studies have suggested that ACBGS is superior to medical treatment in prolonging life in patients with left main coronary artery disease and in patients with three vessel coronary disease involving the right coronary artery, left coronary artery, and left circumflex artery. However, longevity in patients with single- or double-vessel disease appears to be the same whether the patient is treated surgically or medically (European Coronary Surgery Study Group, 1979; Hammermeister, DeRouen, & Dodge, 1980; Marthur, Hall, Garcia, DeCastro, & Cooley, 1980; Murphy, Hultgren, Detre, Thomsen, & Takaro, 1977).

Another factor to consider besides longevity in the management of coronary artery disease is the ability of the treatment to relieve or control the signs and symptoms resulting from ischemic heart disease, i.e., angina pectoris, dysrhythmia, and heart failure. Surgery decreases symptoms in 76-90% of patients; 33-55% of patients become completely asymptomatic (Rahimtoola, 1982). Medical treatment will also reduce the severity of

symptoms, but only 10-15% of patients become asymptomatic and 50% or more of medically-treated patients continue to be severely limited (European Coronary Surgery Study Group, 1979; Hammermeister et al., 1980; Rahimtoola, 1982). Studies documenting ACBGS effectiveness in eliminating symptoms of ischemic heart disease often fail to report the patient's current medical therapy; thus, the improved statistics may be the result of the combination of medical and surgical treatment rather than surgical results alone. Likewise, studies reporting better statistics with medical management contain patients that have undergone ACBGS (Miller & Dodge, 1977).

The VA Cooperative Study (Murphy et al., 1977) demonstrated a relationship between the improvement in symptomatic status after ACBGS and vein graft patency. These findings are supported by the work of Frick, Vale, and Harjola (1980), who compared preoperative and postoperative stress tests and cardiac catheterization results. They demonstrated that the principal factors improving symptomology after ACBGS were related to graft patency and completeness of revascularization.

Sarma and San Marco (1982) compared exercise hemodynamic and electrocardiographic changes in patients with severe coronary artery disease who had ACBGS and

patients who did not have ACBGS. All patients had exertional hypotension (indicating severe myocardial ischemia), exercise-induced ST depression, and decreased ejection fraction at rest and with exercise. After surgery, the ACBGS group demonstrated normal blood pressure response to exercise, significantly reduced ST depression on exercise ECG, no change in resting ejection fraction, and an improved exercise ejection fraction. The nonsurgical patients continued to have abnormal hemodynamic and electrocardiographic changes with exercise. Surgery patients were also able to increase their exercise duration, maximal heart rate, and systolic blood pressure after surgery. These findings support the concept that successful revascularization in the patients with ischemic heart disease improves ventricular function, increases work capacity, and reduces symptoms associated with CAD (Amsterdam & Mason, 1978; Gundle, Bozman, Tate, Raft, & McLaurin, 1980; Oldridge, Nagle, Balke, & Corliss, 1978; Roskamm, Weisswange, Hahn, Jauch, Schmuziger, Petersen, Rentrop, & Schnellbacher, 1977; Sarma & San Marco, 1981; Zyanski, Stanton, Jenkins, & Klein, 1981).

No difference in the incidence of myocardial infarction has been demonstrated when comparing surgically- and medically-managed patients. This may be due, in part, to

the occurrence of perioperative myocardial infarction in a high percentage of patients (1.2-40%) (McIntosh & Garcia, 1978). Improved surgical techniques, shorter operating time, and more complete revascularization have reduced this complication considerably. These advances may result in decreased incidence of myocardial infarction in ACBGS patients in future studies (Harrison, 1981; McIntosh & Garcia, 1978; Miller et al., 1977; Rahimtoola, 1982).

Graft patency is an important factor in maintaining the benefits obtained from ACBGS. In patients receiving a single vein bypass, there is a 23% chance the graft will occlude within the first 2 years after the operation. Patients receiving double vein bypass grafts have a 5% chance of both grafts occluding during the first 2 years. As for patients receiving triple vein bypasses, there is a 1% chance that all three grafts will occlude within the first 2 postoperative years (Frick et al., 1980). Rahimtoola (1982) reported that 7-15% of vein grafts occlude within 2-4 weeks after ACBGS, and 10-25% occlude within 6-12 months; thereafter, the vein graft occlusion rate is approximately 2% per year.

Angiography has demonstrated the continuation of the atherosclerotic process after ACBGS and reinforced the idea that surgery is a palliative procedure and not a

cure. Frequently the rate of CAD progression is accelerated in the bypassed vessel when the graft remains patent. Change in the ungrafted vessels occur at a rate similar to patients receiving medical management (Kimbiris & Segal, 1981).

Psychosocial Aspects of ACBGS

The physical benefits obtained from ACBGS have led to conjecture that the patient's quality of life has also been improved. Very little research regarding the psychological and sociocultural impact of ACBGS has been conducted to support or refute this assumption (Gundle et al., 1980; LaMedola & Pellegrini, 1979; Ramshaw & Stanley, 1981).

Most studies focused on return to work as the measure of increased quality of life and, consequently, concluded that surgical treatment of coronary artery disease does not significantly improve quality of life. Nitter-Hauge (1980) studied ACBGS patients 14 months after surgery and found that only 45% of patients who were working prior to surgery returned to work after surgery. Only 13% of those unemployed before surgery returned to work after surgery. Gundle et al. (1980) reported an 83% postoperative unemployment rate in low-income patients. LaMedola and

Pellegrini (1979) found that 52% of the post bypass patients they studied either retired or were unemployed after bypass surgery. However, few patients in the LaMedola and Pellegrini study perceived themselves as physically limited. Most patients were satisfied with the outcome of surgery but did not return to work because of the influence of important persons in their social situations. Therefore, the researchers concluded that return to work may not be a valid indicator of quality of life.

Only recently have studies been conducted to evaluate a wider range of psychological responses in the long-term recovery of ACBGS patients. The results of these studies have been contradictory. Heller et al. (1974) studied 70 patients 1 year after open heart surgery and found no relationship between success of surgery and psychological outcome. Over 90% of the patients experienced improvement in their physical condition compared to their preoperative ability. However, psychological adjustment decreased after surgery with approximtely one-third of the patients demonstrating significant psychological hinderance to recovery. Anxiety, depression, poor self-esteem, and somatic preoccupation were identified as major hinderances to psychological adjustment.

Zyzanski et al. (1981) studied the psychosocial adjustment and emotional status of 724 patients after ACBGS. They found a relationship between the success of surgery and psychosocial outcomes; patients requiring hospitalization for heart-related problems or other major illnesses experienced decreased psychosocial function. Patients who received relief from symptoms experienced a positive outcome. Women undergoing ACBGS and patients who exhibited type A behavior experienced significantly more negative emotional changes than patients who exhibited type B behavior. Type A behavior patients reported significantly more anxiety, depression, discouragement, and restlessness when compared to type B behavior patients.

LaMedola and Pellegrini (1979) studied quality of life in 95 postoperative patients. They found that patients viewed themselves as physically limited and few were satisfied with the outcome of surgery. The failure of over 50% of their subjects to resume employment was not associated with decreased physical ability but the influence of significant persons in the social situation.

Soloff (1978) compared the results of exercise conditioning in medically- and surgically-treated coronary patients. The results indicated there was a marked

difference between the initial mood assessment of the two groups. Myocardial infarction patients were significantly more depressed, anxious, angry, fatigued, and confused than the ACBGS patients. After 6 weeks of exercise training, the difference in mood assessment between the two groups was greatly reduced; myocardial infarction patients demonstrated significantly less tension, anxiety, total mood disturbance, and an increase in vigor. All patients improved in total mood disturbance and vigor after 6 weeks of exercise training.

Gundle et al. (1980) studied physical, psychological, and social parameters in ACBGS patients before and after surgery. Most patients demonstrated an increased functional capacity on treadmill testing after surgery. However, a large number of patients were socially and psychologicaly disabled at follow-up examination, i.e., 83% were unemployed and 57% reported sexual dysfunction, low self-esteem, and lack of pleasure from close relationships. Gundle et al. (1980) stated the patients did participate in an active physical rehabiliation program after surgery, but the researchers did not describe the program's content, or the intensity, duration, and frequency of exercise.

Ramshaw and Stanley (1981) studied patients 19-32 months after ACBGS. They concluded that the quality of life after ACBGS is less than might be expected, especially considering the good surgical result. Patients who exhibited low neurotic scores and who were internally oriented exhibited better psychosocial adjustment. Patients with high neurotic scores, who were externally oriented, demonstrated poor psychosocial adjustment.

Soloff (1978) and Gundle et al. (1980) did two of the studies that described postoperative attempts at risk factor modification. In view of the evidence that ACBGS is palliative rather than curative, more research regarding the relationship of risk factor modification in ACBGS patients and postoperative biopsychosocial adjustment is indicated.

Soloff (1978) reported a more positive psychosocial adjustment after ACBGS than most investigators. The ACBGS patients in the Soloff study were tested before and after they participated in a 6-week exercise conditioning program. This study has been beneficial in comparing the difference in biopsychosocial adjustment between myocardial infarction and ACBGS patients and emphasized the importance of outpatient rehabilitation to the biopsychosocial recovery of the CAD patient, whether medically or

surgically treated. Incorporation of a nonexercising myocardial infarction and ACBGS control group to the research design would have helped clarify the role of exercise in improving psychosocial adjustment of the patient with CAD.

Coronary Artery Disease and Physical Activity

Multiple risk factors have been implicated in the development of CAD: a family history of the disease, hypertension, hypercholesterolemia, smoking, type A behavior, sedentary life-style, stress, and diabetes. However, a direct cause and effect relationship has not been established between CAD and any one of the risk factors. Because of the interrelatedness of the various risk factors, the impact of only one of these risk factors is difficult to assess. However, the Framingham study (Kannel, 1976) has demonstrated that the more risk factors a person exhibits, the geater the chance of a coronary event.

Several studies have considered the impact of an active rather than a sedentary life-style on the development of CAD. Paffenbarger (1977) studied the relationship between physical activity and reduced incidence of coronary artery disease in San Francisco longshoremen from

1952 to 1972. The study classified the longshoremen's work as high-energy jobs and low-energy jobs. Each year assessments were made regarding energy expenditure and occurrence of fatal heart attack. Results of the study indicated that even though both high-energy and low-energy workers exhibited similar coronary risk factors, high-energy workers demonstrated significantly less risk of fatal heart attack, especially from sudden death, than the low-energy workers. The study also indicated that risk of fatal heart attack was reduced in high-energy workers even when they exhibited their risk factors. The study concluded that high levels of physical activity may provide a protective mechanism against fatal heart attack.

In another study, Paffenbarger, Wing, and Hyde (1978) studied exercise habits, morbidity, and mortality in Harvard alumni. A physical activity index was devised to provide an estimate of energy expenditure for various activities: stairs climbed, distance walked, and sports played. The results of the study showed that men who expended less than 2000 Kcal/week, experienced 42% greater risk of fatal heart attack than the more active subjects. Harvard alumni who survived the first heart attack demonstrated a reduced risk of fatal subsequent heart attack as

their energy expenditure increased. The study identified three high risk characteristics: low physical activity index (less than 2000 Kcal/week), hypertension, and smoking. The presence of one of these characteristics increased the risk of fatal heart attack by 50%; the presence of two characteristics tripled the risk. The results of the study supported the thesis that vigorous physical activity reduces the risk of fatal heart attack.

Coronary artery disease is only one of the diseases associated with physical inactivity. In addition, hypertension, depression, anxiety, and low back problems have also been related to an inactive life-style. All of these diseases are referred to as hypokinectic diseases (Pollock et al., 1978; Stegemann, 1981). Physical inactivity places an inadequate amount of stress on the individual; consequently, the body loses its capacity to respond effectively to emotional or physical stress

This process can be reversed by adopting a regular exercise habit. Stressing the cardiovascular system through regular aerobic exercise (exercise training) stimulates physical fitness, eliminates the negative effects of a sedentary life-style, and enhances the individual's abilty to respond to emotional and physical

stress (McArdle, Katch, & Katch, 1981; Pollock et al., 1978; Stegemann, 1981; Thomas, Lee, Franks, & Paffenbarger, 1981).

Exercise and Fitness

Acute physical exercise is one of the most stressful conditions imposed on the cardiovascular system because it requires sudden alterations in the routing of blood within the body to meet the oxygen requirements of exercising muscle. The cardiovascular response during exercise is mediated by the autonomic nervous system and local mechanisms occurring in the exercising muscle. At the onset of exercise, there is inhibition of the parasympathetic branch of the autonomic nervous system and increased activity in the sympathetic branch. Epinephrine and norepinephrine are released from the sympathetic nervous system causing an increased heart rate, increased myocardial contractility, and vasoconstriction in the nonexercising muscle. Vasoconstriction in the nonexercising tissues of the body is responsible for maintaining blood pressure during exercise and shunting necessary blood to the working tissues. At the same time, local vasodilitation occurs in the exercising muscle to increase blood flow, enhance oxygen delivery, and fascilitate the

removal of metabolic waste products (Blomqvist, 1980; McArdle et al., 1981; Smith, Guyton, Manning, & White, 1977).

The efficency of the cardiovascular response to exercise depends on the person's physical fitness level. Physical fitness is determined by the measure of the body's maximal oxygen uptake during peak physical effort. It is the point where the oxygen consumption plateaus and does not increase with an additional workload. His measurement is known as the maximum oxygen uptake (Vo_2 max.) or aerobic capacity and is measured in milliliters of oxygen per kilogram of body weight per minute. It represents the individual's capacity for aerobic resynthesis of adenosine triphosphatase; any additional work is accomplished by anaerobic processes resulting in the accumulation of lactic acid. Under these conditions, the individual would soon become exhausted and be unable to continue (McArdle et al., 1981; Pollock et al., 1978).

Direct measurement of maximal oxygen uptake requires an extensive laboratory and is impractical for the general population. Since there is a linear relationship bewteen heart rate and oxygen consumption regardless of sex or age, the most common method of determining the individual's aerobic capacity is recording the maximal heart

rate obtained in a maximal treadmill test (McArdle et al., 1981). Endpoints of a maximal treadmill test include inability of the individual to continue due to exhaustion, chest pain, ST depression greater than 2 mm, and dangerous dysrhythmia (American College of Sports Medicine, 1980).

When the stress of exercise is imposed on a regular basis, chronic adaptations occur, resulting in improvement in cardiovascular fitness. The purpose of regular aerobic exercise is to stress the cardiovascular system in a manner that promotes physical fitness. Essential elements in a regular exercise program that promote cardiovascular fitness include: the mode of exercise and the intensity, duration, and frequency at which exercise is performed (American College of Sports Medicine, 1980; McArdle et al., 1981; Pollock et al., 1978). An aerobic mode of exercise is best suited for improving cardiovascular fitness because it allows the exercise heart rate to be maintained at a constant level throughout the exercise period. Examples of aerobic activities include walking, swimming, jogging, running, racketball, tennis, and squash. Bowling and golf are usually not considered aerobic because the starting and stopping motion of these games prevents a continued elevation of heart rate.

The intensity of exercise should be vigorous enough to elevate the heart rate to 60-85% of the maximum heart rate obtained on a maximal treadmill test. This correlates to 45-75% of the individual's maximum oxygen uptake. Exercise does not need to be strenuous to obtain positive results. An exercise heart rate of 70% maximum represents moderate exercise and is of sufficient intensity to improve aerobic capacity (Pollock et al., 1978; Stegemann, 1981). During the first few minutes of submaximal exercise, oxygen consumption rises rapidly. By the fourth minute, a plateau is reached and oxygen consumption remains stable for the duration of the exercise period. The exercise heart rate also plateaus at this point and remains constant unless oxygen consumption changes. This plateau in oxygen consumption is referred to as the steady state or steady rate and reflects a balance between the energy requirements of exercising muscle and energy production via aerobic metabolism. Lactic acid accumulation is minimal at this level of activity (McArdle et al., 1981).

To obtain an aerobic effect, the duration of exercise can range from 15 to 60 minutes per exercise session. The frequency of exercise can vary from 3 to 5 days per week, with nonconsecutive days off. The duration and frequency

of exercise is adjusted according to the intensity of exercise performance, i.e., the lower the intensity of exercise, the longer and more frequently the exercise should be performmed to obtain cardiovascular conditioning (American College of Sports Medicine, 1980). Pollock et al. (1978) studied variations in intensity, duration, and frequency of exercise. The results demonstrated the same level of aerobic conditioning occurred in individuals who walked 40 minutes on 4 nonconsecutive days per week and joggers who jogged 20 minutes on 3 nonconsecutive days per week.

Chronic adaptations occur as a result of exercise conditioning and enhance the body's ability to tolerate physical and emotional stress (Pollock et al., 1978; Stegemann, 1981). These adaptations include increased physical work capacity, decreased resting and working heart rates and systolic blood pressures, increased stroke volume, increased maximal oxygen uptake, increased lean body mass, and reduced fat stores. Serum lipids (mainly triglycerides) and blood sugar are also reduced following exercise conditioning (Pollock et al., 1978; Stern & Cleary, 1981; Wenger, 1979).

Aerobic conditioning does not appear to stimulate the development of collateral circulation, improve myocardial

oxygen uptake, or increase the diameter of the coronary arteries in patients with CAD. Instead, the benefits CAD patients receive from exercise training are related to decreased myocardial oxygen consumption. Myocardial oxygen consumption is determined by multiplying heart rate by systolic blood pressure. Since exercise training reduces both of these factors, the net effect is a reduction in myocardial oxygen consumption, allowing the patient with coronary artery disease to perform at a much higher work capacity. The chronic adaptations occurring after exercise training have also been documented in the ACBGS patient. Exercise training increases the physical capabilities of patients after ACBGS, thus enhancing the benefits gained from surgery. Frequently, the ACBGS patient can achieve a higher exercise tolerance and maximum heart rate than medically-treated patients after aerobic conditioning (Hartung & Rangel, 1981; Soloff, 1978).

The exact mechanisms involved in the chronic adaptations of aerobic conditioning are not well understood. Some of the physiological adaptations that occur as a result of exercise training are similar to changes that occur with the administration of beta-adrenergic blocking agents such as propanolol. Cooksey, Reilly, Brown, Bomze,

and Cryer (1978) postulated that alterations in the sympathetic nervous system could be responsible for the improvements in exercise tolerance in patients with coronary artery disease. They studied exercise performance and catecholamine levels in 10 patients with ischemic heart disease before and after cardiovascular conditioning. After 3 months of training, the patients demonstrated a significant increase in exercise performance, a lowered heart rate and arterial blood pressure at any given workload, a decrease in mean plasma norepinephrine levels during supine rest, and no change in plasma epinephrine levels.

Cooksey et al.(1978) concluded that the mechanism of improvement after exercise training is at least partially mediated by adaptations resulting in lower plasma catecholamine concentrations and improved myocardial tolerance to catecholamine. Other studies have suggested that exercise training decreases sympathetic stimulation of the heart and increases parasympathetic activity in the individual (Clausen, 1977; Froelicher, Battler, & McKirnan, 1980; McArdle et al., 1981).

Cantor, Zillman, and Day (1978) also demonstrated a difference in sympathetic arousal (measured by elevations in heart rate, systolic and diastolic blood pressure, and

decreases in skin temperature) between high and low fitness groups. A comparison of cardiorespiratory fitness levels and physiological responses to watching stress-provoking films demonstrated increased sympathetic arousal in low fitness subjects. The high fitness group displayed less sympathetic arousal. The conclusion was that fit individuals are better able to tolerate emotional and physical stress.

Anxiety and Physical Fitness

Anxiety has been identified as one of the stress emotions that occurs in response to a potentially threatening situation and includes feelings of nervousness, tension, and apprehension (Folkins & Amsterdam, 1977; Horn-Saric, 1979; Spielberger, 1972). When faced with a threat, either from internal or external sources, the body mobilizes physical and mental resources to respond to the threat. This response is referred to as the fight or flight response, or a defense-alarm reaction, and characteristically involves sympathetic stimulation and elevated muscle tension (Benson, 1976; Beull & Elliott, 1979; Bove, 1977; Folkins & Amsterdam, 1977; Selye, 1978; Stoyva & Budynski, 1979).

Spielberger, Gorsuch, and Lushene (1970) differentiated anxiety into state and trait anxiety. They defined state and trait anxiety as follows:

> State anxiety (A-State) is a transitory emotional state or condition of the human organism that is characterized by subjective, consciously perceived feelings of tension and apprehension, and heightened autonomic nervous system activity. A-State may vary in intensity and fluctuate with time. Trait anxiety (A-Trait) refers to relatively stable individual differences in anxiety proneness, that is, the differences between people in the tendency to respond to situations perceived as threatening with elevations in A-State intensity. (p. 3)

Individuals with high trait anxiety would be expected to exhibit state anxiety more frequently and at a higher intensity than individuals with low trait anxiety. Spielberger (1972) stated state anxiety can be used as a measure of psychological stress. This seems appropriate since state anxiety reflects heightened autonomic nervous system activity. State anxiety decreases following acute physical activity (Morgan & Horstman, 1976). Trait anxiety has been decreased in highly anxious individuals after long-term participation in an aerobic conditioning program (Layman, 1974).

A strong association has been identified between prolonged anxiety and coronary artery disease (Benson, 1976; Beull & Elliott, 1979; Bove, 1977; Folkins &

Amsterdam, 1977). During prolonged anxiety, chronic stimulation of the fight or flight response results in heightened sympathetic activity and elevated muscle tension. Eventually, the individual loses the ability to execute the opposite response which is mediated by the parasympathetic nervous system and allows the body to recuperate and reenergize (Benson, 1976; Brown, 1977; Folkins & Amsterdam, 1977; Stoyva & Budzynski, 1979).

Anxiety and depression have been identified as the major barriers preventing a positive psychological adjustment after aortocoronary bypass graft surgery regardless of the improvement in functional capability (Gundle et al., 1980; Heller, 1974; Soloff, 1978; Wenger, 1980). Many patients continue to perceive themselves as damaged and are uncertain about their physical capabilities (Gundle et al., 1980). Most studies regarding ACBGS patients' recovery has focused on describing psychosocial adjustment after surgery and identifying personality characteristics that increase the individual's susceptibility for maladaptive behavior. Very few studies have been done to identify interventions for improving psychosocial adjustment after ACBGS (Soloff, 1978; Wenger, 1980).

Because exercise conditioning has a positive influence on many psychological parameters such as

emotional tension, anxiety, depression, and low self-esteem, it has been suggested as one of the methods for enhancing the ACBGS patients' psychosocial adjustment. Research evaluating the relationship of exercise conditioning and psychological parameters has been done in normal adults, psychiatric patients, and myocardial infarction patients. Morgan, Brand, and Feinerman (1970) studied the relationship of depression and the effects of chronic physical activity in 101 normal adult males. Subjects participated in 6 weeks of an exercise program which consisted of circuit training, jogging, swimming, treadmill running, and bicycle ergometry. The exercise group was compared with a control group of nonexercisers. The results of the study indicated the following: (a) there was no significant relationship between age, body weight, strength of grip, aerobic capacity, and percentage body fat to depression levels in normal males; (b) depressed adult males experienced significantly less depression following 6 weeks of chronic physical exercise, and (c) nondepressed males reported "feeling better" following the exercise program, but this feeling was not accompanied by a change in depression. Morgan et al. (1970) concluded that people experiencing emotional stress have the most to gain from chronic regular exercise.

Emotionally healthy individuals also reported an improved mood, but the psychometric tools used in this study did not measure or were not sensitive to this change.

Tharp and Schlegelmilch (1977) compared differences in personality traits in exercise trained and nontrained individuals. Trained individuals were significantly more relaxed, conscientious, emotionally stable, self-assured, and secure than nontrained individuals. The conclusion was that some of the personality differences between trained and nontrained persons may have resulted from the chronic exercise of the trained subjects.

McPherson, Paivio, Yuhasz, Rechnitzer, Pickard, and Lefcoe (1967) examined the psychological effects of an exercise program in postmyocardial infarction patients and healthy adult men. The study included control groups of sedentary cardiac and noncardiac adult men. Prior to exercise conditioning, the personality characteristics of the cardiac subjects differed significantly from those of the noncardiac subjects. The cardiac exercisers experienced the greatest number of positive changes in personality characteristics. In addition to improving their fitness level, the cardiac exercisers demonstrated an improved sense of well-being, increased self-confidence, and decreased anxiety. The exercising normal

adult men were already experienced exercisers and, therefore, did not demonstrate any significant changes in personality characteristics. The noncardiac sedentary control group remained unchanged. The cardiac control group did demonstrate some improvement in personality characteristics but to a lesser extent than the cardiac exercisers. The improvement in the sedentary cardiac men was considered to result from a group effect which implies that participation in a group will improve cardiac patients' mood to some extent.

A study involving 784 men with a history of myocardial infarction who participated in a 6-week exercise conditioning program were evaluated for psychological changes. The study showed a decrease in depression levels measured by the MMPI Depression scale after the exercise program. There was an increase in anxiety in nonanxious subjects and a decrease in anxiety in hyperanxious subjects as measured by the Taylor Manifest Anxiety Scale, which correlates with trait anxiety on the State-Trait Anxiety Inventory. The increase in anxiety in nonanxious subjects was felt to be due to exercise-related psychic mobilization (Stern & Cleary, 1981). The decrease in anxiety in hyperanxious subjects was attributed to exercise conditioning. The conclusion was made that

exercise conditioning will decrease anxiety in hyper-anxious individuals and increase anxiety in individuals with normal or low anxiety (Stern & Cleary, 1981).

In a study comparing psychological adjustment and the effects of aerobic conditioning in medically- and surgically-treated CAD patients, Soloff (1978) demonstrated that initial levels of anxiety, depression, fatigue, anger, and confusion were higher in the medically-managed patient. However, both groups exhibited an improvment in total mood disturbance and vigor after 6 weeks of exercise training. Another study by Gundel et al. (1980) found that a large number of ACBGS patients were socially and psychologically disabled. All patients in this study participated in an active physical rehabilitation program, but no description was included stating the length of the program, or the mode, frequency, intensity, and duration of the exercises performed. These factors are essential when trying to elicit the benefits of aerobic conditioning. Therefore, conclusions about the relationship between the psychosocial adjustment and physical activity of the subjects cannot be made.

Morgan and Hortsman (1976) investigated state anxiety (modified STAI) in normal adult and clinically-anxious subjects before, during, and 20-30 minutes after

exercise performed at 80% Vo_2 maximum. Anxiety increased during the first half of exercise, reached a plateau, and remained at this level throughout exercise. Following exercise, state anxiety decreased below the baseline measurement. It was concluded that acute vigorous physical activity reduces anxiety below baseline levels in normal and anxious individuals. These findings are interesting when correlated to the evalution of serum catecholomines during physical exercise (Smith et al., 1977) and the decrease in norepinephrine levels below pre-exercise levels following exercise training (Clausen, 1977; Cooksey et al., 1978; McArdle et al., 1981). The improved tolerance to emotional and physical stress after exercise conditioning may be related to chonic adaptations in the sympathetic nervous system.

Wilson, Berger, and Bird (1981) studied changes in anxiety levels in three groups of adults: runners, participants in an aerobic dance class, and people who ate lunch together. All groups demonstrated a decrease in state anxiety levels which may indicate that diversionary activities decrease anxiety. Anxious runners showed a larger drop in anxiety levels than nonanxious runners. This study did not control for initial fitness levels of

the participants. The authors concluded that exercise and diversionary activities may reduce anxiety levels.

Summary

General systems theory provided a theoretical framework for investigating the interrelationships of the biopsychosocial systems in man. This study focused on the psychophysiological effects of exercise training, i.e., the relationship between exercise training and anxiety in post aortocoronary bypass graft surgery patients.

Recent studies have suggested that the majority of aortocoronary bypass graft surgery patients have improved physical capability after surgery. However, many bypass patients do not perform at their physical potential and demonstrate impaired psychological adjustment after surgery due to anxiety aand depression. Various researchers have found that exercise training not only improved physical capacity in individuals, but also reduced anxiety and depression. Since anxiety and depression seem to be decreased as result of exercise training in other populations, it may serve as an important component of care in improving the psychosocial adjustment of the post aortocoronary bypass graft surgery patient. Furthermore, a sedentary life-style has been identified

as a coronary risk factor and is associated with increased incidence of fatal heart attack. Regular aerobic exercise modifies this risk factor and also seems to have a positive effect on other coronary risk factors by improving stress tolerance, reducing serum lipids, controlling obesity, and reducing hypertension.

CHAPTER 3

PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

The design of this study was quasi-experimental. The study used a nonequivalent control group, pretest-posttest design. There was manipulation of the independent variable, patients' participation in aerobic exercise program. This study qualified as quasi-experimental since there was no random selection or assignment of subjects (Polit & Hungler, 1978).

Setting

The patient population came from a private 350-bed hospital in a metropolitan area of the Southwest. This hospital was selected for the study because approximately 300 aortocoronary bypass graft operations are performed there annually and the hospital has an outpatient cardiac rehabilitation program where patients exercise as defined by the aerobic exercise program of this study.

The treatment subjects were selected from the hospital's outpatient cardiac rehabilitation program. The

control subjects were patients from the hospital who were not referred to any formal aerobic exercise program.

Population and Sample

The population consisted of those patients recovering from aortocoronary bypass graft surgery. A convenience sample of eight control subject and seven treatment subjects were chosen for the study. Subjects met the following criteria.

1. Diagnosis of post aortocoronary bypass graft surgery, an ejection fraction greater than 40%, and a left ventricular end-diastolic pressure less than 20 mm Hg.
2. At least 21 years of age.
3. Able to read and understand English.
4. Qualify in the sedentary category as defined and achieve less than 12 METS on the postoperative maximal treadmill test.
5. Physically able to perform treadmill walking or stationary biking.

The treatment group was composed of aortocoronary bypass graft patients who were referred to the hospital's outpatient cardiac rehabilitation center by their physicians. The treatment group began the aerobic conditioning program after the completion of a maximal

treadmill test. The control group were aortocoronary bypass graft patients who were not referred to a formal outpatient aerobic conditioning program and who did not participate in the aerobic conditioning program.

The treatment group participated in the cardiac rehabilitation center's program of regular exercise that met for 70 minutes, 3 nonconsecutive days per week for 8 weeks. At each visit, this group engaged in 10 minutes of warm-up calisthenics, 30-40 minutes of treadmill walking or stationary biking at 75-85% of his/her maximum heart rate, followed by 10 minutes of cool-down exercises, and 10 minutes of rest.

The control group was composed of post aortocoronary bypass graft patients who were not referred by the health team to any formal outpatient cardiac rehabilitation program. They had a history of a sedentary life-style. The control group received the same inpatient care as the treatment group, but they did not participate in any supervised outpatient exercise program after discharge. No attempt was made to control exercise the patient may have initiated on his own.

Protection of Human Subjects

This study was exempted from approval by the Human Subjects Review Committee because it met the requirements of Category I as questionnaire research and presented no risk to subjects as outlined in the Federal Regulation on protection of human subjects. Permission to conduct the study was obtained from the physicians and patients. Written permission was obtained from the agency where the study was conducted (Appendix A).

Patients participating in the study received an oral description of the study and specific details regarding their participation (Appendix B). Completion of the mailed questionnaires was assumed as consent from each participant. The cover letter (Appendix C) accompanying the questionnaires included the following.

1. A brief description of the study.
2. A description of the potential risks.
3. A description of the potential benefit.
4. An offer to answer any questions regarding the study.
5. Information that the subject could withdraw from the study at any time without penalty.
6. Information that the subjects could obtain the results of the study.

Reassurance of response confidentiality was given to each subject. Group data were used which eliminated the identification of individual responses. Anonymity was maintained by requesting subjects not to sign questionnaires. Subjects received information that physician approval of the study purpose and procedure had been obtained and that their participation would not affect the care they received.

To insure that both the initial STAI, the final STAI, and the demographic data sheet were received from each subject, the questionnaires were coded. No record was kept matching the subject's name with the code number.

Instruments

Two instruments were used: the demographic data sheet (Appendix D) and the State-Trait Anxiety Inventory (STAI) (Appendix E) by Spielberger et al. (1970). The demographic data sheet was used to collect data necessary to describe the characteristics of the sample and the actual exercise pattern each subject maintained during the 8-week period.

The State-Trait Anxiety Inventory (STAI) was used to measure the dependent variable of anxiety. This instrument is a 20-item each, 2-scale, self-administered

questionnaire on a 4-point Likert scale. The questionnaire usually takes less than 20 minutes to complete. Twenty items are designed to measure state (A-State) anxiety, a transitory condition of perceived tension. A-State scores will vary according to the amount of anxiety the subject is experiencing at the moment he is taking the test. The other 20 items assess trait (A-Trait) anxiety, a relatively stable condition of anxiety proneness that does not fluctuate regardless of the emotional climate in which the test is taken. Scores on each test range from a minimum of 20 (reflects low anxiety) to a maximum of 80 (reflects high anxiety) (Spielberger et al., 1970).

A study involving 197 undergraduate college students who were tested under varying conditions on three different occasions demonstrated a relatively high test-retest reliability correlation for the A-Trait scale. The test-retest correlations for the A-Trait scale ranged from .73 to .86. Test-retest correlations for the A-State scale were low, ranging from .16 to .54. This low correlation on the A-State scale can be expected since the A-State scale conceptually does not measure a persistent characteristic of the individual but rather a transitory condition of anxiety (Spielberger et al., 1970).

A very high concurrent validity (.75 and .80) was established for the A-Trait scale by correlating the scores with those of the IPAT Anxiety Scale and the Taylor Manifest Anxiety Scale. The implication is that any of these tests may be used as a measure of A-Trait anxiety (Spielberger et al., 1970).

Construct validity of the A-State scale was established in a study involving 977 undergraduate college students. The students were first asked to respond to the A-State scale under normal conditions. Later, they were asked to respond to the A-State scale under examination conditions. The mean scores for item and total A-State scores were significantly higher under examination conditions than under normal conditions (Spielberger et al., 1970).

Data Collection

Potential subjects for the study were identified from the hospital post aortocoronary bypass graft patients. Cardiologists at the hospital routinely have the bypass patients perform a maximal treadmill test 6 weeks after surgery. The treadmill test was conducted in the hospital's stress laboratory or in the physican's office.

All post aortocoronary bypass graft patients who met the criteria and obtained a functional capacity of 12 METS or less on their maximal treadill test were telephoned and asked to participate in the study. A verbal explanation of the study and specific details regarding their participation in the study were given at that time. A brief exercise history was obtained by telephone to determine if the sedentary requirements of the study were met (Appendix F). When agreement to participate was obtained and the sedentary requirements were met, the STAI was mailed with a cover letter to each subject. Subjects checked the appropriate response for each question and returned the completed questionnaire to the investigator, using the self-addressed, stamped envelope.

The treatment group began the aerobic conditioning program after their maximal treadmill test. The program was conducted 70 minutes on 3 nonconsecutive days per week for a total of 8 weeks. At each visit, the subject did 10 minutes of warm-up calisthenics, 30-40 minutes of treadmill walking or stationary biking at 75-85% of his/her heart rate obtained on the maximal stress test, followed by 10 minutes of cool-down calisthenics, and 10 minutes of rest.

Upon completion of the 8-week program, each member of the treatment group was mailed a demographic data sheet (Appendix D), the A-State scale (Appendix E), and a cover letter (Appendix G). The subjects returned the completed information to the investigator using the self-addressed, stamped envelope.

The control group was again mailed the demographic data sheet (Appendix D), the A-State scale (Appendix E), and the cover letter (Appendix G) 8 weeks after they completed their maximal stress test. The control group followed the same procedure in returning the information to the investigator.

Treatment of Data

Demographic data were summarized by descriptive statistics using means, frequencies, and percentages as indicated. The hypotheses were tested using analysis of covariance (ANCOVA). Analysis of covariance utilizes analysis of variance and regression to statistically control for one or more extraneous variables (pretreatment A-State and A-Trait levels). This statistical treatment is particularly useful with a quasi-experimental design when randomization has not been used and the equivalency of the comparison groups is questionable (Polit & Hungler,

1978). The dependent variable in this study was state anxiety as measured by the State-Trait Anxiety Inventory. The independent variable was the specific exercise program.

Analysis of the data was conducted using the Texas Woman's University computer. The level of significance was set at .05.

CHAPTER 4

ANALYSIS OF DATA

This quasi-experimental, nonequivalent control group, pretest-posttest study was conducted to determine the relationship between state-trait anxiety levels in sedentary aortocoronary bypass graft surgery patients who participate in a specified program of aerobic exercise and sedentary artocoronary bypass graft patients who did not participate in a specified program of aerobic exercise. Pretreatment data were collected in both the control ad treatment groups after their routine, postoperative maximal treadmill test. Posttreatment data were collected from the treatment group after 8 weeks of participation in a specified program of aerobic exercise. Posttest data were collected in the control group (who did not participate in a specified program of aerobic exercise) 8 weeks after their postoperative maximal treadmill test. In this chapter, the study findings include the descriptive data of the sample and the statistical test results for the research hypotheses.

Description of Sample

All subjects in the sample had undergone aorto-coronary bypass graft surgery and achieved less than 12 METS on a routine postoperative maximal treadmill test. The treatment group consisted of seven conveniently-selected sedentary ACBGS patients who participated in an 8-week aerobic exercise program that met 3 nonconsecutive days per week for approximately 70 minutes At each visit, the treatment group did 10 minutes of warm-up calisthenics, 30-40 minutes of treadmill walking or stationary biking at 75-85% of his/her maximum heart rate, followed by 10 minutes of cool-down calisthenics, and 10 minutes of rest. The control group consisted of a convenience sample of eight sedentary ACBGS patients who were not referred to a specified program of aerobic exercise by their physician.

The ages of the treatment group ranged from 38 to 64 years with a mean age of 49.7 year and a standard deviation of 7.95 years. The ages of the control group ranged from 45 to 78 years. The mean age for the control group was 58.2 years with a standard deviation of 11.1 years.

The treatment group consisted of seven (100%) male subjects. The control group consisted of six males (75%)

and two females (25%) subjects. All subjects in the treatment and control groups were married and of the Caucasian race.

The demographic data sheet also provided information regarding the exercise habits of the treatment and control groups. All subjects in the treatment group were enrolled and complied with the specified program of aerobic exercise as defined by the study. None of the control group subjects were enrolled in a formal exercise program, but all of the subjects in the control group reported a regular exercise routine. The mode, frequency, and duration of exercise for each group is described and presented in tabular form (Tables 1, 2, and 3).

Six subjects (85.7%) in the treatment group used walking as the aerobic mode of exercise; one subject (14.3%) in the treatment group used a combination of walking and biking as the mode of exercise. Six subjects (75%) in the control group used walking as a mode of exercise. Two subjects (25%) in the control group used a combination of walking and biking as the mode of exercise. A total of 12 subjects (80%) from both groups used biking as the aerobic mode of exercise; 3 subjects (20%) used a

combination of walking and biking as the mode of exercise (Table 1).

Table 1

Exercise Mode in Treatment and Control Groups

Mode	Treatment Group	Control Group	Row Total
Walked			
Subjects	n = 6	n = 6	n = 12
Row Percentage	50.0	50.0	
Group percentage	85.7	75.0	
Sample percentage	40.0	40.0	80.0
Biked/Walked			
Subjects	n = 1	n = 2	n = 3
Row Percentage	33.3	66.7	
Group Percentage	14.3	25.0	
Sample Percentage	6.7	13.3	20.0
Total			
Subjects	n = 7	n = 8	n = 15
Sample Percentage	46.7	53.3	100.0

All subjects (100%) in the treatment group exercised for a duration of 30-45 minutes. The duration of exercise varied in the control group: 2 subjects (25%) exercised for 15-30 minutes; 3 subjects (37.5%) exercised for 30-45 minutes; 2 subjects (25%) exercised for 40-60 minutes; and 1 subject (12.5%) exercised for 60 or more minutes (Table 2).

The frequency of exercise ranged from 5 to 7 days per week in the treatment group. In the treatment group 1 subject (14.3%) exercised 5 days per week; 2 subjects (28.6%) exercised 6 days per week; and 4 subjects (57.1%) exercised 7 days per week. The frequency of exercise in the control group ranged from 4 to 7 days per week; 1 subject (12.5%) exercised 4 days per week; 3 subjects (37.5%) exercised 6 days per week; and 4 subjects (50%) exercised 7 days per week (Table 3).

Findings

Two null hypotheses were tested in this study. The hypotheses are reviewed and the findings are presented.

The state anxiety scores were similar in both groups (Appendix H). The pretreatment state anxiety scores in

Table 2

Minutes of Exercise in Treatment and Control Groups

	Treatment Group	Control Group	Row Total
15-30 minutes			
Subjects	n = 0	n = 2	n = 2
Row Percentage	0.0	100.0	
Group Percentage	0.0	25.0	
Sample Percentage	0.0	13.3	13.3
30-45 minutes			
Subjects	n = 7	n = 3	n = 10
Row Percentage	70.0	30.0	
Group Percentage	100.0	37.5	
Sample Percentage	46.7	20.0	66.7
45-60 minutes			
Subjects	n = 0	n = 2	n = 2
Row Percentage	0.0	100.0	
Group Percentage	0.0	25.0	
Sample Percentage	0.0	13.3	13.3
60 or more minutes			
Subjects	n = 0	n = 1	n = 1
Row Percentage	0.0	100.0	
Group Percentage	0.0	12.5	
Sample Percentage	0.0	6.7	6.7
Total			
Subjects	n = 7	n = 8	n = 15
Sample Percentage	46.7	53.3	100.0

Table 3

Frequency of Exercise in Treatment and Control Groups

	Treatment Group	Control Group	Row Total
4 days/week			
Subjects	n = 0	n = 1	n = 1
Row Percentage	0.0	100.0	
Group Percentage	0.0	12.5	
Sample Percentage	0.0	6.7	6.7
5 days/week			
Subjects	n = 1	n = 0	n = 1
Row Percentage	100.0	0.0	
Group Percentage	14.3	0.0	
Sample Percentage	6.7	0.0	6.7
6 days/week			
Subjects	n = 2	n = 3	n = 5
Row Percentage	40.0	60.0	
Group Percentage	28.6	37.5	
Sample Percentage	13.3	20.0	33.3
7 days/week			
Subjects	n = 4	n = 4	n = 8
Row Percentage	50.0	50.0	
Group Percentage	57.1	50.0	
Sample Percentage	26.7	26.7	53.3
Total			
Subjects	n = 7	n = 8	n = 15
Sample Percentage	46.7	53.3	100.0

the treatment group ranged from 44 to 55 (mean = 48.86), and the control group scores ranged from 40 to 53 (mean = 47.38). Posttreatment state anxiety scores were also similar; both groups' scores ranged from 41 to 53 with a mean of 48.00 in the treatment group and a mean of 47.38 in the control group.

Trait anxiety scores were also similar in both groups (Appendix H). Pretreatment trait anxiety scores ranged from 43 to 47 (mean = 44.43) in the treatment group and ranged from 40 to 49 (mean = 43.63) in the control group. Postreatment trait anxiety scores ranged from 41 to 45 (mean = 43.71) in the treatment group and ranged from 40 to 45 (mean = 42.63) in the control group.

Hypothesis 1

The first hypothesis stated that with pretreatment trait and state anxiety scores controlled, there is no significant difference between the posttreatment state anxiety scores as measured by the State-Trait Anxiety Inventory (STAI) of sedentary post aortocoronary bypass graft patients who participated in a specified program of aerobic exercise and sedentary post aorotocoronary bypass

graft patients who did not participate in a specified program of aerobic exercise. The hypothesis was tested using ANCOVA. The independent variable was a specified program of aerobic exercise. The dependent variable was the posttreatment state anxiety score. The covariates were the pretreatment state and trait anxiety scores. This analysis (Table 4) yielded no significant difference ($F_{1,11}$ = .007, p =. 93) between the two groups on posttreatment state anxiety scores after controlling for pretreatment state and trait anxiety. Hypothesis 1 was not rejected. Therefore, there was no statistical difference between the posttreatment state anxiety of sedentary post aortocoronary bypass graft patients who participated in a specified program of aerobic exercise and sedentary post aortocoronary bypass graft patients who did not participate in a specified program of aerobic exercise.

Hypothesis 2

The second hypothesis stated that with pretreatment trait and state anxiety scores controlled, there is no significant difference between the posttreatment trait anxiety scores as measured by the State-Trait Anxiety

Table 4

Analysis of Covariance of Posttreatment State Anxiety with Pretreatment Trait and State Anxiety Controlled

Source of Variation	Sum of Squares	df	Mean Square	F	p
Covariates					
Pretreatment Trait Anxiety	0.017	1	0.017	0.001	0.975
Pretreatment State Anxiety	69.751	1	69.751	4.308	0.062
Main Effects					
Group	0.117	1	0.115	0.007	0.934
Residual	178.088	11	16.190		
Total	259.333	14	18.524		

Inventory (STAI) of sedentary post aortocoronary bypass graft patients who participated in a specified program of aerobic exercise and sedentary post aortocoronary bypass patients who did not participate in a specified program of aerobic exercise. The hypothesis was tested using ANCOVA. The independent variable was a specified program of aerobic exercise. The dependent variable was the posttreatment trait anxiety score. The covariates were the pretreatment state and trait anxiety scores. This analysis (Table 5) yielded no significant difference

($F_{1,11}$ = 1.216, p = .293) between the two groups on posttreatment trait anxiety scores after controlling for pretreatment state and trait anxiety. Hypothesis 2 was not rejected. Therefore, there was no statistical difference between the posttreatment trait anxiety of sedentary post aortocoronary bypass graft patients who participated in a specified program of aerobic exercise and sedentary post aortocoronary bypass graft patients who did not participate in a specified program of aerobic exercise.

Table 5

Analysis of Covariance of Posttreatment Trait Anxiety with Pretreatment Trait and State Anxiety Controlled

Source of Variation	Sum of Squares	df	Mean Square	F	p
Covariates					
Pretreatment Trait Anxiety	5.245	1	5.245	1.595	0.233
Posttreatment State Anxiety	1.948	1	1.948	0.592	0.458
Main Effects					
Group	4.004	1	4.004	1.217	0.293
Residual	36.181	11	3.289		
Total	45.733	14	3.267		

Additional Findings

Age was also added into the analysis as a covariate. No significant difference ($F_{1,10} = .008$, $p = .929$) was found in posttreatment state scores with age and pretreatment state and trait anxiety controlled (Table 6).

Table 6

Analysis of Covariance of Posttreatment State Anxiety with Age and Pretreatment Trait and State Anxiety Controlled

Source of Variation	Sum of Squares	df	Mean Squares	F	p
Covariates					
Pretreatment Trait Anxiety	0.000	1	0.000	0.000	0.997
Pretreatment State Anxiety	68.579	1	68.579	3.908	0.076
Age	2.570	1	2.570	0.146	0.710
Main Effects					
Group	0.146	1	0.146	0.008	0.929
Residual	175.488	10	17.549		
Total	259.333	14	18.524		

No significant difference ($F_{1,10} = 2.240$, $p = .165$) was found in posttreatment trait anxiety scores with age and pretreatment state and trait anxiety controlled (Table 7).

Table 7

Analysis of Covariance of Posttreatment Trait Anxiety with Age and Pretreatment Trait and State Anxiety Controlled

Source of Variation	Sum of Squares	df	Mean Squares	F	p
Covariates					
Pretreatment Trait Anxiety	5.539	1	5.539	1.728	0.218
Posttreatment State Anxiety	2.056	1	2.056	0.641	0.442
Age	0.959	1	0.959	0.299	0.596
Main Effects					
Group	7.179	1	7.179	2.240	0.165
Residual	32.047	10	3.205		
Total	45.733	14	3.267		

Summary of Findings

The findings of this study were:

1. With pretreatment state and trait anxiety scores controlled, there was no significant difference between the posttreatment state anxiety scores of sedentary post aortocoronary bypass graft patients who participated in a specified program of aerobic exercise and sedentary post aortocoronary bypass graft patients

who did not participate in a specified program of aerobic exercise.

2. With pretreatment state and trait anxiety scores controlled, there was no significant difference between trait anxiety scores of sedentary post aorto-coronary bypass graft patients who participated in a specified program of aerobic exercise and sedentary post aortocoronary bypass graft patients who did not participate in a specified program of aerobic exercise.

3. No significant difference was found in post-treatment state and trait anxiety scores when age was added into the analysis of covariance.

CHAPTER 5

SUMMMARY OF THE STUDY

A quasi-experimental, nonequivalent control group, pretest-posttest study was conducted to determine the relationship between state and trait anxiety level in sedentary aortocoronary bypass graft surgery patients who participated in a specified program of aerobic exercise and sedentary aortocoronary bypass graft surgery patients who did not participate in a specified program of aerobic exercise. Chapter 5 includes the summary, discussion of the findings, conclusions and implications, and recommendations for further study.

Summary

Bertalanffy's general systems theory was used as the framework to view the relationship between state and trait anxiety level in sedentary aortocoronary bypass graft surgery patients who participated in a specified program of aerobic exercise and sedentary aortocoronary bypass graft surgery patients who did not participate in a specified program of aerobic exercise. A review of the

current literature revealed that anxiety and depression are major barriers preventing a positive psychosocial adjustment after aortocoronary bypass graft surgery regardless of the improvement in functional capability (Gundel et al., 1980; Heller, 1974; Soloff, 1978; Wenger, 1980). Very few studies have been conducted to identify interventions for improving psychosocial adjustment after aortocoronary bypass graft surgery (Soloff, 1978; Wenger, 1980). Two null hypotheses were tested to determine if participation in a specified aerobic exercise program would alter anxiety and improve psychosocial adjustment after aortocoronary bypass graft surgery. The treatment group consisted of seven conveniently-selected subjects who were referred by their physician to an 8-week program of aerobic exercise. The control group consisted of eight conveniently-selected subjects who were not enrolled in any formal exercise program. Subjects were pre- and post-tested with the State-Trait Anxiety Inventory. The first hypothesis was not rejected; with pretreatment state and trait anxiety controlled there was no significant difference between postreatment state anxiety scores in the treatment and control subjects. The second hypothesis

was not rejected with pretreatment state and trait anxiety controlled, there was no significant difference between posttreatment trait anxiety scores in the treatment and control groups.

Discussion of Findings

No significant difference in posttreatment state and trait anxiety was found between sedentary aortocoronary bypass graft surgery patients who participated in a specified aerobic exercise program and sedentary aortocoronary bypass graft surgery patients who did not participate in a specified program of aerobic exercise. Two factors may have had an influence on these findings. First, the small sample size may have affected the findings of the study. Second, none of the control subjects were enrolled in a formal exercise program, but all of the subjects in the control group reported an exercise habit very similar to the exercise habit of the treatment group.

The benefits of regular aerobic exercise have received a wide range of coverage in the television and news media. Consequently, public awareness regarding the role of exercise and disease prevention has grown substantially. This sustained promotion of cardiovascular

fitness made it difficult to prevent the control group participation in unauthorized fitness programs (Kavanagh, 1979).

All subjects in this study had participated in a detailed inpatient education program regarding coronary artery disease and risk factor modification, during which they were taught mild calesthenics and encouraged to increase their walking distance gradually each day by the hospital's physical therapists. These factors may have strongly influenced the ACBGS patients in the control group of this study to continue regular exercise program on an outpatient basis. No information was obtained regarding the emphasis the patients' physician placed on the role of exercise in recovery after ACBGS. However, physician emphasis on regular exercise also may have influenced the subjects' exercise habits.

In describing emotional recovery after ACBGS, Soloff (1978) stated that fear, depression, weakness, fatigue, and incisional pain dominate the early weeks of post-hospitalization. This is followed by 2 months of a more euphoric mood associated with progressive physical improvement. The subjects in this study were pretested for state and trait anxiety 6 weeks posthospitalization

and posttested for state and trait anxiety approximately 14 weeks posthospitalization. This timeframe coincided with the euphoric stage of recovery described by Soloff (1978). The subject being in the euphoric stage may also have influenced the results of this study.

Several studies have demonstrated that the greatest improvement in psychological parameters after an exercise training program is seen in subjects who demonstrate the most psychological distress prior to exercise conditioning. Whereas individuals demonstrating low psychological distress prior to exercise training, do not improve their psychological state after exercise training to the same degree as individuals with high psychological distress (Folkins & Sime, 1981; Morgan et al., 1970; Soloff, 1978). The subjects in this study demonstrated normal levels of state and trait anxiety before and after the exercise program and, therefore, support the findings of these studies.

Conclusions

The findings of this study could not be generalized because of the small sample size and the control group

participation in regular aerobic exercise. The conclusions drawn from the findings of this study.

1. Other factors influence patients' exercise even when they are not enrolled in a formal exercise program, i.e., inpatient education program, news media, and physician advice.

2. Even though there was a wide age range between groups, both groups were alike regarding exercise and anxiety pre- and posttreatment.

For nursing, this study implies that it may be difficult to obtain a pure clinical control group that will not perform some degree of exercise in a large metropolitan area where a large volume of aortocoronary bypass graft surgery and health teaching are performed. Controlling the intensity, frequency, duration, and mode of exercise may be one way to study the benefits resulting from exercise.

Recommendations

As a result of this study, the following recommendations have been made.

1. Replication of the study with age and degree of exercise as covariates should be conducted.

2. A euphoric phase may be experienced by post aortocoronary bypass graft surgery from 1 to 3 months after hospital discharge; therefore, evaluation of posthospitalization psychological parameters in the ACBGS patient should extend beyond 3 months after hospital discharge.

3. Studies to investigate other factors influencing patients to exercise should be undertaken.

APPENDIX A

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE _____

GRANTS TO Patricia Lynn Slavich
a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem.

Physical Fitness and Anxiety In

Post Aortocoronary Bypass Graft Patients

The conditions mutually agreed upon are as follows:

1. The agency ~~(may)~~ (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency ~~(may)~~ (may not) be identified in the final report.
3. The agency (wants) ~~(does not want)~~ a conference with the student when the report is completed.
4. The agency is (willing) ~~(not willing)~~ to allow the completed report to be circulated through interlibrary loan.
5. Other _____

Date: 3-2-77

Patricia L. Slavich
Signature of Student

Signature of Agency Personnel

Brad C. Hawkins, M.Ed. RN Ed.D.
Signature of Faculty Advisor

*Fill out & sign three copies to be distributed as follows: Original - Student: First copy - Agency: Second copy - TWU College of Nursing.

APPENDIX B

ORAL PRESENTATION

I am a registered nurse and graduate student at Texas Woman's University. I am conducting a research study about patient's reactions to recovery after aorto-coronary bypass graft surgery.

The study will involve completing a questionnaire. The questionnaire will be mailed to each participant a week after the maximal treadmill test and again 8 weeks later. It is anticipated that the questionnaire will take approximately 20 minutes to complete. Stamped, addressed evenlopes will be provided for the return of the completed questionnaires.

The questionnaires will be coded so that both portions of the study may be matched. You will be asked not to put your name on the questionnaire so that your identity will be anonymous. Care will be taken to protect the privacy of the information given. Your decision to participate or not to participate will not affect the medical care you receive. The study involves minimum physical or psychological risk. However, should you experience any inconvenience or fatigue, you may rest for awhile and complete the questionnaire at your convenience. You may withdraw from the study at any time. Your participation in this study would assist nurses and

other health professionals to improve their care of patients recovering from bypass surgery.

Do you have any questions?

Would you be willing to participate?

If you do wish to participate, would you like to be informed of the results of the study?

APPENDIX C

FIRST COVER LETTER

Dear Participant:

Thank you for consenting to participate in my research study about patient's reactions to recovery after aortocoronary bypass graft surgery. Your participation in this study will assist nurses and other health professionals to improve the care of patients recovering from bypass surgery.

The questionnaires are enclosed. Complete each form as directed in the written instructions on each form. Do not sign your name on any forms. Return of the questionnaire is your agreement to participate in the study. Remember, your decision to participate or not to participate will not affect the medical care you receive. The study involves minimum physical or psychological risk. However, should you experience any inconvenience or fatigue, you may rest for awhile and complete the questionnaire at your convenience. You may withdraw from the study at any time.

Please return the completed questionnaire within 1 week. The stamped, addressed envelope is enclosed for this purpose. The completed forms should be returned by mail no later than _____. If for some reason you are unable to complete the questionnaire, please return the blank form. The final questionnaire will be sent to you in 8 weeks. Should you have any questions or concerns regarding the study, feel free to contact me at my office. The number is (214) 661-7836. Thanks again for your cooperation.

Sincerely,

Pat Slavich, R.N.
Graduate Student
Texas Woman's University

PS/
Enclosures

APPENDIX D

DEMOGRAPHIC DATA SHEET

Please state your age:_____

Please check the appropriate blank:

Sex:
_____Male
_____Female

Marital Status:
_____Never married
_____Married
_____Separated
_____Divorced
_____Widowed

Race/Ethnic Group:
_____Caucasian
_____Black
_____Hispanic
_____Other (please specify)

Present Exercise Schedule:

Mode of exercise:
_____Walk
_____Bike
_____Swim
_____Other (please specify)
_____None

Minutes of exercise at one time:
_____0-15 minutes
_____15-30 minutes
_____30-45 minutes
_____45-60 minutes
_____Over 60 minutes

Frequency of exercise each week:
_____Once/week
_____Twice/week
_____Three days/week
_____Four days/week
_____Five days/week
_____Six days/week
_____Seven days/week

APPENDIX E

BRIEF EXERCISE HISTORY

1. Prior to your surgery, did you participate in any regular exercise? (If yes, proceed with questions 2 through 4).

2. What type of exercise was it?

3. How many minutes would you exercise at one time?

4. How many days per week would you exercise?

5. Have you exercised three or more non-consecutive days during the past week?

APPENDIX F

SECOND COVER LETTER

Dear Participant:

Thank you for returning the questionnaire for the first portion of the study about patient's reactions to recovery after aortocoronary bypass graft surgery. Enclosed are the questionnaire and data sheet for the last portion of the study. Please complete each form as directed in the written instructions on each form. Do not sign your name on any forms. Return of the questionnaire is your agreement to participate in the study.

Return the completed questionnaire and data sheet within 1 week. The stamped, addressed envelope is enclosed for this purpose. The completed forms should be returned by mail no later than _____. If for some reason you are unable to complete the questionnaire, please return the blank form. If you have any questions or concerns about the study, contact me at my office. The number is (214) 661-7836.

Again, I want to thank you for your time and assistance in completing this research study.

Sincerely,

Pat Slavich, R.N.
Graduate Student
Texas Woman's University

PS/
Enclosures

APPENDIX G

STATE AND TRAIT ANXIETY SCORES

Group	Pretreatment		Posttreatment	
	State Anxiety	Trait Anxiety	State Anxiety	Trait Anxiety
Treatment	45	44	53	44
	44	43	47	44
	53	46	50	42
	51	44	48	45
	46	44	47	41
	48	43	41	45
	55	47	50	45
Control	49	41	50	40
	46	48	43	44
	53	49	53	44
	53	42	53	42
	42	40	42	45
	50	42	51	42
	40	44	46	44
	46	43	41	40

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