ATTITUDES TOWARD PHYSICAL EXERCISE AND ACTIVITY OF THE POST MYOCARDIAL INFARCTION PATIENT

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CHAPTER I

INTRODUCTION

Heart disease is purported to be the number one cause of death in this country. Public awareness of this statistic has brought an increased demand for determination of the etiology of heart disease, a way to decrease the morbidity and mortality of heart disease, and an acceleration of the rehabilitative process.

In the search for causative factors of heart disease, the American life style has come under close scrutiny. The 1960's and 1970's have seen a rise in the sedentary way of life. With the continuing advance of technology, individuals are becoming less and less physically active. Many average Americans view this decrease in physical activity as a detriment to their health. Besides a decrease in physical activity, the manner in which one views health influences his attitudes about physical exercise. Each individual's concept of health and illness, his attitudes toward various health-related matters, and the kind of health activities in which he engages are influenced by the life he leads and the

people with whom he associates.[1]

Americans generally place a high value on strength, youth, and productivity. Many individuals see these values as attainable through physical exercise. The majority, however, have no regular physical exercise for various reasons. Physical exercise is viewed as important and necessary in order to maintain at least a degree of strength and productivity. Thus the victim of a heart attack often feels these same values are in jeopardy following convalescence from his initial attack.

This study proposes to look at cardiac patients' attitudes toward physical exercise and activity. Attitudes can influence the aim and emphasis of future educational programs for convalescent cardiac patients. This information would be valuable in designing rehabilitation programs necessary to meet patient needs.

Statement of Problem

The problem of this study was to identify attitudes of post myocardial infarction patients toward physical exercise and activity and to determine the relationship between these attitudes and the age, sex, and occupation of the patients.

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[1] Godfrey Hochblum, Health Behavior (Belmont, California: Wadsworth Publishing Co., 1970), p. 4.

Purposes

1. To identify the attitudes of post myocardial infarction patients who are participating in a planned exercise program and attitudes of those who are not participating in a planned exercise program.

2. To compare the attitudes of post myocardial infarction patients who are participating in a planned exercise program and attitudes of those who are not participating in a planned exercise program.

3. To compare favorable and unfavorable attitudes of the post myocardial patients when differentiated by sex.

4. To compare favorable and unfavorable attitudes of the post myocardial patients when differentiated by age.

5. To compare favorable and unfavorable attitudes of the post myocardial patients when differentiated by occupation.

Background and Significance

Great emphasis has recently been put on identification of "coronary prone" individuals by studying the

inherent common risk factors. The risk factors involved are: unsuspected hypertension, elevated levels of blood cholesterol and other blood lipids, abnormal electrocardiograms, overweight, excessive cigarette smoking, a "driving" personality, familial tendency, and physical inactivity. It is with the last factor, the physical inactivity, that this study was concerned. Physical inactivity is one of the reasons that cardiovascular disease is the number one cause of death in the United States according to a study done in 1971.[1] In addition to the death rate, the prevalence of some form of blood vessel disease was found in 27,710,000 Americans. Besides the high human cost, the dollar cost of heart disease rises to 19.7 billion dollars annually. Because of high mortality and morbidity rates in an individual's most "productive" years, concern about how the coronary patient views heart disease is evident. His attitude about possible preventative or rehabilitative programs are thus influenced by his attitudinal response toward physical exercise and activity.

Americans are a people of definitive beliefs and attitudes regarding most subjects. Oppenheim defines attitude as a state of readiness, a tendency to act or react in

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[1]National Center of Health Statistics, United States Public Health Service, 1971.

a certain manner when presented with certain stimuli. He sees an individual's attitudes as always present but usually in a quiescent state until they may be expressed in speech or in behavior.[1]

Rokeach states that an attitude is a relatively enduring organization of beliefs around an object or situation leading one to respond in a predictable manner. He identifies three components of attitude: a cognitive component that represents the individual's knowledge about what is good or bad, true or false, desirable or undesirable; an effective component often generating intense feelings about this attitude; and a behavioral component with response leading to some action, either covert or overt.[2]

Rokeach indicates that a minimum of two interacting attitudes is necessary for social behavior change. Attitude change can be a change in organization or in content. He says it is typically considered a change in content but could often have a structual change such as occurs from development, education, or therapy. For example, the breadth of an attitude could be increased while retaining the original

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[1]A. N. Oppenheim, Questionnaire Design and Attitude Measurement, (New York: Basic Books Publisher, 1966), pp. 105-106.

[2]Milton Rokeach, Beliefs, Attitudes, and Values (San Francisco: Jossey Bass Pub., 1969), pp. 112-114.

feeling toward that attitude.[1]

One of the ways attitudes are influenced is through role modeling. Little and Carnevali stress the importance of role models in teaching attitudes. They see the nurse in her role as often effecting change in patient and staff attitudes, consciously or unconsciously.[2] Zohman and Tobis, in their study of rehabilitation of cardiac patients, considered patient attitudes as the prime factor in the program's success. This area, however, was the most difficult to change.[3] Graham distinguishes a change from a negative, pessimistic, passive attitude to a positive, optimistic attitude as the most important result of an exercise program. He feels that this is reason enough to encourage the cardiac patient to pursue actively an exercise program.[4]

Nite, in her book The Coronary Patient, contends that patients' attitudes toward their disease, their care, and their rehabilitation would change if they were allowed to have some control in planning their care. These patients

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[1] Ibid., p. 135.

[2] Dolores Little and Doris Carnevali, Nursing Care Planning (Philadelphia, Toronto: J. B. Lippincott Co., 1969), p. 19.

[3] Jerome Tobis and Lenore Zohman. "A Rehabilitation Program for Inpatients With Recent Myocardial Infarction," Archives of Physical Medicine and Rehabilitation, 1968, p. 446.

[4] M. F. Graham, Prescription for Life (New York: David McKay Co., 1966), p. 34.

often do not have any control in their planning since coronary patients are frequently transposed in a very short time from an independent functioning individual to a totally dependent patient. Any person, in order to change an attitude, needs to be able to relate to a significant person. This significant person is anyone with whom the coronary patient develops rapport, but the establishment of this rapport necessitates some continuity of care. Team members on a floor change, the nurses may go to another floor, and the doctors change services leaving the patient the one consistent member of the health team that remains.[1]

Little research has been done on exercise programs for the cardiac patient before 1963. Since then, many programs have been developed to improve the physical condition, mental outlook, motivation, work tolerance, and social functioning of cardiac patients.[2]

The Newman Veteran's Administration program of 1948 was one of the first cardiac rehabilitation inpatient programs. This particular program utilized both physical

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[1]Gladys Nite and Frank Willis, The Coronary Patient (New York: Macmillan Co., 1964), p. 282.

[2]Tobis and Zohman, "Rehabilitation Program," p. 443.

therapy and occupational therapy in its structure.[1]

Since then, measurement of cardiac activity has become much more precise with many programs now using the "Equi-Caloric" expenditure concept with telemetered electrocardiograms to monitor activity. The "Equi-Caloric" expenditure is a term used by the cardiologist for prescribing physical and occupational therapy caloric levels and matching these with activities of daily living. The electrocardiogram reading is used as a basis for prescribing activities which are expressed as calories per minute. For example, washing the face and hands is assessed at 2.5 calories per minute, so it is permissible to carry out other activities at or below the same expenditures such as active exercises to upper extremities valued at 1.7 calories per minute.[3]

A similar measurement of energy expenditure, the metabolic unit or Met, was used by Cassem and Hackett in rehabilitation of myocardial infarction patients. A Met unit is the amount of energy expended per kilogram of body weight per minute for an average subject sitting quietly in a chair. This is approximately 1.4 calories per minute or 3.5 to 4 ml

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[1] L. B. Newman et al., "Physical Medicine and Rehabilitation in Acute Myocardial Infarction," Archives Internal Medicine, 89 (April, 1952), p. 552.

[2] Tobis and Zohman, "Rehabilitation Program", p. 444.

of oxygen per minute. In this way Met values can be assigned to the activities of daily living for the coronary patient and the patient then may have some control over his own energy expenditure.[1]

In an earlier study by Fox, Naughton, and Gorman, Met values were allotted to recreational and occupational levels of activity.[2] These were determined in the same manner by amount of oxygen used and calories burned per minute. Since then a plethora of exercise programs and studies have been done with emphasis on various aspects of the treatment of the cardiac patient.

Programs were developed for the in-treatment patient, the outpatient, the rehabilitative patient, and for prophylaxis against coronary disease. However, the benefit of exercise in preventing myocardial infarction cannot be regarded as an established fact.[3] Rubin, Gross, and Arbeit cite studies that have been made of patients with angina who have developed an increased exercise capacity before

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[1]N. H. Cassem, and T. P. Hackett, "Psychological Rehabilitation of Myocardial Infarction Patients in the Acute Phase", Heart and Lung, 2 (May-June, 1973), pp. 304-385.

[2]Samuel M. Fox, John P. Naughton, and Patrick A. Gorman, "Physical Activity and Cardiovascular Health," Modern Concepts of Cardiovascular Disease, 41 (June, 1972), pp. 27-38.

[3]William Ganong, Review of Medical Physiology (Los Altos, Calif.: Lange Medical Publications, 1971), p. 458.

experiencing pain, but the investigators are quick to acknowledge that the relief may be only symptomatic.[1] They also suggest that after the healing process has ended, a deliberate program of physical activity should be started to effect an increase in collateral circulation to the myocardium. These authors see the regulated exercise program as a measure to create a new blood supply to replace the previously occluded artery.[2] In support of exercise, Eckstein in his work with dogs showed an increase in collateral circulation in the heart after exercise. He suggested that the judicious use of early and continued physical exercise may reduce the clinical manifestations of coronary heart disease.[3] In addition, still others contend that physical exercise and activity contribute to an earlier return to the activities of daily living. The rationale is that physical activity combats fatigue and weariness which may be caused by non-use of skeletal muscles. Improved stamina engenders an increased level of confidence and

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[1] Ira Rubin, Harry Gross, and Sidney Arbeit, Treatment of Heart Disease in the Adult (Philadelphia: Lea and Febiger, 1972), pp. 41.

[2] Ibid., pp. 454-464.

[3] Richard W. Eckstein, "Effect of Exercise on Coronary Artery Narrowing on Collateral Circulation," Circulation Research, 5 (1957), pp. 230-233.

increased well-being in the patient.[1]

Tobis emphasized that although he favored exercise classes for active businessmen in an effort to prevent recurrent myocardial infarctions, there is no incontrovertible evidence that exercise prolongs life following a heart attack. However, it constitutes a positive approach to the post myocardial infarction patient, and Tobis found his patients to be generally enthusiastic and appreciative of their improved level of physical and mental functioning.[2] Other authorities see the psychological effect of exercise

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[1] G. Torkelson, "Rehabilitation of the Patient with Acute Myocardial Infarction," Journal of Chronic Diseases, 17 (June, 1964) pp. 685-704; H. D. Cain, W. G. Feather, and R. S. Stivelman, "Graded Activity Program for Safe Return to Self-Care After Myocardial Infarction," Journal American Medical Association, 177 (July, 1961), pp. 111-15; J. Naughton et al, "Cardiovascular Responses to Exercise Following Myocardial Infarction," Archives Internal Medicine, 117 (April, 1966), pp. 541-545; Lawrence Meltzer, Rose Pinneo and J. Roderick Kitchell, Intensive Coronary Care (Philadelphia: Charles Press, 1970), pp. 16-17; H. K. Hellerstein, "Relation of Exercise to Acute Myocardial Infarction" Circulation 40 (Supp. 4) (November, 1969), pp. 124-126; Tobis and Zohman, "Rehabilitation Program", p. 444.

[2] Ibid., p. 328.

on patients as equally important as the physiological effect.[1] Hellerstein stated that the control of physical activity and exercise has an established place in therapy. He noted that physical activity is markedly reduced during the acute state and gradually increased during convalescence. Furthermore, since all organs, including the heart, are maintained by function and the lack of function produces detraining and atrophy, sound guidelines are needed for the patient resuming normal activity after a myocardial infarction.[2] Meltzer maintains that there is no evidence that retiring from work or inactivity is conducive to longevity.[3]

In this country, preventive programs for cardiac patients are limited in nature and scope particularly when compared to Europe's massive reconditioning centers. In Germany alone, centers accommodate over 20,000 fatigued and

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[1] B. D. McPherson et al, "Psychological Effects of an Exercise Program for Post-Infarct and Normal Adult Men," Journal of Sports, Medicine, and Physical Fitness, 2-3 (1963), pp. 95-102; Howard Rusk and Joseph Benton, "Recent Advances in Rehabilitation of the Patient with Cardio-Vascular Disease," Diagnosis and Treatment of Cardio-Vascular Disease, ed. Stroud and Stroud (Philadelphia: F. A. Davis, Co., 1957) p. 1195; White, Cardiovascular Rehabilitation, p. 5.

[2] Herman Hellerstein, "Rehabilitation of Exercise to Acute Myocardial Infarction," p. 126.

[3] Meltzer, Intensive Coronary Care, pp. 16-17.

tense, but usually not overtly ill, persons for four to six weeks at a time. This preventive aspect of medicine is sponsored by regional insurance and industrial agencies. In Germany a law of the federal insurance legislation passed in 1957 guarantees every insured worker and employee the right to be sent to a reconditioning center on the recommendation of the plant or insurance physician. In fact, if the employee refuses to attend the center, he may be jeopardizing later pension payments.[1]

The Soviet Government has over 2,000 centers which operate similarly to the German ones. These have been in existence for decades sponsored jointly by the government and labor unions.[2]

Authorities such as Raab and Gilman researched preventive medicine in this country. The recommendations included establishing centers such as in Germany and in the Soviet Union for rest, relaxation, and systematic physical training.[3]

In reporting on sex differences in the exercising adults, aerobic capacity has long been used as the most

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[1]Wilhelm Raab and Lawrence Gilman, "Report on Study Tour of German Reconditioning Centers", American Journal of Cardiology 13 (1964), pp. 670-673.

[2]Ibid.

[3]Ibid., p. 672.

effective criteria for determining accurate measurements of the effectiveness of exercise. Astrand defined aerobic capacity as the maximal oxygen intake and indicated that there is a lack of conclusive studies in sex differences of aerobic capacity. He contends that it is most difficult to measure the maximal work load of individuals. He favors lactic acid determination of the degree of exhaustion as being more objective than maximal oxygen intake.[1] In an unpublished study of eighteen female and seventeen male students, Astrand attempted to measure maximal oxygen intake between the two groups. The experiments were carried out on a bicycle ergometer with intensity up to the highest work load that could be maintained for five minutes. The findings of this experiment showed the average oxygen intake value was 36.0 ml/kg/min for the women. The men averaged 51.0 ml/kg/min. However, he felt the test results were not conclusive since women strongly dislike heavy physical exertion and he felt this would affect the results. Brooks concurred with Astrand that women have less aerobic power and are able to take less oxygen into their lungs when working harder than men. She says the difference in aerobic power disappears between the ages of fifty to sixty-five

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[1] P. O. Astrand, "Human Physical Fitness with Special Reference to Sex and Age", Physiological Review, 36 (July, 1956), pp. 307-329.

years.[1]

Another physiological difference between the sexes is increase in pulse rate in the female during exercise which remains at a level higher than the males. The female has a smaller heart and smaller muscle mass and, except in rare instances, is able to do less physically strenuous work than the male.[2] Cain found in his exercise program that men had a better overall performance than women, but he did not postulate as to why this occurred.[3]

An additional study of differences in the sexes was done on obese subjects by Chirico and Stunkard. Their study portrayed obese women as responding much more passively to despondency, boredom, and social interaction than non-obese women. Obese men, on the other hand, did not differ from non-obese men in their responses to given situations. Chirico and Stunkard concluded that lowered physical activity may be an important variable in the obesity of women but not in men.[4]

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[1]Pamela Brooks, "Are Women the Weaker Sex?" Nursing Times (December, 1971), p. 1610.

[2]Graham, Prescription for Life, p. 104.

[3]Cain, Graded Activity Program, pp. 111-115.

[4]A. M. Chirico and A. J. Stunkard, "Physical Activity and Human Obesity," New England Journal of Medicine, 263 (1960), p. 935.

In testing attitudes and performances of individuals of different sex, Astrand considered the results to be of dubious value since motivation plays such a dominate role.[1] Kraus and Raab in their book, Hypokinetic Disease, question whether or not the remarkable disproportion between male and female death rates in the United States can be attributed to greater emotional tensions and strains of the male in today's competitive life style, or because the female probably has a greater physical activity level than her male counterpart. They considered the "average" housewife to be more active than the "average" male of the same age.[2] Hanson says that a capacity for intense physical activity relates more to general health and present level of fitness than to either sex or age.[3]

Astrand has done a great many studies on physical fitness. He finds physical fitness to be remarkably similar in both sexes up to the age of puberty. After puberty, the aerobic capacity and pulmonary ventilation differences between males and females become more apparent.

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[1] Astrand, "Human Physical Fitness", p. 327.

[2] Hans Kraus and William Raab, Hypokinetic Disease (Springfield Illinois: Chas. Thomas Publishing Co., 1961), p. 105.

[3] Dale Hanson, Health Related Fitness (Belmont, California: Wadsworth Publishing Co., 1970), p. 59.

According to Paul Dudley White on the subject of age, there is a hopeful phenomenon for patient recovery from a serious degree of heart disease. From repeated patient observations, he saw recovery occurring, not only as a spontaneous measure, but also through medical and surgical measures. He does not see age as correlated with poor and deteriorating health. He finds it fascinating that as one grows older, one can also grow healthier.[1]

Age plays a part in mortality statistics of heart disease. The mortality rates have changed drastically in recent years. In 1930, death from heart disease was equal in men and women. Now it is two to two and one-half times more common in males than in females. It is not until age fifty-five that women lose their protective hormonal influence. White male death rate is 6.6 times greater than that of white females' death rate in the thirty-five to forty-four age group, 5.3 times greater in the forty-five to fifty-four age group and equalizes in the fifty-five to eighty-five age group.[2]

Physical activity is decreased in the pursuit of many occupations. Graham speaks of the "awkward age" which

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[1]Paul Dudley White and Helen Donovan, Hearts, Their Long Follow-Up (Philadelphia, London: W. B. Saunders Col, 1967), p. ii.

[2]Graham, Prescription for Life, p. 4.

he designates as ages eighteen to forty years. This period is one of sedentary effort usually directed toward succeeding in one's profession. Usually physical exercise is decreased during these decades when physiologic ability is at its peak. The heart of the sedentary worker functions at about 1/30 of its maximum capacity; therefore, the average sedentary worker is far from producing a "conditioning" effect on his heart muscle through his occupation. In an effort to correlate occupational activity and increased coronary artery disease, many studies have used these factors as foci. Graham identifies a decided change in occupational selection following World War II.

> He (Man) has traded his pick and shovel for a pen, his blue denims for a coat and tie. Fat and lazy and indolent, he gets his kicks as a spectator of the silver screen instead of as a participant in a sandlot ball game. Modern man, like an overripe banana, has become soft, a woefully inept physical specimen--deskbound, cigarette-chained, and blissfully ignorant of his plight.[1]

Spain and Bradess in their study of occupational differences classified their subjects (all men) in two categories: sedentary and physically active. Their results showed that automation and higher standards of living have resulted in decreased physical activity in most adults and

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[1]Graham, Prescription for Life, p. 10.

children. However, there was no significant difference in coronary atherosclerosis between the two groups studied.[1] Therefore, no cause and effect could be shown between occupation and physical activity. These findings were also confirmed by Stamler.[2] England's Morris and Crawford studied physical activity of work and coronary heart disease. They found more damaging patches, scars, infarcts, and occlusions in those who were less active physically but essentially there was no relationship between atheroma of coronary walls and physical activity of occupation.[3]

Andreoli states that individuals in occupations of sedentary nature with great responsibilities and stresses have a high incidence of coronary heart disease. In particular, the individual's response to the stressful occupation is more important than the degree of stress.[4] This is also confirmed by Russek, who states that occupational and

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[1]David Spain and Victoria Bradess, "Occupational Physical Activity and the Degree of Coronary Atherosclerosis in Normal Men," Circulation 22 (August, 1960), pp. 239-242.

[2]J. Stamler, M. Kjelsberg, and Y. Hall, "Epidemiologic Studies on Cardiovascular-Renal Diseases," Journal of Chronic Diseases, 12 (October, 1960), pp. 440-452.

[3]J. N. Morris, and M. D. Crawford, "Coronary Heart Disease and Physical Activity of Work," British Medical Journal, 2 (1958) pp. 1485-1496.

[4]K. B. Andreoli et al, Comprehensive Cardiac Care (St. Louis: C. V. Mosby Co., 1971), p. 29.

emotional stress are the most important factors in coronary heart disease in young adults. The ratio was 4.6 patients with coronaries to one normal patient when considering evidence of stressful lives.[1] Rosenman found that men who reported moderate to heavy work activity and who reported daily exercise habits had coronary heart disease rates lower than those with sedentary to light occupational activity. However, these differences did not reach significant levels.[2] Fox and Gefter also say that individuals presumed to be more active physically have less coronary disease.[3]

Another factor which influences a person can be the milieu in which he finds himself. Graham discusses how man can help and protect himself against twentieth century civilization.

> The best antidote yet available for this slow poison is regular, vigorous exercise. It is a natural outlet for tension, a ready means of dieting, nature's own method of inducing rest. It is the hub around

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[1] Henry Russek and Burton Zohman, Coronary Heart Disease (Philadelphia, Toronto: J. B. Lippincott Co., 1971), p. 1789.

[2] R. H. Rosenman et al, "Coronary Heart Disease in the Western Collaborative Group Study," Journal of Chronic Diseases, 23 (1970), pp. 173-190.

[3] Gefter, Synopsis of Cardiology, p. 774; Samuel Fox and William Haskell, "Physical Activity and the Prevention of Coronary Heart Disease," Bulletin New York Academy of Medicine, 44 (August, 1968), pp. 950-966.

> which the spokes of tension release, weight control and abolition of excess (food and otherwise) all revolve.[1]

It has been shown that planned exercise does indeed have a place in the rehabilitation of the post myocardial infarction patient. In most instances, no one member of the medical team is equipped to say to the patient, "This is what we feel you must do to obtain your maximal potential of wellness." Members of the health team leave the patient's physical activity up to him and unless the patient expresses desires or concern, little follow-up exists to encourage him to pursue physical exercise and activity as a life long activity. Therefore, as an adjunct to planning future rehabilitation programs for post myocardial patients, it is deemed desirable to identify existing attitudes of patients toward physical exercise and activity.

Hypotheses

The following hypotheses were tested in this study:

1. There will be no difference in the attitudes of post myocardial patients regarding physical exercise and activity, who are participating in a planned exercise program as compared to those not in a planned exercise program.

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[1] Graham, Prescription for Life, pp. 155-156.

2. There will be no difference in the attitudes of post myocardial infarction patients regarding physical exercise and activity when differentiated by age.

3. There will be no difference in the attitudes of post myocardial infarction patients regarding physical exercise and activity when differentiated by sex.

4. There will be no difference in the attitudes of post myocardial infarction patients regarding physical exercise and activity when differentiated by occupation.

Definition of Terms

The following definitions were formulated for this study:

1. Post myocardial infarction patient:

A patient who has suffered a first myocardial infarction as diagnosed by a physician.

2. Attitude:

The feelings, beliefs, and tendency to action of an individual.

3. Physical Activity:

A movement performed or controlled by voluntary action of muscles working in opposition to an external force.

4. Physical Exercise:

A current planned routine of activity during which an increased cardiac output is demanded from the circulation.

5. "Met" Unit:

The energy expended per minute per kilogram of body weight by an individual sitting quietly in a chair.[1]

6. Occupational Differences:

The classification of employment activities as measured by a met unit (Appendix C).

7. Planned exercise program:

An exercise plan recommended and tailored for an individual by his personal physician with a minimum adherence of three times per week necessary.[2]

Limitations

The limitations of this study were:

1. It was not possible to control the various life styles of the sample.

2. It was not possible to control the various exercise histories and backgrounds of the sample.

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[1]Fox, Naughton, and Gorman, "Physical Activity and Cardiovascular Health," pp. 27-28.

[2]Donald Pansegrau, M.D.--personal communication, July, 1974.

Delimitations

The delimitations of this study were:

1. The members of the study have experienced a myocardial infarction at least six weeks prior to data collection.

2. The sample of patients not participating in a planned exercise program were polled by mail.

Assumptions

The assumptions of this study were:

1. The heart requires use and activity to maintain proper muscle tone.

2. An individual must be motivated to perform exercise and physical activity.

3. Cardiac patients experience anxiety.

4. Individuals value health differently.

Summary

This chapter enumerates some of the studies on exercise pertinent to attitudes about exercise and physical activity. It was found that attitudes toward exercise are important since they influence the subject's participation in exercise. The content for ensuing Chapters is as follows: Chapter II, Review of Literature, contains an exposition on the physiology of exercise; exercise in relation to age, sex,

occupation; and attitude development, changes, and measurement. Chapter III, Procedure for Collection and Treatment of Data, describes the manner in which the data were collected, the tool used, and the reliability and validity of the tool established. Chapter IV, Analysis of Data, contains a description of the data obtained. Chapter V, Summary, Recommendations, Implications, and Conclusions, includes a brief summary of the findings of the study along with recommendations for future studies, implications for health care, and conclusions drawn from the study.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Treatment of the post myocardial infarction patient has changed considerably over the years. Three decades ago physicians imposed a six-month convalescence period upon the recovering patient, and in many instances the patient was literally treated as an invalid. Today, the aim is to restore the patient to the activities of daily living as soon as possible. Early and continued mobilization plays a large part in returning the patient to productive status. More and more physicians are planning their patients' exercise programs with as much care as their diets and medications. This chapter will explore the physiology of exercise, exercise and the coronary heart patient, exercise in relation to age, exercise in relation to sex, exercise in relation to occupation, and attitudes, attitude change, and attitude measurement.

The Physiology of Exercise

Even before the start of exercise, the ideation of intended activity causes increased blood flow. The initial

blood flow to the muscles increases at or before the start of exercise. Therefore, it is believed that the beginning rise of blood flow must be neurally mediated. Ganong reports impulses in the sympathetic vasodilator system the most likely to be involved.[1] Guyton feels two neurogenic factors are involved: 1) stimulatory impulses from the motor cortex and 2) proprioceptive stimulatory reflexes from the exercising joints.[2]

During exercise, the cardiac output is increased to five or six times the normal value and may exceed 35 liters per minute. The increased cardiac output is due to an increase in heart rate and stroke volume. The pulse rate can increase three or four fold and the stroke volume often doubles. The increased cardiac output is caused by the left ventricle contracting more forcibly and discharging more of the end systolic volume of blood. The end systolic volume of blood is the remaining volume in each ventricle as the ventricles empty during systole.[3]

This increased cardiac output as seen in exercise

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[1] William Ganong, Review of Medical Physiology (Los Altos, California: Lange Medical Publications, 1971), p. 456.

[2] Arthur C. Guyton, Medical Physiology (Philadelphia: W. B. Saunders Company, 1971), pp. 502-503.

[3] Ganong, Medical Physiology, p. 458.

results in a significant redistribution of fluid. In mild to moderate exercise, the blood flow to the coronary arteries and skeletal muscles is increased, cerebral flow is maintained, and flow to renal and splanchnic areas is decreased. During heavier exercise, the blood flow to the coronary arteries and skeletal muscles is further increased while cerebral flow is maintained, and renal and splanchnic flow further decreased. In maximal exercise, the cerebral flow may be decreased because of respiratory alkalosis and hyperventilation.[1] Cerebral flow is decreased in the alkalotic state because the muscle layer in the vessels, as well as in all muscles, is in a period of contraction due to repetitive firing of the neurons.[2] In addition, the tremendous shift of blood volume causes more blood to be available to the heart, arterial vessels, and exercising muscles. One authority reports as much as a 30 percent increase in the amount of blood in the arterial tree. This comes from the splanchnic and other reservoir areas during strenuous exercises.[3]

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[1] J. Willis Hurst, R. Bruce Logue, Robert C. Schlant, and Nanette Kass Wenger, The Heart (New York: McGraw-Hill Book Co., 1974), p. 101.

[2] Guyton, Medical Physiology, p. 438.

[3] Ganong, Medical Physiology, p. 456.

The blood pressure is elevated moderately during exercise because of the increased cardiac output; vasodilatation in the active muscles is seen while vasoconstriction occurs in the viscera. Hurst indicates that the systolic blood pressure may rise 40-60 mm of mercury during moderate to strenuous exercise and the diastolic blood pressure may increase slightly, decrease slightly, or stay the same.[1] Following exercise, the blood pressure drops to "normal" more quickly than the "slower" return to a normal pulse rate.[2]

Exercise also results in an increase in body temperature as the thermostat is re-set in the hypothalamus. The body responds by activating heat dissipating mechanisms such as increasing perspiration. With the dilatation of the vascular bed, metabolites increase faster than they can be removed and the pH decreases. The decreased pH along with the increased temperature, produces a shift to the right of the oxygen curve. With the hemoglobin shift to the right, more oxygen is given up by the blood. This results in a tremendous increase in oxygen availability

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[1]Hurst, The Heart, p. 101.

[2]Ganong, Medical Physiology, p. 456.

for consumption by the skeletal muscles.[1]

The increase in oxygen consumption relates in an almost direct proportion to the work output in exercise. During exercise the body may require as much as twenty times the normal amount of oxygen. The diffusing capacity for oxygen increases about three fold during exercise mainly because of the larger number of participating dilated alveoli and capillaries. This decreases the distance between the blood and active cells. The specialized nature of the pulmonary capillaries enables them to be completely saturated with oxygen by the time oxygen has passed through one third of their length. Due to increased blood flow the time available for oxygen uptake is decreased. However, the shortened exposure time, due to exercise, will have little or no effect on their oxygen saturation capacity.[2]

The ability of the respiratory membrane to exchange a gas between the alveoli and pulmonary capillaries is due to its diffusing capacity. Diffusing capacity is defined as that volume of a gas that diffuses through the membrane each minute. Other names for this property are oxygen

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[1]Ganong, Medical Physiology, p. 456.

[2]Guyton, Medical Physiology, p. 482.

uptake or aerobic capacity of the respiratory system.[1]

The effects of exercise on cardiac output, blood pressure, body temperature, and oxygen consumption is conceptualized in terms of measurement of energy. Energy expenditure has been researched and elaborated for the past three decades. Because of this research, cardiac patients and other patients can be assigned activities of daily living with corresponding energy requirements.

From these studies has come the "Calories per kilogram per minute" expenditure and more recently the "Met" unit. This "Met" or metabolic unit is defined by Cassem as the energy expenditure per kilogram of body weight per minute of an average subject sitting quietly in a chair. This quiet activity in a chair takes one Met unit which is approximately 1.4 calories per minute or 3.5 to 4 ml of oxygen per minute. Other graded activities of daily living have carefully computed met units and therefore more specific directions may be given to the patient than the statement "do it in moderation". For example, passive range of motion exercises are no more costly to the patient than

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[1] Ibid., p. 479.

remaining in bed that is, one Met unit.[1]

Exercise And The Coronary Heart Patient

There has been considerable controversy over a possible relationship between coronary heart disease and the lack of exercise. Many generalizations have been made regarding the benefit of exercise, but few scientific measurements. One difficulty is the determination of what constitutes physical fitness. It is also difficult to distinguish which physical activities produce the greatest preventive, social, economic and psychological benefits. Fox, Naughton, and Gorman postulated that perhaps a regular performance of physical activity is more important for an individual's physiological benefit than the level of fitness achieved. They established that exercise three or four times weekly contributes to a more satisfactory level of performance, and that perhaps long, vigorous walks are as beneficial as those shorter, more intense periods of exercise.[2]

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[1]N. H. Cassen and T. P. Hackett, "Psychological Rehabilitation of Myocardial Infarction Patients in the Acute Phase", Heart and Lung, 2 (May-June, 1973), p. 382.

[2]Samuel Fox, John Naughton, and Patrick Gorman, "Physical Activity and Cardiovascular Health", Modern Concepts of Cardiovascular Disease, 41 (June, 1972), pp. 226-230.

Others interpret exercise needs as daily requirements. Friedman "strongly recommends an hour or more of mild exercise daily for the coronary prone subject."[1] But a forceful advocate of more intense exercise regimen is Kenneth Cooper who says all exercise should be directed toward improving the cardiovascular system. He feels it important that vigorous exercise be employed and that conditioning does not occur unless the cardiovascular system is stressed. In essence the effect of conditioning can be achieved only through a high level of exercise.[2]

Another variation in planned activities for the coronary patient comes from Australia. Although emphasizing that the heart is built for action, a physician in Australia established his cardiac program on the premise that the heart has considerable ability to compensate for injury. He used a two-phase program: the first phase directed toward increasing joint mobility and endurance and the second phase directed toward more group activities such as swimming pool exercises, dancing, jogging, and games. The change in activities between phase one and phase two was planned to

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[1]Meyer Friedman and Ray Rosenman, "The Prudent Management of the Coronary Prone Individual", Geriatrics, 11 (May, 1972) pp. 74-79.

[2]Kenneth Cooper, Aerobics (Philadelphia and New York: M. Evans and Co., 1968), p. 26.

relieve the boredom of exercises and to encourage perseverance in the program.[1] Cassem and Hackett also felt adherence to their program was enhanced by variety.[2] Some patients were further helped by the social influence of a group exercise program while others preferred to exercise alone. The building of attractive, well-equipped facilities was seen as an important factor in increasing community-wide exercise programs.

The type of exercise is also an important factor. Lavin in her article on "Bed Exercises for Acute Cardiac Patients" recommends rhythmic exercise rather than isometric exercises. She cites the possible deleterious effects of isometric exercise as the valsalva maneuver which could result in a fainting or possible premature ventricular contractions. Further, a patient with cardiac dysfunction cannot tolerate a rise in after load, that is a rise in left ventricular end-diastolic pressure which may either lead to or increase left ventricular dysfunction. These occurrences are accentuated in isometric exercises. She feels the rhythmic exercises are better evaluated and

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[1] E. R. Nye and P. Guy Wood, "Exercise and the Coronary Patient", Medical Journal of Australia 1 (February, 1972), p. 247.

[2] Cassem and Hackett, "Psychological Rehabilitation", pp. 386-387.

controlled than isometric exercises, and are therefore, the better choice in preventing venous stasis, thrombosis, and embolus.[1] Again, Fox, Naughton and Gorman expressed a preference for endurance building physical activity over isometric strength building exercises for improving the quality of life, it not the length.[2]

Exercise in Relation to Age

Adult physical fitness is directly related to fitness during youth. If youth cultivates poor nutrition habits, deficient rest and sleep patterns, or decrease in physical fitness, it can be reflected in the adult.[3] According to Sneddon, a large part of the child's performance is related to his physical growth and development. He does not perform well unless he is developing normally. Therefore, Sneddon believes more emphasis should be placed on detecting exercise deficiencies in children. If physical deficiencies in children were corrected, the adult

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[1] Mary Ann Lavin, "Bed Exercises for Acute Cardiac Patients", American Journal of Nursing, 73 (July, 1973), pp. 1226-27.

[2] Fox, Naughton, and Gorman, "Physical Activity and Cardiovascular Health", p. 229.

[3] Russell Sneddon, "Physical Fitness for Exercise Participation" Journal of American Medical Association, 220 (April, 1972), p. 587.

could be helped to improved physical fitness.[1]

The educational system has a fairly comprehensive physical education program in elementary school and junior high school. Less emphasis is placed on physical fitness during high school and even less during the college years. The elementary school student participates actively each day in exercise; the junior high student, high school student and college student participates on an elective basis with only part time requirement in an exercise program. The decreased emphasis in physical education is not limited to the American scene at the secondary or tertiary level. In a study by Cumming, where some comparison between American and Canadian school children was possible, Canadian children were rated as inferior in such events as the "fifty yard dash" and the "broad jump". The low performance scores were attributed to the inadequacy of school physical education programs, a lack of example and direction by the parents, and a lack of government planning and financing for physical exercise.[2]

Astrand confirms the desirability of a strong comprehensive physical education program in school. Astrand

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[1] Ibid.

[2] G. R. Cumming, "Current Levels of Fitness", Canadian Medical Association Journal, 96 (March, 1967), pp. 874-75.

found in his study that exercise increases the aerobic capacity of the lungs. Therefore, he emphasized that it is important to condition the adolescent through structured physical education programs. If this aspect is neglected, Astrand believes that the adolescent may never be able to reach high levels of physical performance as an adult.[1]

A symposium speaker in Canada discussed motivation for sports participation in the community and emphasized that physical activity must be encouraged not only in the junior grades but throughout the whole of school life. He saw physical education programs extending throughout the university years and becoming a part of the program for preventive medicine. He envisioned the provincial and federal governments as the sponsoring agencies for the development of social programs at community centers for group participation in sports could become a social requirement.[2]

A study of children, six to eighteen years of age, done by Cumming in Stockholm, Boston, Philadelphia, Cologne,

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[1] P. O. Astrand, "Commentary on Physical Activity and Cardiovascular Health", Canadian Medical Journal, 96 (March, 1967), p. 760.

[2] J. R. Brown, "Commentary on Motivation for Sports Participation in the Community by M. H. Stiles", Canadian Medical Association Journal, 96 (March, 1967), p. 894.

Indianapolis, Lapps, and Winnipeg, showed the highest maximal oxygen uptake was found in both boys and girls in Stockholm. He postulated that the children in Stockholm probably received more physical education than the other children of the study. He further suggested that vigorous activity in childhood led to the acquisition of a high aerobic capacity.[1]

Astrand suggests that up to the age of twelve years the maximal oxygen uptake values or aerobic capacity are the same for girls and boys. But he also stated that there is a definite decline in aerobic capacity at age fourteen years for females which does not improve as the female gets older.[2]

All studies reviewed show the average aerobic capacity as decreasing after the age of thirty years in both males and females. However, when the adult over thirty continued in active sports, there is a difference in aerobic capacity. From a study of active skiers in Norway, Cumming found that these skiers, even at ages fifty to sixty years, compared favorably with twenty-five year olds in aerobic capacity. Therefore, middle age is not necessarily

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[1] G. R. Cumming, "Current Levels of Fitness", p. 869.

[2] P. O. Astrand, "Human Physical Fitness", pp. 308-328.

associated with a low maximal oxygen uptake.

This same study compared the motor performance of thirteen year olds in the same school in 1934 and again in 1958. They found no proof that the thirteen year old of 1958 was "softer" than his counterpart in 1934.[1] However, even with increased stature and growth in strength of children today, as opposed to those in 1934, the motor performance was equivalent and did not improve as might be expected.

In the Roskanna study to determine the difference in exercise patterns for adults, the subjects were divided by age. After four weeks training on the bicycle ergometer, each group showed considerable increase in the training effect. Although the training effect was lower in the older subjects, it did show that a significant improvement of working capacity can be achieved in a training program. The older individuals developed a lower heart rate during training; heart rate in the younger age groups averaged 150 beats per minute, while in the fifty to sixty age group, it was 131 beats per minute.[2]

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[1] G. G. Cumming, "Current Levels of Fitness", pp. 875-876.

[2] H. Roskanna, "Optimum Patterns of Exercise for Healthy Adults" Canadian Medical Association Journal, 96 (March, 1967), p. 898.

In another study related to age, Anderson tested differences in fitness for sustained and strenuous muscular activity of the nomadic Lapps of northern Scandinavia and the inhabitants (largely sedentary) of Easter Island in the South Pacific. This study was concerned with discovering if there were true ethnic differences in fitness for work as evidenced by evolutionary natural selection. They concluded that the habitual physical activity of the two groups contributed to the difference in fitness. It was found that the nomadic Lapps have a higher level of fitness at all ages except for women over the age of thirty years. The maximal oxygen uptake increased with age throughout childhood. Lapp males and females reached a peak of oxygen capacity in the mid-twenties and then gradually decreased. Easter Island males reached their peak of oxygen capacity earlier, at about eighteen years, and remained essentially the same until age forty years and then decreased rapidly. Easter Island women increased until mid-adolescence, then remained unchanged with age. Thus, the habitual physical activity was the dominant factor revealed in the Anderson study while age became less of a factor in overall fitness.[1]

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[1] K. L. Anderson, "Ethnic Group Differences in Fitness for Sustained and Strenuous Muscular Exercise," Canadian Medical Association Journal, 96 (March 1967), p. 832-833.

An animal study on rats, to determine the effect of age and exercise on lipid content of various tissues, showed that aging definitely influenced the plasma lipid levels in the rat. Exercise had a tendency to lower the lipid content of plasma, because the degradation of fatty acids (or lipolysis) precedes stepwise by the removal of two carbons at a time and results in formation of acetyl Co A. Acetyl Co A is utilized in the oxidative process which is increased by exercise.[1]

Although exercise showed no effect on heart or liver tissue, Grollman and Costello felt that most of the evidence pointed to the formation of lipids in atheromas as coming from the plasma. However they point out the contradictory nature of investigations of lipid changes with aging. They felt more research is needed to measure humoral and local factors of pathogenesis of atherosclerosis and to determine why species such as the dog and rat are so resistant to this type of degeneration especially in the arteries.[2] Certain drugs are effective

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[1]Ewald E. Selkurt, Physiology (Boston: Little, Brown and Company, 1971), p. 736.

[2]Sigmund Grollman and Leslie Costello, "Effect of Age and Exercise on Lipid Content of Various Tissues of the Male Albino Rat," Journal of Applied Physiology, 32 (June, 1972), pp. 761-765.

hypolipidemic agents in rats but do not act in the same manner in humans. Research is often done with rats since they are available and cheap but results often do not correlate with human metabolism.[1]

From these studies it can be seen that aerobic capacity declines naturally with age although this can be altered with conditioning. Also, several authorities such as Astrand, Cumming, and Sneddon recommend a structured physical education program from early childhood through college and into the adult years.

Exercise in Relation to Sex

Males and females tend to regard exercise differently. Females are reported less inclined to enjoy exercise, especially any type of heavy exercise. It is also expected that few girls will continue sports beyond the junior high years, excluding the exceptional athlete who trains for special event. The role expectations for young girls have early beginnings with emphasis on specific patterns of behavior. This is supported by books, toys and schools. The male also is subject to labels which identify him as performing particular masculine behaviors.

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[1]David Kritchevsky, "New Drugs Affecting Lipid Metabolism", Lipids, 9 (February, 1974), p. 97.

Thus, social environment may play a large role in expectations of physical activity of the sexes. Consequently some differences in exercise as it relates to males and females based on societal demand would be expected.

Females have become more sedentary in the 1960's and 1970's with less physical activity associated with housekeeping tasks. Males also have lowered physical activity. The hormonal influence, a protection against atherosclerosis, is deficient in the male and decreases in the older female person. In some instances estrogen administration may offer some protection against secondary coronary attacks.[1] In addition to the hormonal influences, as they relate to the sexes, lean body mass is also an important variable to consider. The aerobic capacity of boys and girls, studied in Winnipeg by Cumming, showed that boys had ten percent higher aerobic capacity based on lean body mass. Lean body mass is determined by a whole-body scintillation counter. However, between the ages of seven and thirteen years the height and lean body mass ratio is similar in both boys and girls so this would not entirely explain the ten percent difference in aerobic capacity.

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[1]Guyton, Medical Physiology, p. 810.

Cumming relates this difference to the varying exercise habits of boys and girls. Furthermore, after the age of thirteen years, the fat content of girls increases while it decreases in boys. By the age of eighteen years body fat is 30 percent of body weight in girls as compared to only 12 percent in boys.

Girls at all ages have a lower aerobic capacity which can be partially explained by anatomical differences. The female has a smaller heart and lesser lung capacity as well as a difference in physical activity. However, with advancing age, aerobic capacity becomes more equalized in the sexes. A study of women in Norway and Sweden showed the decline in aerobic capacity from the age of twenty years to the age of sixty years to be twenty-eight percent, which is similar to that of men. In Stockholm, the aerobic capacity of men at age twenty to thirty years exceeds that of women of the same age by twenty-three percent, while at age fifty to sixty years, the sex difference is only fifteen percent. Cumming reports no comparative data available on the fitness levels of adult populations. However, if testing aerobic capacity of primitive population groups is taken as representative of 100 years ago, the adults today have equal or better aerobic capacity than 100 years ago.

An additional factor to consider in sex differences is maturity. Both boys and girls are maturing earlier and this maturity is accompanied by an acceleration of strength development. Muscle strength increases in both boys and girls up to the age of twelve years, after that it rapidly increases for boys, while values for girls are stationary. In the middle years, however, there was little difference in muscle strength between the sexes. Again, conditioning can lead to increased muscle strength. This same phenomenon occurs when testing children for performance levels. Boys improve steadily in such events as the standing broad jump or the fifty yard dash while girls fail to improve after age thirteen years and may even get worse.[1]

A study to determine optimum patterns of exercise in the sexes was done by Roskanna of Germany. He used a bicycle ergometer in a four week conditioning program with twenty-four male and female subjects. Both groups showed a conditioning effect by a marked improvement in the working capacity evidenced by a drop in pulse rate.[2]

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[1] G. R. Cumming, "Current Levels of Fitness", pp. 869-874.

[2] Roskanna, "Optimum Patterns of Exercise for Healthy Adults", p. 898.

Nye and Wood found women cardiac patients expecially those over the age of forty years were reluctant to participate in any sort of calisthenics. They also found that women were more difficult to assemble for group activities since their free time was so variable. They did conclude, however, that it was probably best to encourage exercise in a group even though it was a small group and varied from meeting time to meeting time. They concluded that adherence to an exercise program is not as likely to be a success for women as it is for men.[1]

There are some physiological differences in the male and female aerobic capacity. The fat content is different in the sexes, as well as is muscle strength development which equalizes in the middle years. But the greatest difference between the two sexes probably is in motivation and in society's expectations.

Exercise in Relation to Occupation

Man in the distant past achieved considerable exercise and activity in most of his occupational pursuits. This is not generally true today. Cumming defines physical fitness as the capacity to do physical work and the more

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[1]Nye and Wood, "Exercise and the Coronary Patient," p. 36.

work one can do the more fit one is.[1] Hellerstein states that society today does not enjoy increased physical fitness secondary to caloric demands of daily work. It is the exceptional man that expends more than one or two Mets for his occupational endeavors.[2] By assessing a number of calories expended per minute in activity, the energy expenditure for everyday activities can be determined.

Taylor says conclusive findings between occupation and coronary heart disease will not be found until a sizeable group of high risk males are randomized into a control and a treatment group with the treatment group being put on a systematic exercise schedule. Even then there will be difficulties in controlling other variables such as diet, weight, and smoking, but the effects of exercise independent of selection can be examined.[3]

In a group of 3,524 men studied in the Los Angeles, San Francisco, and Oakland areas, 113 men were found to have evidence of coronary artery disease and 3,411 men had

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[1] Cumming, "Current Levels of Fitness", p. 868.

[2] H. K. Hellerstein, et al, "The Influence of Active Conditioning Upon Subjects with Coronary Artery Diseases," Canadian Medical Association Journal, 96 (March, 1967), pp. 758-759.

[3] H. L. Taylor, "The Occupational Factors in the Study of Coronary Heart Disease and Physical Activity", Canadian Medical Association Journal, 96 (March, 1967), pp. 825-831.

none. A larger number of the coronary group (12.4 percent) were found to have occupations with a high level of responsibility as compared to (5.6 percent) of the control group which had no manifestation of coronary artery disease.[1]

The first relevant study of occupations and coronary heart disease was done in the 1950's by Morris and his coworkers covering London bus conductors and bus drivers. They found the frequency of coronary heart disease in the more active bus conductors to be seventy percent of that of the less active bus drivers. Morris classified his subjects in three categories of activity: light as schoolmaster, bus driver, and clerk; active as postman, carpenter, and bus conductor; and heavy as boilermaker, dock laborer, and farm laborer.[2]

In support of Morris' study, Dr. Kannel, who reported on physical activity and the risk of coronary heart disease in the Framingham Study, found the most sedentary population to be particularly liable to fatal heart attacks.

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[1] R. H. Rosenman et al, "A Predictive Study of Coronary Heart Disease" Journal American Medical Association, 189 (July, 1964), p. 15.

[2] J. N. Morris and M. D. Crawford, "Coronary Heart Disease and Physical Activity of Work", British Medical Journal, 2 (1958), pp. 1485-96.

He used three objective indicators of physical activity; weight gain, vital capacity, and resting pulse rate. He felt that all three indicators had some relation to the habitual level physical activity. Those persons who had unfavorable values for two or more of these indicators had a five times greater mortality from coronary heart disease than those who did not have the unfavorable indicator and were presumably more active. Kannel used as evidence of sedentary living: obesity $\geq$ 20 percent overweight, rapid pulse $\geq$ 85, and vital capacity $<$ 3.0 for men and $<$ 2.0 for women.[1]

The Framingham study emphasized the difficulty in methods used to assess physical activity, and it also emphasized the lack of physically active adults in the population. Kannel feels we need to know the optimal intensity and duration of exercise in middle aged subjects who are predisposed to myocardial infarctions and who survive the myocardial infarction.[2] A further study of occupations and coronary heart disease of Chicago utility workers by

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[1] W. B. Kannel, "Habitual Level of Physical Activity and Risk of Coronary Heart Disease", Canadian Medical Journal, 96 (March, 1967), pp. 811-812.

[2] W. B. Kannel, "Habitual Level of Physical Activity and Risk of Coronary Heart Disease", Canadian Medical Journal, 96 (March, 1967), pp. 811-812.

Stamler was not statistically significant. However, this study showed a trend toward a decreased incidence of coronary heart disease for the occupationally active person.[1]

A study in Georgia in 1960-1962 of 3,102 persons showed significant differences in coronary heart disease prevalence. This could only be attributed to physical activity as it related to occupation, because dietary fat intake or cigarette smoking were shown to be present in the subjects studied. Negroes were shown to have more activity and less heart disease. Therefore, the conclusion of the study was that the difference in coronary heart disease and serum cholesterol observed between the various racial, social class, and occupational groups of males is explainable only by the difference in physical activity. Even the small farm owners had significantly lower incidence of heart disease than large farm owners which again would indicate more physical activity involved in the actual working of the small farm than the large farm. The small farm owner would have less automated equipment and would do more physical work. A low level of physical activity appears, then to be a major determinant of coronary artery disease

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[1] J. Stamler, M. Kjelsberg, and Y. Hall, "Epidemiologic Studies on Cardiovascular-Renal Disease", Journal Chronic Diseases, 12 (October, 1960), pp. 440-453.

prevalence.[1]

Another study, of the same country-wide population in Georgia in 1967-1969 noted some different changes. While the first study showed a marked increase in prevalence rates of coronary heart disease in the more sedentary occupations and a low rate in the more active occupations, this study indicated coronary heart disease is lower in black men than in white men in every occupational category except sharecroppers. Among non-farming occupations, the occupational gradient or gradual increase in coronary heart disease was no longer present. The lower prevalence rate in white farmers compared to non-farmers was confirmed in the study. It showed 150 per 1,000 incident cases of coronary heart disease for non-farmers (again less physical activity) as compared to 73 per 1,000 incident cases of coronary heart disease for farmers (comparatively a more active group).[2]

An interesting addendum to this study was the hypothesis concerning the protective effect physical activity has

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[1] J. R. McDonough et al, "Coronary Heart Disease Among Negroes and Whites in Evans County, Georgia", Journal Chronic Diseases, 18 (1965), pp. 453-454.

[2] John Cassel et al, "Occupational and Physical Activity and Coronary Heart Disease", Archives Internal Medicine, 128 (December, 1971), pp. 920-927.

in coronary heart disease. The relationship between physical exercise, activity, and coronary heart disease has usually been suggested to be a lessening of the risk factors in the formation of atherosclerosis. Other hypotheses, include a reduction in thrombosis formation possibility or the enhancement of collateral circulation. This group felt the possibility that physical activity might lead to an increased caliber of the coronary vessels thus making atherosclerosis less damaging was consistent with the known facts and could provide a plausible biological explanation for the protective effect physical activity has in coronary heart disease.[1]

Another study which could influence occupational selection was done to determine coronary circulation during heavy exercise and the relationship between coronary blood flow and heart rate. A study was conducted to determine if the coronary blood flow increased at all levels of exercise. In both coronary heart disease subjects and the control subjects during heavy exercise, the coronary blood flow increased approximately linearly with increased heart rate. The increase was the same in moderate exercise in both groups. During heavy exercise, the demand for increased

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[1]John Cassel et al, "Occupation and Physical Activity and Coronary Heart Disease", p. 927.

oxygen uptake in the coronary heart disease group was not able to be met and a decrease in myocardial contractility resulted. The coronary heart disease patient could be affected adversely by heavy exercise.[1]

The Anderson study of the nomadic Lapps and the sedentary Easter Islanders found a high level of fitness in the Lapps. Anderson felt that the difference in habitual physical activity in the two contrasting environments is a factor that has contributed to the difference in fitness. The Lapps led very active lives in herding their reindeer while the Easter Island community led very sedentary lives.[2]

In contrast to what Anderson found, a study in Puerto Rico determined that physical activity was not the most important factor. The purpose of this was to identify factors in Puerto Rico that contribute to the low mortality rate of coronary heart disease in comparison to other countries. Serum lipids, relative weight, blood glucose, and physical activity in 9,814 male subjects were studied. The conclusions stated that relative weight was the most

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[1] Stig Holmberg, Wieslaw Serzyro, and Edvardas Varrausras, "Coronary Circulation During Heavy Exercise in Control Subjects and Patients with Coronary Heart Disease", Acta Medical Scandanavian, 190 (December, 1971), pp. 465-480.

[2] W. L. Anderson, "Ethnic Group Differences in Fitness for Sustained and Strenuous Muscular Exercise", p. 833.

significant variable in explaining urban-rural differences in heart disease.[1]

Stress has sometimes been implicated as a factor in the etiology of heart disease. However, one study discounted the effect of stress and tension in high-level management positions or occupations as a cause of increased coronary heart disease. A five-year prospective survey of the 270,000 employees of the Bell Telephone system found that as a group, persons in the highest level of management positions did not have a higher incidence of coronary heart disease than those not in a high level management position. The study concluded that the early period of growth and development in children may be very important in the genesis of later coronary heart disease. Habits of eating, smoking, and perhaps exercise contribute to these differences in formation of later coronary heart disease.[2]

There appear to be some changes in the thinking of cardiologists about the causative factors of coronary heart disease. Friedman and Rosenman in a study in 1959 distinguished a marked increase of both clinical coronary

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[1]Mario R. Garcia et al, "Interrelationships of Serum Lipids with Relative Weight, Blood Glucose, and Physical Activity," Circulation, 45 (April, 1972), pp. 829-836.

[2]L. E. Hinkle et al, "Occupation, Education, and Coronary Heart Disease", Science, 161 (1968), pp. 238-245.

artery disease and arcus senilis in eighty-three subjects of Group A behavior patterns. They contrasted these individuals with intense ambition, competitive drive, constant preoccupation with occupational deadlines and a sense of time urgency, with Group B individuals having the opposite behavior patterns. They felt there was a connecting link between the type of individual and the occupational area he usually chose and his resulting coronary heart disease.[1] That is, the type A individual chooses occupations with high stress levels and of a sedentary nature.

A more optimistic approach into a fascinating study of what conditioning can do the cardiac muscle function was demonstrated in a study concerning theTarahumara Indians of Mexico. They are called the "Modern Spartans" and their ability to run for 75, 100 and 150 miles at an altitude of 7,000 to 8,000 feet above sea level is phenomenal. Groom reports deaths from cardiac or circulatory complications are unknown. They are halted in their endurance races by skeletal muscle cramps or urinary complaints, if at all. No heart enlargement by x-ray or

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[1]Meyer Friedman and Ray Rosenman, "Association of Specific Overt Behavior Patterns with Blood and Cardiovascular Findings", Journal American Medical Association, 169 (March-April, 1959), pp. 1286-1295.

physical examination and no electrocardiogram abnormalities were noted. It is not known how they compensate for the large oxygen debt at such high altitudes. The runners invariably showed a decrease in systolic blood pressure and marked drop in diastolic blood pressure during the running and immediately afterward. Groom felt the study showed that the sedentary life style of individuals uses only a fraction of the potential cardiac reserve.[1] Some studies show an increase in coronary heart disease with a corresponding decrease in physical activity in daily occupations. As the studies above show, considerable controversy still exists in determining the sine qua non factors of heart disease, but the research appears to show a correlation between cardiac disease and physical inactivity.

Attitude Development

Attitudes are developed in early childhood regarding physical fitness and tend to remain throughout life. The concept of attitude is used to denote the sum total of a man's tendencies and feelings, prejudices or biases, preconceived notions, ideas, fears, threats, and convictions

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[1]Dale Groom, "Cardiovascular Observations on Tarahumara Indian Runners", American Heart Journal, 81 (March, 1971), pp. 304-314.

about any specified topic.[1] These attitudes can range from a casual relationship to an unalterable persuasion regarding some object. Attitudes are considered an acquired predisposition to act, think, or feel in certain ways, therefore inferring that they are learned. However, most attitudes are acquired from the social environment. Most attitudes are absorbed without one being aware of it from culture, subculture, community and family.[2]

Some areas of agreement exist despite a wide variety of interpretations of the meaning of attitudes. Summers sees an attitude as a pre-disposition to respond to an object rather than an actual behavior toward that object. This readiness to act is a characteristic quality of an attitude. Another area of substantial agreement is the persistence of attitudes. If generated in childhood or early adulthood, changes in middle life attitudes can be extremely difficult and frustrating. A third area of agreement is consistency in behavioral manifestations, that is, repeated behavior in the same manner. Also an attitude is directional, expressing

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[1] L. L. Thurstone, Attitude Measurement, ed. Gene F. Summers (Chicago: Rand McNally and Co., 1970), p. 128.

[2] James M. Sawrey and Charles W. Telford, Psychology of Adjustment (Boston: Allyn and Bacon, Inc. 1967), p. 277.

either positive, negative, or neutral feelings for the object.[1]

Smith, Bruner, and White define attitude in much the same way as Summers. But they choose to look more carefully at the way attitudes interrelate with other aspects of personality. They see attitudes predisposing to experience, serving as a motivator, and an act toward a class of objects. Man's attitudes serve as the mediators between the inner demands of the person and the outside environment. It is man's major equipment for dealing with reality. One cannot predict a man's attitude by either his personality alone or his environment alone but the balance between the two.[2] Therefore, an opinion or an attitude about most commodities around is expressed. The patient, especially the cardiac patient is particularly vulnerable to attitudes of those around him: family, friends, nurses, and physicians.

Attitude of Cardiac Patients Toward Exercise

The cardiac patient offers special problems in his attitudes toward exercise. Cassem in his work on

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[1]Gene F. Summers, ed., Attitude Measurement (Chicago: Rand McNally and Co., 1970), p. ii.

[2]M. Brewster Smith, Jerome S. Bruner, and Robert W. White, Opinions and Personality (New York: John Wiley and Sons, Inc., 1964), pp. 33-39.

rehabilitation of the cardiac patient sees the depressed mental state of the patient as the leading psychological barrier to his recovery. He feels early mobilization and activity to be the leading antidote to the depressed state. Some mobilization should begin on the third hospital day and be continued thereafter through his hospital discharge period.[1]

Bibring describes a myocardial infarction as a severe blow to the self-esteem of the patient. The patient responds with depression, anxiety, and often denial of his illness as evidenced by a lack of conformation to the coronary regimen.[2]

Another psychological barrier to exercise is the patient's tendency to regard himself a semi-invalid. Too often, this tendency is reinforced by family and friends of the myocardial infarction patient. Then too, the lack of definite instructions and encouragement by the physicians contribute to his attitude about exercise.[3]

Physicians are reluctant to state conclusively that exercise protects the patient from coronary artery disease or

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[1]Cassem, "Psychological Rehabilitation of MI Patients", p. 382.

[2]Jacqueline Rosen and Grete Bibring, "Psychological Reactions of Hospitalized Male Patients to a Heart Attack", Psychosomatic Medicine, 6 (March, 1966), pp. 808-820.

[3]McPherson et al, "Psychological Effects of an Exercise Program", p. 95.

from reoccurrence of a myocardial infarction. But among the studies reviewed, there is unanimous agreement that the patient subjectively feels better when he exercises. He has more self confidence and is more optimistic. In Cooper's book, Aerobics, the conditioned patient exhibits marked changes in his attitude. He was able to relax, worry less, and enjoy his work and family more. Cooper determines the physical change to be significant but also emphasizes the improvement in the patient's attitude and alleviation of mental depression to be equally important.[1]

Another positive attitude toward the value of exercise was expressed by a physician in Canada. He faults other physicians for not encouraging the patient to exercise. He observes that if physicians have had personal knowledge of being physically fit as opposed to not being physically fit, it is difficult to understand why physicians often have a negative attitude toward recommending exercise. He feels the deaths from heart disease and the deaths from over exertion make a very unequal equation. He things it possible that the over-fed and under-exercised physician has the same general horror of exercise as has the general public.[2]

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[1] Kenneth Cooper, Aerobics, p. 112.

[2] Norman A. Harvey, "In Praise of Exercise", New England Journal of Medicine, 286 (February, 1972), p. 323.

In support of exercise for the cardiac patient as an adjunct to improving his mental outlook and attitudes, Cassem thinks mobilization of some sort should begin on the third hospital day. Even though the cardiovascular benefits for angina and post infarction patients have not been proven for physical activity, it provides many positive effects for the patient. He may sleep better, eat better, and have an increased sense of well-being. It gives the patient something to "do" as opposed to the many "don'ts" he receives, such as "don't smoke" or "don't overeat". It is a symbol of life rather than depressing invalidism.[1]

A similar feeling is expressed by a physician and physiotherapist in Australia. They feel that the desirable aim is to restore the patient to his normal health and activity. If this is not possible, then at least the patient should be restored to the enjoyment of liv ng. Any factors that lead to this end should be implemented and one factor is a planned exercise program appropriate for each individual.[2]

In summation, since attitudes are developed in early life and remain implanted in the thinking indefinitely, they

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[1] Nye and Wood, "Exercise and the Coronary Patient", p. 247.

[2] N. H. Cassem and Thomas P. Hackett, "Psychological Rehabilitation of Myocardial Infarction Patients in the Acute Phase", Heart and Lung, 2 (May-June, 1973), pp. 382-387.

continue to be germane in generating positive and negative responses to exercise for the coronary patient. This study reflects the tendency to act as a characteristic attribute of attitude, a persistence of attitude, consistency in attitudes, and a directional quality to an attitude. Motivation to exercise results in improved mental outlook and optimism and constitutes a positive attitude.

Attitude Change

Attitudes are difficult to change. If the attitude is a strongly held conviction, it will require considerable pressure to change it.[1] Herbert Abelson in his book on persuasion and how to go about changing opinions, postulates that a newly adopted attitude stays with the individual as long as it provides satisfaction for him, but no one can really judge how long that might be. Abelson indicates a more favorable chance for a change in opinion to occur if the persuader is one of high credibility. Therefore, a person of recognized authority would have a greater impact than an unknown individual and would be much more likely to effect an attitude change.[2]

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[1] Gene F. Summers, ed., Attitude Measurement (Chicago: Rand McNally and Co., 1970), p. ii.

[2] Herbert L. Abelson, Persuasion: How Opinions and Attitudes Are Changed (New York: Springer Publishing Co., Inc. 1970), pp. 44-72.

Attitude change is expressed by Smith, Bruner, and White as one of the means the person can use to maintain balance between inner and outer demands. They assume that most changes promote resistance and change should not be attempted for minor causes. As events change, some individuals shift attitudes faster than others. These people are termed "flexible" while those very slow to change are termed "rigid".[1]

Factors that facilitate change are seen as a shift in the relation of the reality situation to personal interests and values, a change in social situations, or an alteration in the inner self of the personality. The process of change involves a shift in the balance of all three factors. One may be a precipitating factor for the change and it depends on the individual's weightings at the time involved as to whether the change occurs.[2] It takes time and effort to effect change, but if it is felt necessary to make an attempt and the effort is meaningful to the patient, change can be effected.

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[1]Smith, Bruner, and White, Opinions and Personality, p. 46.

[2]Ibid.

Attitude Measurement

Attitude can be measured by acceptance or rejection of opinions. However, the measurement of attitudes expressed by a man's opinions do not necessarily predict his behavior. Thurstone says that it is of interest to know what men say "they believe", even if their actions are inconsistent. He says that an attitude scale should be used when it is fairly certain that the individuals tested will tell the truth about their convictions and opinions. But it must be assumed, even while testing, that attitudes will change.[1] Another authority concurs that attitudes are not observed directly but are inferred from the consistency of behavior toward a group of similar objects in situations. Attitudes are noted to account for persistent and consistent behavioral trends.[2]

Measurement is the assignment of numbers to observations according to some set of rules. This is true no matter what phenomenon is studied. But if the phenomenon is attitude, then the process is more difficult in that attitudes cannot be measured directly but must be inferred from

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[1] L. L. Thurstone, Attitude Measurement, ed. Gene F. Summers. (Chicago: Rand McNally and Co., 1970), p. 129.

[2] Sawry and Telford, Psychology of Adjustment, p. 276.

behavior.[1] Measurement is used as an adjunct to theory. Authors Smith, Bruner, and White feel a clearer concept of attitude domains needs to be studied before it can be determined which attitudes are worth measuring. Opinions or attitudes are part of man's attempt to meet or conquer his world. If his attitudes are an inseparable part of his personality, the study of these attitudes are one phase of his complex behavior in general.[2]

Attitude scales typically yield a total score indicating the direction and intensity of the individual's attitude toward a group of people, a policy, or a program. The construction of an attitude scale is directed toward a unidimensional approach or a single attitude. Attitude scales are frequently used to measure instruction, training, or procedures. They provide a quantitative measure of the individual's standing on a unidimensional attitude continuum.

Measurement of attitudes is both difficult and controversial. Part of this concern is the interpretation of verbal and non-verbal behavior. Whether the "verbally" expressed attitude is the "real" one or the non-verbal

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[1]Gene F. Summers, ed. Attitude Measurement (Chicago: Rand McNally and Co., 1970), p. i.

[2]Smith, Bruner and White, Opinions and Personality, pp. 1-4.

behavior expressed the "real" one is the center of controversy. Problems in measuring attitudes are difficulty in establishing validity, since there is often a difference in what the person says and what he does; reliability, since single question surveys cannot be considered as consistent measures; good questionnaire construction, since ambiguities and other sources of error are often present; inadequate sampling in both size and representativeness; and problems in administration, since it is often difficult to control conditions under which tests are given.[1]

Summary

This chapter has enumerated some of the studies detailing the correlations of exercise to age in which there were demonstrated changes in heart function as the subject grows older. It also has shown that different patterns of exercise have been exhibited by male and female subjects. Occupational factors have been found, in some cases, to be important in the various groups of people who opt for exercise. However, not all authorities have concurred with this view. It is a well-known maxim that attitude influences behavior. Also, in regard to attitudes about exercise, it was

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[1]Anne Anastasi, Psychological Testing (London: MacMillan Company, 1968), pp. 480-482.

found that it is an important, influencing parameter. Therefore, it is of tantamount importance to measure attitudes as well as the ability to accomplish attitude change.

CHAPTER III

PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

Introduction

A descriptive study was conducted with a factual questionnaire used to collect the data. Abdellah and Levine define descriptive research as being primarily concerned with obtaining accurate and meaningful descriptions of the phenomena being studied.[1] Another aim of descriptive research is the discovery of new facts about the situation under study.[2]

In nursing, descriptive research has yielded important data for program planning and for decision making.[3] Descriptive research has also often provided the basis for undertaking explanatory research. In many areas the progression has gone from a broad descriptive study that uncovers problem areas, to explanatory research that investigates

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[1]Faye Abdellah and Eugene Levine, Better Patient Care Through Nursing Research (New York: The Macmillan Company, 1965), p. 40.

[2]Ibid., p. 518.

[3]Ibid., p. 426.

the possible causes of the problem.[1]

The problem of this study was to determine favorable and unfavorable attitudes of post myocardial infarction patients about physical exercise and activity and to compare these attitude scores with sex, age, and occupation of the patients.

Setting For The Study

The setting for the collection of data was a large metropolitan area of over one million population located in the Southwestern part of the United States. Two groups of post myocardial infarction patients were studied. One group, a planned exercise group, met six times weekly at a local Young Men's Christian Association gymnasium. The other group, without known history of planned exercise and not participating in planned exercise program currently, was polled by mail from lists of post myocardial infarction patients. Exact activity levels of the second group were undetermined.

Sample

The sample was conveniently selected from those members of the population meeting the following criteria: male or female, age range from twenty-five years to sixty-five

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[1] Ibid., p. 425.

years of age, and at least six weeks following their first diagnosed myocardial infarction.

Since forty questionnaires were administered at the planned exercise program's exercise sessions and thirty were polled by mail, certain criteria were needed to select from those the sample for the study. Both male and female respondents were considered desirable since myocardial infarction occurs in both sexes. The age range, as determined by response, extended from twenty-five years to sixty-five years of age. Questionnaires were only selected for the study if the respondent did have a diagnosed myocardial infarction, since other cardiac conditions could affect patient attitudes regarding exercise. Patients with more than one myocardial infarction were not included as Bibring reports patients' anxiety increases regarding their condition and capacity for exercise following a second or multiple myocardial infarction.[1] It has been suggested by studies reviewed that a minimum of six weeks time following a myocardial infarction should lapse before a structured vigorous

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[1]Rosen and Bibring, "Psychological Reactions", pp. 808-820.

exercise program is conducted.[1]

Two groups of post myocardial infarction patients were selected. The first group consisted of members of a planned exercise group in a large metropolitan area. This non-profit program provides physician supervised exercise and educational facilities for the cardiac patient. Seventeen post myocardial infarction patients were selected by non-random convenience sampling methods from this group. The exercising group is hereafter referred to as Group A.

Group A members were encouraged to participate as often as possible in the planned exercise program or at least three times weekly. A physiologist directed the program and a physician was in attendance at all times. Each participating member was checked once during the exercise session for heart rate, blood pressure, and bipolar electrocardiogram. These findings were logged in the member's record along with subjective data from the member regarding his physical condition that day. Members were encouraged to report any unusual occurrences or problems during exercise to

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[1] H. K. Hellerstein, "Relation of Exercise to Acute Myocardian Infarction", pp. 124-126; B. D. McPherson et al, "Psychological Effects of an Exercise Program for Post Infarct and Normal Adult Men", pp. 95-102; Tobis and Zohman, "Rehabilitation Program", p. 444.

the attending physician. Each member followed his individual exercise prescription given to him by the physiologist and cardiologist.

The second group was polled by mail from a list of cardiac patients with a predominance of myocardial infarction patients who were discharged at least six weeks before this study. Some had been approached to join an exercise program, but to date were not currently enrolled in a planned exercise program. The non-participating group is hereafter referred to as Group B.

Methodology

The sample obtained from Group A was given the questionnaire at one of the scheduled exercise sessions. Forty questionnaires were distributed. The members were asked to return them the next day or at the earliest opportunity. They were directed to describe in detail their present and past occupation and to include any and all physical exercise and activity in which they were currently participating as well as their exercise history. They were specifically asked what kinds of physical activity, how often they participated, and how long they continued this activity. Finally, they were asked if they were told by their doctors that they had had a heart attack. Each respondent was directed to circle the answer category which most accurately expressed

his view of physical exercise. The respondents were assured that there were no right or wrong answers.

In Group A, seventeen of the forty patient questionnaires were selected based on the established criteria for the study. In Group B, thirteen questionnaires of the thirty sent to patients met the established criteria of the study.

Description of the Research Tool

According to Abdellah and Levine,[1] the single most widely used instrument for data collection in the non-experimental study is the factual questionnaire. The major advantages are its relatively low cost, ease of distribution and collection, and its appropriateness for administration by the mail. Its precision and response accuracy are additional advantages. However, although a low response error is expected, such is not always the case. A major disadvantage of questionnaires is the source of error in response to factual questions, particularly questions relating to past events. Faulty memory is usually the case of such error. It is also difficult when using questionnaires to determine the interval between one scale category and another. For example, difference between an agree response and a

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[1]Abdellah and Levine, "Better Patient Care", p. 710.

neutral response cannot easily be determined.

The questionnaire was divided into three sections: directions, biographical data, and questions pertaining to physical exercise and activity (Appendix A). The directions and questions pertaining to physical exercise and activity were used with permission from McPherson and Yuhasz (Appendix B). The biographical data was deemed necessary to fulfill the criteria for the study. The additional questions on physical exercise and activity were coded to provide a base line for a total occupation score. Anonymity was assured all participants since no signature was requested, and the participants who were polled by mail were requested to return the completed questionnaire via an enclosed self-addressed stamped envelope.

The questionnaire was scored on a Likert Scale of five degrees: strongly agree, agree, neutral, disagree, and strongly disagree. Each statement received a rating from one point to five points in computing the final score. This particular scale varied in rating some questions as five for "strongly agree", with other questions rating one for "strongly agree".

The Likert scale is a qualitative ordinal type of scale that places a responsibility on the rater to respond

to each statement by different degrees.[1] It is then possible to evaluate a desired variable by response to a series of statements. The response, according to a degree of favorableness or unfavorableness, can then provide a criterion measure of the variable.[2] One of the disadvantages of such a scale is the tendency of the rater to avoid the extreme categories. This results in an accumulation in the central classes which reduces the sensitivity of the measuring instrument. One way to avoid this bias is to eliminate the central category.[3] In this questionnaire, the directions included a statement of "Avoid choosing 'neutral' in very many instances" to partially eliminate this bias.

The "McPherson-Yuhasz Attitude Toward Exercise and Physical Activity Inventory"[4] was used to assess present attitudes and changes in attitudes of adults toward physical exercise and activity. This inventory was validated by McPherson and Yuhasz in a previous study and established as a reliable instrument. The reliability of the tool was

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[1] Abdellah and Levine, Better Patient Care, p. 317.

[2] Ibid., p. 710.

[3] Ibid., p. 240.

[4] McPherson-Yuhasz, "Attitude Toward Exercise and Physical Activity Inventory."

established with high school teachers as subjects. Reliability was determined by administering the inventory on two occasions to twenty-five male physical education teachers. The test sessions were seven days apart. The reliability was also determined by the odd-even split-half method and the obtained co-efficient was corrected by the Spearman-Brown formula. The reliability of the "McPherson-Yuhasz Attitude Toward Exercise and Physical Activity Inventory" ranged from +0.81 to +0.95. For validation purposes, the group of physical education teachers was designated as the group with the presumed "Favorable" attitudes and practice with respect to exercise and physical activity.

The inventory was mailed out to twenty-five members of the "Unfavorable" group. Twenty replies were received from this group. An indication of the validity of the inventory was determined by sign tests and a t test. A t test for the significance of the difference between the uncorrelated means of the two groups revealed a t ratio of 6.697. A sign test of the mean scores on each test item revealed a statistically significant difference between the criterion group presumed to have "favorable" attitudes and the criterion group presumed to have "unfavorable" attitudes.

The fifty statements were divided into five categories to further evaluate the data by the researcher. They were:

exercise and work productivity, exercise and health concepts, exercise and physician supervision, exercise as a current satisfaction and exercise as gaining a psychological response.

Procedure for Treatment of Data

This study was descriptive in nature; therefore, descriptive statistics were most appropriate in summarizing the data. Data collected from individual patient questionnaires were compiled and presented in appropriate tables. Computation of statistical tests of significance such as the *t* test and Pearson correlation coefficients were used. These tests were used to determine if any relationship existed between the variables. Variables used were age, sex, and occupation of the members in Group A, the planned exercise group, and Group B, the non-participant group, in comparing their attitudes about physical exercise and activity.

The *t* test for two independent samples is a powerful test widely used for a variety of research problems.[1] When the data of research consist of frequencies in discrete categories, the *t* test may be used to determine the significance of differences between two independent groups. The measurement involved may be as weak as nominal scaling. The

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[1] John T. Roscoe, Fundamental Research Statistics (New York: Holt, Rinehart and Winston, Inc., 1969), p. 168.

hypothesis being tested is usually that the two groups differ with respect to some characteristics and therefore with respect to the relative frequency with which group members fall in several categories.[1]

The Pearson coefficient is a parametric measure to determine if there is a relationship between the two sets of scores and the degree of their relation.[2] The correlation is an abstract number, a convenient index of relationship which has been defined in such a fashion as to lie between the limits minus one to plus one. It is expressed as a decimal fraction but should not be regarded as a proportion or percentage since it is independent of the unit and magnitude of the original score.[3] A correlation coefficient is an index of relationship between two variables. When two variables are positively correlated, a direct relationship exists in that a higher score on one variable is associated with a higher score on the other variable. This perfect positive correlation will have a coefficient of one. When two variables are perfectly negatively correlated, a higher score

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[1]Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., 1956), p. 116.

[2]Ibid., p. 195.

[3]Roscoe, Fundamental Research Statistics, p. 7.

on one variable is always associated with a lower score on the other. This perfect negative correlation will have a coefficient of minus one. Most variables studied by the behavioral scientist will yield a correlation between zero and plus or minus one.[1]

Summary

Chapter III, Procedure for Collection and Treatment of Data, included discussion of the type of study and population sample used. There were twenty-nine respondents in the total sample: seventeen from Group A, the exercising patients, and twelve from Group B, the non-participating patients.

Data were collected by a fifty item questionnaire which was developed and validated in a previous study. Data were submitted to *t* tests for independent samples and a Pearson correlation coefficient to establish differences and relationships.

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[1] Ibid., p. 72.

CHAPTER IV

ANALYSIS OF DATA

Introduction

This study was conducted to determine the attitude of post myocardial infarction patients concerning physical exercise and activity as evidenced by their replies to a fifty item questionnaire. A total of seventeen members were chosen from a planned exercise group and were called Group A, and twelve members were selected who did not belong to any planned exercise group and were called Group B.

Data concerning exercise and age, sex, and occupation, will be presented in tables to facilitate clarity and comprehension. Statistical evaluation will be presented and followed by a summary of the findings.

Sample

The sample population, including males and females, had an average age of 51.31 years. The mean age for females was 59.5 years. The mean age for males was 50.70. The mode for Group A was 50-59 years while the mode for Group B was 40-44 years (Table 1).

TABLE 1

NUMBER AND PERCENTAGE OF THE TOTAL SAMPLE IN EACH AGE GROUP

Age Group	Group A		Group B	
	Number	Percentages	Number	Percentages
30-34 yrs.	2	11.8	0	0.0
35-39 yrs.	1	5.9	1	8.3
40-44 yrs.	0	0.0	5	41.5
45-49 yrs.	2	11.8	1	8.3
50-54 yrs.	3	17.6	1	8.3
55-59 yrs.	4	23.5	2	16.6
60-64 yrs.	3	17.6	1	8.3
65 yrs.	2	11.8	1	8.3
Total	17		12	

Group A--Planned exercise group.

Group B--Non-participating in a planned exercise group.

Description of Findings

The first hypothesis stated "that there will be no difference in attitudes regarding physical exercise and activity of post myocardial patients who are participating in a planned exercise program". The alternate hypothesis stated that these two groups were different in their attitudes, with Group A having a more favorable attitude toward physical exercise and activity. To analyze the data, the *t* test for independent samples was used. The level of significance was arbitrarily set at $\alpha = .05$.

The data presented in Table 2 indicates rejection of the null hypothesis and acceptance of the alternate hypothesis. With 27 degrees of freedom, the *t*-value equaled 2.39 which fell within the region of rejection and thus significant at the .05 level of confidence. The *t*-value is the statistic which takes both the standard deviation and the difference in means under consideration (along with the sample size). Therefore, there was a difference in the attitude between exercising post myocardial infarction patients in a planned program and the post myocardial infarction patients not in a planned exercise program. The attitude was more favorable in the planned exercise group.

TABLE 2

STATISTICAL SIGNIFICANCE IN THE DIFFERENCE IN ATTITUDES OF GROUP A AND GROUP B TOWARD EXERCISE

Groups	Number	Mean	Standard Deviation	Degrees of Freedom	T-value
Group A	17	198.1176	15.358	27	2.39
Group B	12	183.2500	18.021		

The second hypothesis states "that there will be no difference in the attitudes regarding physical exercise and activity when differentiated by age in post myocardial infarction patients". Again the t-test for independent samples was used. The two groups, A and B, were divided into those with ages below fifty years, and those with ages of fifty years or above. These were divided in this manner to determine if a more favorable attitude existed in the younger adult or in the older adult. The mean score was 187.0000 for the below fifty year age group and 195.4706 for the fifty year and above age group. The t-value was -1.27 which was not significant at the .05 level with 27 degrees of freedom (Table 3).

TABLE 3

DIFFERENCE IN THE ATTITUDE TOWARD EXERCISE OF ADULTS UNDER 50 YEARS OF AGE AND THOSE OVER 50 YEARS OF AGE

Years of Age	Number	Mean	Standard Deviation	Degrees of Freedom	T-value
<50	12	187.0000	13.922	27	-1.27
>50	17	195.4706	19.787		

The hypothesis that there would be no difference in their attitudes regarding physical exercise and activity when differentiated by age was not rejected. However, there seems to be some indication that the below fifty year age group had a more favorable attitude toward exercise than the fifty year or above age group.

The third hypothesis stated "that there will be no difference in the attitudes regarding physical exercise and activity when differentiated by sex in post myocardial infarction patients". There were not enough data to do statistical analysis. However, the scores based on the responses to the questionnaire for the two female subjects, one of which was in the planned exercise group and the other in the non-participating group, were lower than the population

mean. The female member of the Group A or the planned exercise group scored 181 while the female member of Group B or non-exercise group scored 170. The average mean of all respondents in both groups was 191.9655 with a standard deviation of 17.8295.

The fourth hypothesis stated "that there will be no difference in the attitudes regarding physical exercise and activity when differentiated by occupation in post myocardial infarction patients". The score for occupation was determined as outlined (Appendix D). To analyze the data, a Pearson correlation coefficient was used. The correlation of .1225 of total score with occupation was found. It was not significantly different from "0" at the .05 level of significance. Therefore the null hypothesis was not rejected. The total score of Group A and Group B for occupation questions yielded a mean of 12.2414 and a standard deviation of 2.9959. All seventeen of the planned exercise group, or Group A, members belong to the lowest level of activity, 1½-2 Mets, as defined. That is, they expend 4-7 ml O_2/min/kg, or 2-2½ kcal/min per 70 kg person. This category of patients work at occupations such as desk work, auto driving, typing, or electric calculating machine operation (Table 4).

The Group B, or non-participants in planned exercise group, had nine members in the 1½-2 Mets unit category. Two

members of this group had levels of activity which put them in the 2-3 Met unit category. This category of patients expended 7-11 ml O_2/min/kg or 2½-4 kcal/min for a 70 kg person. They worked at occupations requiring increased activity such as auto repair, radio-television repair, janitorial service, manual typing, and bartending. One member of Group B was presently working at 4-5 Met units or 14-18 ml O_2/min/kg or 5-6 kcal/min for a 70 kg person. People belonging to this category of activity had increased activity in their occupations and did such work as painting, masonry, paper hanging, or light carpentry (Table 4).

TABLE 4

COMPARISON OF GROUP A AND GROUP B AND THEIR LEVEL OF ACTIVITY AS RELATED TO THEIR OCCUPATION

Group	Present Occupation Level of Activity Expressed in Met Units*			
	1½-2 Mets	2-3 Mets	3-4 Mets	4-5 Mets
A	17	0	0	0
B	9	2	0	1

*One Met units is the amount of energy expenditure at rest, equivalent to approximately 3.5 ml O_2/kg body weight/minute.

Total attitude scores from the questionnaire for each subject in each group was also determined. A score of "200" is designated as a favorable attitude since a "strongly disagree" response on the questionnaire would total 50, a "disagree" response 100, a "neutral" response 150, an "agree" response 200, and a "strongly agree" response 250 (Table 5). Since "200" was a favorable attitude toward physical exercise and activity, sixteen of the seventeen respondents (94 percent) in Group A, the exercising group, had a favorable response toward exercise. Group B, the non-participating group, had two of the twelve respondents (16.6 percent) with favorable responses toward exercise.

TABLE 5

ATTITUDE SCORES TOWARD EXERCISE FOR EACH SUBJECT IN GROUP A (PLANNED EXERCISE GROUP) AND GROUP B (NON-PARTICIPANTS IN PLANNED EXERCISE GROUP)

Group A N=17 Subjects	Total Attitude Scores	Group B N=12 Subjects	Total Attitude Scores
1	158	1	188
2	193	2	175
3	214	3	228
4	186	4	170
5	192	5	156
6	188	6	175
7	205	7	187
8	218	8	185
9	212	9	201
10	198	10	171
11	181	11	180
12	199	12	183

TABLE 5-Continued

Group A N=17 Subjects	Total Attitude Scores	Group B N=12 Subjects	Total Attitude Scores
13	199		
14	198		
15	222		
16	208		
17	197		

Other Information Derived from Questionnaire

Grouping of questions pertaining to a specific area showed various results (Table 6). Three questions were related to viewing exercise as an asset to work productivity. Both Groups A and B did agree that exercise is an asset to work productivity.

Ten questions were related to primary health concepts. Of the ten questions related to primary health concepts, only one question was answered with a predominately agree response by all respondents of Group and Group B. This would indicate that patients do not readily understand basic

health concepts such as that exercise prevents colds, rids the body of poisons, and is a factor in maintaining desirable body weight.

Question 19 stated, "You should seek help from a qualified physical educator before you undertake strenuous exercise". Group A, the planned exercise group, had one respondent disagree with this statement with the remainder agreeing or strongly agreeing. Group B, the non-participating group, was uncertain in its replies with 3 disagreeing, 1 strongly disagreeing, 2 neutral, and 6 agreeing. Since Group A consisted of respondents under the guidance of a physiologist and a physician, it would be expected that the replies would be favorable.

Three questions obtained information about the patients' perception of exercise as a deterrent to heart disease. More respondents in Group A saw a relationship between exercise and prevention of heart disease or longevity of life than did respondents in Group B.

Three questions obtained information about patients' view of exercise as a current satisfaction. Both Group A and Group B members gave favorable responses to these questions.

Ten questions were related to gaining a positive psychological response from exercise. Group A viewed exercise as offering psychological benefits to the individual

while Group B respondents were much less likely to observe these benefits.

TABLE 6

RELATIONSHIP OF THE NUMBER OF RESPONSES TO EACH QUESTION ON THE QUESTIONNAIRE

Category	Question Number	Group A N=17			Group B N=12		
		Agree	Dis-agree	Neutral	Agree	Dis-agree	Neutral
Exercise and work productivity	3	17	0	0	12	0	0
	25	17	0	0	10	0	2
	49	17	0	0	10	0	2
Exercise and Health Concepts	4	9	6	2	7	4	1
	11	10	4	3	8	3	1
	12	3	9	5	6	4	2
	20	5	6	6	2	5	5
	33	15	1	1	11	1	0
	35	3	5	9	3	7	2
	37	10	0	7	4	3	5
	41	9	7	1	3	9	0
	46	14	0	3	8	1	3
	48	3	9	4	2	5	5

TABLE 6-Continued

Category	Question Number	Group A N=17			Group B N=12		
		Agree	Dis-agree	Neutral	Agree	Dis-agree	Neutral
Physician's Advice and Exercise	19	16	1	0	6	4	2
	15	14	1	2	8	2	2
	47	16	0	1	11	0	1
	50	13	1	3	4	3	5
Exercise as Current Satisfaction	1	17	0	0	12	0	0
	5	17	0	0	12	0	0
	8	16	0	1	12	0	0
Exercise Gaining Psychological Response	2	17	0	0	11	1	0
	10	15	0	2	10	2	0
	13	16	0	1	10	0	2
	16	8	3	6	6	6	0
	21	15	1	1	9	1	2
	26	10	1	6	10	1	1
	32	12	1	4	6	3	3
	43	16	0	1	9	2	1
	44	15	1	1	9	1	2
	45	14	1	2	6	1	5

Summary

Chapter IV has presented an analysis and interpretation of the data. The *t* test for independent samples and the Pearson correlation coefficient were used to test the data statistically. There was a difference in the attitude toward physical exercise and activity between the planned exercise group of post myocardial infarction patients and the group of post myocardial infarction patients not participating in a planned exercise group. There seemed to be a more favorable attitude toward exercise in the below fifty year old group as opposed to the fifty year old or above age group, but the difference did not reach significance. The correlation between the attitude score and occupation of the individual was not significantly different by statistical testing. Insufficient data prevented statistical analysis on attitudes when defined by sex.

CHAPTER V

SUMMARY, RECOMMENDATIONS, IMPLICATION, AND CONCLUSION

Summary

A descriptive study was conducted to determine attitudes of post myocardial infarction patients toward physical exercise and activity and to determine if a relationship existed between these attitudes and the age, sex, and occupation of the patient. The purposes of the study were: 1) to identify attitudes of post myocardial infarction patients; 2) to compare differences in attitudes between a planned-exercise group and a non-participant group of post myocardial infarction patients; 3) to compare attitudes when differentiated by age; 4) to compare attitudes when differentiated by sex; and 5) to compare attitudes when differentiated by occupations.

Twenty-nine patients were selected by the non-random convenience method. Seventeen patients were selected from a planned exercise group of cardiac patients, or Group A. Twelve patients were selected from non-participants in a planned exercise group, or Group B.

Data were collected using a fifty item questionnaire.

When a score of 200 to 250 was obtained, the subject was considered to have a favorable attitude toward exercise. When the score was 150 to 199 the subject's attitude toward exercise was neither favorable nor unfavorable, hereafter referred to as neutral. Thos subjects who scored under 149 on the questionnaire were said to have unfavorable attitudes toward exercise. Group A, the planned exercise group, had a mean score of 198.1, while Group B, the non-participants in a planned exercise regimen, had a mean score of 183.2.

Hypothesis one stated that there will be no difference in the attitudes regarding physical exercise and activity of post myocardial infarction patients who are participating in a planned exercise program and those not in a planned exercise program. The t test for independent samples supported rejection of the null hypothesis and the alternate hypothesis that there would be a difference and that Group A would have a more favorable attitude was accepted.

Hypothesis two stated that there was no difference in the attitudes regarding physical exercise and activity when differentiated by age in the post myocardial infarction patients. Again the t test was used. The t value did not reach significance so the null hypothesis was not rejected.

Hypothesis three stated that there was no difference in the attitudes regarding physical exercise and activity

when differentiated by sex in post myocardial infarction patients. There was insufficient data to test hypothesis three statistically.

Hypothesis four stated that there was no difference in the attitudes regarding physical exercise and activity when differentiated by occupation in post myocardial infarction patients. The null hypothesis was not rejected after utilizing the Pearson correlation coefficient. Each respondent was given a total occupation score from the information submitted as well as a total attitude score. These two scores were tested for correlation of hypothesis four. The total occupation scores were derived from specific questions in the questionnaire regarding their physical activity and exercise patterns in their occupation.

Recommendations

Based on the findings of this study, the following recommendations are offered:

1. That a similar study be conducted using a larger sample size.

2. That a similar study be conducted on patients who have suffered an acute myocardial infarction more than once.

3. That this study be repeated in a different geographic locale.

4. That an experimental study be conducted with one group of patients who upon discharge receive an explanatory booklet concerning heart disease and an exercise program individually planned for them, as compared with another group of patients who are discharged without receiving either the booklet or an exercise program.

Implications

It was found that there is a difference in the attitudes regarding physical exercise and activity of post myocardial infarction patients who are participating in a planned exercise program as opposed to those not participating in a planned exercise program. Therefore, planned exercise programs should be established in schools: elementary, junior high, high school, and college. They should also be established in factories and other places of employment. Ideally, all employers should provide planned exercise programs for their employees. This study showed that patient attitude toward exercise was more highly motivated to involvement in exercise programs when it was a planned exercise program.

This study indicated that exercise should be instigated early in the life continuum. People below fifty

years of age had a more favorable attitude toward exercise than those above fifty years of age.

Special measures need to be researched and studied on different methodology needed to test the female population. Females need to be enticed to appreciate and thus espouse the virtues of exercise as a lifelong pursuit.

The type of occupation did not seem to make any difference in this study regarding attitudes toward exercise. It would seem that the need for exercise for all people exists regardless of occupations or whether they are overly physically active or sedentary in nature. Therefore, planned exercise to the below fifty age bracket for both sexes, for all occupations, seems to be important.

Conclusions

Based upon the findings of this study, the following conclusions are offered:

1. Attitudes toward exercise and physical activity do vary between the planned exercising group and the non-participating group.

2. Attitudes toward physical exercise and activity vary in the different age groups but not significantly so.

3. Attitudes toward physical exercise and activity appear to be influenced to some extent by the sex of the individual.

4. No significant correlation can be determined from this study between attitudes of respondents toward physical exercise and activity and their occupational status.

APPENDIX A

I am a graduate student from Texas Woman's University working on my Master's thesis in Medical-Surgical Nursing. Information from this study will be used to structure future cardiac rehabilitation programs. I am asking your help in completing a study of attitudes about physical exercise and activity. Please do not put your name on your paper unless you wish. Thank you for your cooperation.

Circle your age group: 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65 or over

Sex: Male_____ Female_____

Occupation - Present - Describe in detail. _____

_____

_____

_____

Past _____

_____

_____

In addition to your occupation, in what other physical exercise or activity do you participate? Is the activity a planned exercise program under the supervision of a physician? _____

_____

_____

What kind of physical exercise or activity? _____

_____

How often do you participate in this physical exercise or activity? _____

_____

How long did you continue this physical exercise or activity?

_____

_____

Has your doctor told you that you have had a heart attack?

Please check only one: Yes _____ No _____ Uncertain_____

Directions:

1. Read each statement carefully.
2. Then circle one of the following categories that most closely expresses your view of physical exercise. Strongly disagree, disagree, neutral, agree, strongly agree.
3. There are no "right" or "wrong" answers. It is only desired to know your personal beliefs and attitudes about exercise.
4. If undecided, circle neutral. Try to avoid circling "neutral" in very many instances.
5. Example:

All children should exercise to help them reach full growth.

(Strongly disagree) Disagree Neutral Agree Strongly agree

1. Physical exercise is beneficial to the human body.

Strongly disagree Disagree Neutral Agree Strongly agree

2. Exercise helps to work off emotional tensions and anxieties.

Strongly disagree Disagree Neutral Agree Strongly agree

3. Adults get all the physical activity they need in their daily work.

Strongly disagree Disagree Neutral Agree Strongly agree

4. Exercise is of little value in maintaining desirable body weight.

Strongly disagree Disagree Neutral Agree Strongly agree

5. Regular physical activity makes one feel better.

Strongly disagree Disagree Neutral Agree Strongly agree

6. Physical education should be a required subject for elementary and secondary school children.

Strongly disagree Disagree Neutral Agree Strongly agree

7. Exercise does more harm than good.

Strongly disagree Disagree Neutral Agree Strongly agree

8. Those who are physically able should take part in a daily period of physical activity.

Strongly disagree Disagree Neutral Agree Strongly agree

9. An individual has all the strength and stamina he needs without participating in a program of exercise.

Strongly disagree Disagree Neutral Agree Strongly agree

10. Exercise does little to improve a person's sense of well-being.

Strongly disagree Disagree Neutral Agree Strongly agree

11. Heavy physical exercise makes an individual muscle bound.

Strongly disagree Disagree Neutral Agree Strongly agree

12. When recovering from a cold it is best if one does not engage in physical activity.

Strongly disagree Disagree Neutral Agree Strongly agree

13. Participation in physical activity aids mental relaxation.

Strongly disagree Disagree Neutral Agree Strongly agree

14. Exercise is important in aiding a person to gain and maintain all-roung good health.

Strongly disagree Disagree Neutral Agree Strongly agree

15. The heart cannot be strengthened by exercise.

Strongly disagree Disagree Neutral Agree Strongly agree

16. A person's leisure time should be spent in rest and relaxation.

Strongly disagree Disagree Neutral Agree Strongly agree

17. Individual sprots such as tennis are more staisfying to play than team games.

Strongly disagree Disagree Neutral Agree Strongly agree

18. I think exercise is good for me.

Strongly disagree Disagree Neutral Agree Strongly agree

19. You should seek help from a qualified physical educator before you undertake strenuous exercise.

Strongly disagree Disagree Neutral Agree Strongly agree

20. Regular exercise decreases one's desire to smoke.

Strongly disagree Disagree Neutral Agree Strongly agree

21. A person in good physical condition is better able to endure nervous stress.

Strongly disagree Disagree Neutral Agree Strongly agree

22. Exercising with a group leads to improved social relationships.

Strongly disagree Disagree Neutral Agree Strongly agree

23. Exercise becomes less necessary as one advances in age.

Strongly disagree Disagree Neutral Agree Strongly agree

24. A woman can improve her poise and posture by regular participation in physical activity.

Strongly disagree Disagree Neutral Agree Strongly agree

25. Regular physical activity has a beneficial effect on an individual's ability to carry out his job responsibilities.

Strongly disagree Disagree Neutral Agree Strongly agree

26. Exercise gets rid of harmful feelings and emotions such as anger and hostility.

Strongly disagree Disagree Neutral Agree Strongly agree

27. Those who are physically healthy do not need to engage in physical exercise.

Strongly disagree Disagree Neutral Agree Strongly agree

28. Anyone over 25 years of age should avoid exercise because he might strain his heart.

Strongly disagree Disagree Neutral Agree Strongly agree

29. Regular participation in physical activity makes one look better.

Strongly disagree Disagree Neutral Agree Strongly agree

30. It is better to have never exercised at all than to have exercised and stopped completely.

Strongly disagree Disagree Neutral Agree Strongly agree

31. It is annoying that we have to waste our time exercising.

Strongly disagree Disagree Neutral Agree Strongly agree

32. A period of exercise gives a lasting feeling of well-being.

Strongly disagree Disagree Neutral Agree Strongly agree

33. Exercise is of no real value in improving one's health.

Strongly disagree Disagree Neutral Agree Strongly agree

34. Those who are physically able should engage in a weekly session of physical activity.

Strongly disagree Disagree Neutral Agree Strongly agree

35. Muscles, when not used, turn to fat.

Strongly disagree Disagree Neutral Agree Strongly agree

36. Exercise is valuable in building up an adequate reserve of strength and stamina for everyday living.

Strongly disagree Disagree Neutral Agree Strongly agree

37. Regular exercise does not relieve constipation.

Strongly disagree Disagree Neutral Agree Strongly agree

38. If I exercised I would rather do it by myself.

Strongly disagree Disagree Neutral Agree Strongly agree

39. Girls should not exercise strenuously because they will become muscular.

Strongly Disagree Disagree Neutral Agree Strongly agree

40. Physical exercise is less important today than it was in my parent's time.

Strongly Disagree Disagree Neutral Agree Strongly agree

41. Exercise increases one's appetite.

Strongly Disagree Disagree Neutral Agree Strongly agree

42. When one reaches full physical growth exercise is no longer necessary.

Strongly Disagree Disagree Neutral Agree Strongly agree

43. Physical activity in some form is an excellent remedy for the tense, irritable and anxious person.

Strongly Disagree Disagree Neutral Agree Strongly agree

44. Regular physical activity makes a man more alert.

Strongly Disagree Disagree Neutral Agree Strongly agree

45. Regular physical activity has little effect on one's personality.

Strongly Disagree Disagree Neutral Agree Strongly agree

46. A person in good physical condition is less likely to have colds.

Strongly Disagree Disagree Neutral Agree Strongly agree

47. Regular physical activity will help me live longer.

Strongly Disagree Disagree Neutral Agree Strongly agree

48. Working up a good sweat helps to get rid of body poisons.

Strongly Disagree Disagree Neutral Agree Strongly agree

49. When a person improves his physical condition he improves his work productivity.

Strongly Disagree Disagree Neutral Agree Strongly agree

50. Physical activity can help in preventing major medical diseases.

Strongly Disagree Disagree Neutral Agree Strongly agree

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Faculty of Human Kinetics and Leisure Studies
Department of Kinesiology

APPENDIX B

November 7, 1973

Ms. Betty Ann Chase
7721 Chattington
DALLAS, Texas
75240

Dear Ms. Chase:

In response to your letter of October 19, 1973 which somehow caught up to me at the University of Waterloo, I am sending you some information on the Attitude Inventory. Should you require more information I would refer you to my Masters Thesis entitled "The Psychological Effects of Exercise On Normal and Post-Infaret Adult Males" which was completed at the University of Western Ontario, London, Ontario in 1964. This thesis has been placed on micro-card and is available from the Department of Physical Education at the University of Oregon.

Good luck with your work.

Sincerely yours,

B. D. McPherson

Barry D. McPherson, Ph.D.
Assistant Professor

BDM/dt

APPENDIX C

MODERN CONCEPTS OF CARDIO-VASCULAR DISEASE
APPROXIMATE METABOLIC COST OF ACTIVITIES*
JUNE 1972

	Occupational	Recreational
1½-2 METs**	Desk work	Standing
4-7 ml O_2/min/kg	Auto driving***	Walking (strolling 1.6 km or 1 mile/hr)
2-2½ kcal/min (70 kg person)	Typing	Flying,*** motorcycling***
	Electric calculating machine operation	Playing cards***
		Sewing, knitting
2-3 METs	Auto repair	Level walking (3¼ km or 2 miles/hr)
7-11 ml O_2/min/kg	Radio, TV repair	Level bicycling (8 km or 5 miles/hr)
2½-4 kcal/min (70 kg person)	Janitorial work	Riding lawn mower
	Typing, manual	Billiards, bowling
	Bartending	Skeet,*** shuffleboard
		Woodworking (light)
		Powerboat driving***
		Golf (power cart)
		Canoeing (4 km or 2½ miles/hr)
		Horseback riding (walk)
		Playing piano and many musical instruments
3-4 METs	Brick laying, plastering	Walking (5 km or 3 miles/hr)
11-14 ml O_2/min/kg	Wheelbarrow 220 kg or 100 lb. load	Cycling (10 km or 6 miles/hr)
4-5 kcal/min (70 kg person)	Machine assembly	Horseshoe pitching
	Trailer-truck in traffic	Volleyball (6 man non-competitive)
	Welding (moderate load)	Gold (pulling bag cart)
		Archery
	Cleaning Windows	Sailing (handling small boat)

	Occupational	Recreational
		Fly fishing (standing with waders) Horseback (sitting to trot) Badminton (social doubles) Pushing light power mower Energetic musician
4-5 METs 14-18 ml O_2/min/kg 5-6 kcal/min (70 kg person)	Painting, masonry Paperhanging Light carpentry	Walking (5½ km or 3½ miles/hr) Cycling (13 km or 8 miles/hr) Table tennis Golf (carrying clubs) Dancing (foxtrot) Badminton (singles) Tennis (doubles) Raking leaves Hoeing Many calisthenics
5-6 METs 18-21 ml O_2/min/kg 6-7 kcal/min (70 kg person)	Digging garden Shoveling light earth	Walking (6½ km or 4 miles/hr) Cycling (16 km or 10 miles/hr) Canoeing (6½ km or 4 miles/hr) Horseback ("posting" to trot) Stream fishing (walking in light current in waders) Ice or roller skating (15 km or 9 miles/hr)
6-7 METs 21-25 ml O_2/min/kg 7-8 kcal/min (70 kg person)	Shoveling 10/min (22 kg or 10 lbs)	Walking (8 km or 5 miles/hr) Cycling (17 km or 11 miles/hr) Badminton (competitive) Tennis (singles)

	Occupational	Recreational
		Splitting wood Snow shoveling Hand lawn-mowing Folk (square)dancing Light downhill skiing Ski touring (4 km or 2½ miles/hr) (loose snow) Water skiing
7-8 METs 25-28 ml O_2/min/kg 8-10 kcal/min (70 kg person)	Digging ditches Carrying 175 kg or 80 lbs Sawing hardwood	Jogging (8 km or 5 miles/hr) Cycling (19 km or 12 miles/hr) Horseback (gallop) Vigorous downhill skiing Basketball Mountain climbing Ice hockey Canoeing (8 km or 5 miles/hr) Touch football Paddleball
8-9 METs 23-32 ml O_2/min/kg 10-11 kcal/min (70 kg person)	Shoveling 10/min (31 kg or 14 lbs.)	Running (9 km or 5½ miles/hr) Cycling (21 km or 13 miles/hr) Ski touring (6½ km or 4 miles/hr) (loose snow) Squash racquets (social) Handball (social) Fencing Basketball (vigorous)
10 plus METs 32 plus ml O_2/min/kg 11 plus kcal/min (70) kg person)	Shoveling 10/min (35 kg or 16 lbs)	Running: 6 mph = 10 METs 7 mph = 11½ METs 8 mph = 13½ METs 9 mph = 15 METs 10 mph = 17 METs

Occupational	Recreational
	Ski touring (8+ km or 5+ miles/hr) (loose snow)
	Handball (competitive)
	Squash (competitive)

*Includes resting metabolic needs.
**1 MET is the energy expenditure at rest, equivalent to approximately 3.5 ml O_2/kg body weight/minute.
***A major excess metabolic increase may occur due to excitement, anxiety, or impatience in some of these activities, and a physician must assess his patient's psychological reactivity.

APPENDIX D

Coding Instruction for determining a total occupation score. Various individual questions on the questionnaire were scored in a uniform way which was as follows:

Question 53 asked:

Occupation at present. Describe in detail.

Question 54 asked:

Occupation in the past. Describe in detail.

Question 56 asked:

What kind of physical exercise or activity?

The responses to questions 53, 54, and 56 were given a score of 1 with expenditure of METs 1½-2, but a score of 2 was given to respondents who had an expenditure of METs 2-3, and so on to a possible 9 if 10 METs were expended.

Question 55 asked:

In addition to your occupation, in what other physical exercise or activity do you participate? Is the activity a planned exercise program under the supervision of a physician?

Question 55 was coded 0 if no answer, 1 if not planned exercise, and 2 if planned exercise program under physician supervision.

Question 57 asked:

How often do you participate in this physical exercise or activity?

Question 58 asked:

How long did you continue this physical exercise or activity?

Question 57 was coded 0 if no answer, 1 if exercise was once a week, 2 if two times a week, 3 if three times a week, and 4 if four times a week or more. Question 58 was coded 0 if no answer, 1 if exercise was less than one hour in length, 2 if exercise was less than two hours in length, and 3 if exercise was three or more hours. These totals yielded a mean of 12.2414 and a standard deviation of 2.9959. The MET units used are taken from a table compiled by Fox, Naughton, and Gorman (Appendix C), where one MET unit is the energy expenditure of the body at rest. It is equivalent to approximately 3.5 ml O_2/kg body weight/minute.

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