THE RELATIONSHIP BETWEEN LIFE QUALITY AND PHYSICAL ACTIVITY IN THE ELDERLY

A Thesis Presented

to

The Graduate Faculty

University of Wisconsin-La Crosse

In Partial Fulfillment

of the Requirements for the

Master of Science Degree

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by

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December 1983

ABSTRACT

ZUEHLKE, Mary A. The relationship between life quality and physical activity in the elderly. M. S. in Adult Fitness - Cardiac Rehabilitation, 1983. 96 pp. (Dr. L. K. Hall)

This study utilized a questionnaire to determine the relationship between life quality (LQ) and physical activity (PA) in a sample of independent living elderly (N = 84). LQ was measured using Pflaum's (1973) 40 item short form LQ inventory. The PA questionnaire was developed for the study and estimated past PA (young adulthood) and present PA. The sample consisted of elderly men and women 60 years and older, attending senior day centers in the following cities: Stoughton, WI, La Crosse, WI, and Edina, MN. The data was treated using the Spearman correlation coefficient. Significance was set at the .05 level. LQ was found to be positively correlated with past PA. Past PA was positively correlated with present PA. Sex was significantly correlated with past PA. City size was negatively correlated with past PA and present PA. City size was positively correlated with age. LQ was not found to be significantly correlated to present PA. The findings of this study demonstrate the importance of evaluating the needs and desires of the elderly prior to implementing a program of PA.

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We recommend acceptance of this thesis in partial fulfillment of this candidate's requirements for the degree:

Master of Science, Adult Fitness/Cardiac Rehabilitation

The candidate has completed her oral report.

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ACKNOWLEDGEMENTS

I would like to express a very special thank you to my Chairperson, Dr. Linda K. Hall, and Committee Members Dr. Margaret Dosch and Dr. Robert Arthur. Their guidance and patience are greatly appreciated.

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TABLE OF CONTENTS

CHAPTER Page

LIST OF FIGURES

LIST OF TABLES

TABLE Page

CHAPTER I

INTRODUCTION

Background

One of the factors determining the quality of life in old age is the ability to perform physical activities in everyday life (Bassey, 1978). Those factors which affect this ability and their interrelationships should be of interest to those individuals who are concerned with the welfare of the elderly. There is a difference between the absence of disease and positive health, whether it be psychological or physiological. Health, especially the individual's self-rating of health, seems to be the most important covariate of life satisfaction (Ward, 1979).

There are no rules with regard to how much or the quality of exercise which can be set for everyone at a given age. No two persons have the same physical needs or psychological preferences, and chronological age differs greatly from physiological age. Health, educational level, and past experience are more valid predictors than is chronological age (MacLean, 1981). However, exercise of almost any kind, performed to an appropriate degree can and will help to maintain physical health as well as improved life quality (Morris & Husman, 1978).

Older Americans want to be independent and to take care of themselves. This independence may be very closely related to the levels of activity which they are able to obtain. The elderly in

today's society are generally perceived as being less active (Butler, 1981). The Framingham Study (Bassey, 1978) has demonstrated that the level of physical activity can diminish with age. In this sedentary era, the feelings of exhilaration and confidence associated with physical activity and physical well-being are virtually non-existent among the elderly population (MacKinnon, 1980). Physical fitness, or knowing that your body is capable of doing more than the stereotype says it does, promotes confidence which in turn brings mental fitness (Schweiker, 1981). This may promote a greater human dignity in every aspect of daily life.

There is a general assumption that physical fitness has psychological correlates (MacKinnon, 1980). Psychological research has shown that physical changes result from continuous psychological states, and it seems logical to assume that the reverse is possible, that psychological changes can result from physical states such as fitness (Hammett, 1967). Although not necessarily causal, correlational studies have shown relationships between many psychological factors and physical fitness (Hammett, 1967). This may not be indicative of changes due to fitness because persons with certain psychological characteristics may gravitate towards physical activity programs.

It is assumed that increasing physical activity levels is a positive way to enable the elderly to increase their functional capacity, as well as improve their psychological condition. The more active an individual is, the more control that person has over his or her life and, therefore, greater independence is possible

(Bassey, 1978). Pflaum (1973) lists exercise as a basic need which must be satisfied to obtain a high quality of life. The psychological and social benefits gained through physical activity may be just as important as the physiological benefits. Kuhlen (1948) suggested that the biological changes as perceived by the individual may have greater psychological importance than the actual changes in functional capacity. In examining the physiological and psychological effects of physical activity on the older individual, Barry (1966) suggested that if physiological functions are modified by exercise, then we should also examine the link between the individual and the psychological changes which can occur. The possible changes in attitudes and the elements of behavior may provide new insights into the nature of physical activity.

Need for the Study

The literature reviewed indicated a need for further research and new knowledge concerning the role of exercise and the well-being of people, especially the elderly (MacKinnon, 1980; Morgan, Roberts, Brand, & Feinerman, 1970; Shephard & Sidney, 1978; Harris, 1970; and Hammett, 1967). Our knowledge is incomplete concerning how the elderly exercise, or what the psychosocial aspects of physical activity may be (Harris, 1970).

For the elderly, the ability to carry on the usual life-sustaining activities is central to their conception of good health. Baumann (1961) concluded in her study of elderly individuals that health is conceived in terms of the ability to perform social roles. Physical inactivity over a period of many years may limit the mobility and

strength of the elderly and thus hamper their ability to care for themselves.

In today's fitness movement, people of all ages are involved. Twenty or thirty years ago, exercise and sport were largely the domain of the young, but it is now found that growing numbers of those who are classified as "senior citizens" are taking part (Conrad, 1981). The value of exercise in physical and mental benefits for the elderly have been well established (Smith & Serfass, 1981; Shephard & Sidney, 1978; Leake, 1966; Adams & deVries, 1973; Fox, 1981; and MacKinnon, 1980). Anyone who thinks health promotion is only for young people is mistaken, and anyone who thinks that it's not possible to alter lifestyles throughout life is incorrect (Butler, 1981).

The concern with the aging experience is heightened by an increase in the number of elderly in this country. The decline in death rates due to the control of infectious diseases increased the average length of life in the United States from under fifty years at the turn of the century to almost seventy-five years at the present time (Brody, 1982, p. 4). Today there are over twenty-five million Americans over the age of sixty-five years, or one eleventh of the population (Kutza, 1982, p. 6). Current projections indicate that the number of elderly persons will continue to grow at a faster rate than the other ages of the population as the world moves into the twenty-first century (Zutza, 1982).

We need to understand how the aged view their own lives. There has been no systematically collected data on the recent expansion of exercise programs for the elderly (Smith & Serfass, 1981). We must

fill the gaps of knowledge regarding the effects of exercise on the elderly, both physiological and psychological, to assure the program and exercise directors that the programs are indeed effective.

The quality of life has been widely researched in the elderly living in institutions (Ward, 1979, pp. 388-407; and Atchley, 1977, pp. 116-121). However, studies on relatively healthy and active older people living independently are scarce.

Henry Poindexter once stated, "It is by logic that we prove, but by intuition that we discover" (Smith & Serfass, 1981, p. 7). We have always thought through intuition that physical activity can improve the physical and mental well-being of the elderly, but we are lacking research to back up our intuitions.

Purpose of the Study

The purpose of the study was to determine the inter-relationships among age, sex, physical activity, and life quality of an elderly population. This research project attempted to identify a relationship, if any, between the variables of physical activity and the quality of life.

Hypotheses

The following null hypotheses were stated and tested at the .05 level of significance:

1) The life quality in the elderly is not related to the present level of physical activity.

2) The life quality in the elderly is not related to the past level of physical activity.

3) There is no significant difference in life quality between males and females in the elderly sample.

4) There is no significant difference in the level of past physical activity between males and females in the elderly sample.

5) There is no significant difference in the level of present physical activity between males and females in the elderly sample.

6) There is no significant difference in life quality or physical activity levels between the age groups of sixty years to seventy-four years, and seventy-five years and older.

7) There is no relationship between past physical activity and present physical activity in the elderly sample.

8) There is no relationship between the city of residence and either life quality or physical activity in the elderly sample.

Assumptions

A major assumption of this study was the fact that the researcher had to accept as valid the information each individual gave regarding their physical activity. Although the elderly may have thought that they were active relative to others their age, activity measurements and fitness level assessments may indicate an inactive lifestyle (Smith & Serfass, 1981).

It was also assumed that the respondents answered the questions on the Life Quality Inventory accurately.

Delimitations

This study consisted of elderly men and women over the age of sixty years. The variables of life quality and physical activity were

measured. The sample was taken from three settings: the Stoughton Area Senior Citizen Center in Stoughton, Wisconsin; the Harry J. Olson Senior Citizen Center in La Crosse, Wisconsin; and the Edina Senior Community Center in Minneapolis, Minnesota. The samples consisted of senior citizens living independently.

Limitations

There were two limitations identified in the present study.

1) A major limitation of this study involved the estimation of physical activity or fitness level in the elderly. The researcher had to rely on the accuracy of the subjects' responses and, therefore, the activity estimation could have been over-estimated or under-estimated.

2) Another limitation involved the ability to extrapolate the findings of the study to the total population of the elderly. These samples may be representative of the elderly living independently in the three communities being considered; however, there are marked differences between this setting and other types of living situations as well as differences in the environment.

Definition of Terms

Aged - gerontologists divide old age into early old age, sixty-five to seventy-four years, and advanced old age, seventy-five years and above (Butler, 1975). As a result of the fact that senior day centers include individuals younger than sixty-five years, these categories have been modified to sixty to seventy-four years as young-old and seventy-five years and above as old-old.

Aging Process - the process of chronological and progressive deteriora-

tion of selected cells, organs, and tissues which may occur in the absence of any major specific pathology (Poindexter, 1979, p. 91).

Life Quality - the degree to which the environment is perceived as facilitating or retarding one's functioning (Pflaum, 1973, p. 9).

Physical Activity - a regular program of physical activity which develops or maintains the components of physical fitness (Miller & Allen, 1979).

Physical Fitness - the ability to carry out daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure pursuits and to meet unforeseen emergencies (Miller & Allen, 1979).

Senior Citizen Day Center - a resource center for the general needs of those individuals sixty years or older. Its participants are those individuals living independently.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter reviewed literature of the topics pertinent to establishing a rationale for correlating life quality and physical activity of the elderly. Research has shown that physical activity plays an important role in delaying the loss of functional capacity with age (Smith & Serfass, 1981; Emes, 1979; Stamford, 1972; Adams & deVries, 1973). If research could also determine what value this increased functional capacity has upon the quality of life in the elderly, activity opportunities could be planned which would enhance these changes and, thus, make a better contribution to this population. Investigations involving the assessment of physical activity are numerous. However, instruments and investigations measuring the psychological and social benefits of participation in an older population are practically non-existent (Harris, 1970).

The Aging Process

The causes of aging may be unknown, but almost all individuals gradually experience decreased and/or altered function of various physiological systems throughout their lives. These changes may be a part of the natural aging process, or may occur as a result of disease. The degree and rate of change vary from one person to the next, but ultimately every human who lives long enough will experience some of these body changes.

The long period of adulthood in which people are physically and intellectually vigorous has been lengthening (Neugarten, 1982). Estimates suggest that there may be as many as six million people 85 years and older in the United States by the year 2000 (Brody, 1982). The conquest of communicable diseases which had formerly been fatal in earlier years has allowed for a steady increase in longevity (Kreulter, 1980). In the United States, the life expectancy, or the expected age at death for the average individual, is 73 years, and rising (Fries & Crapo, 1981). Figure 1 shows the life expectancy by sex from the years 1930 to 1977.

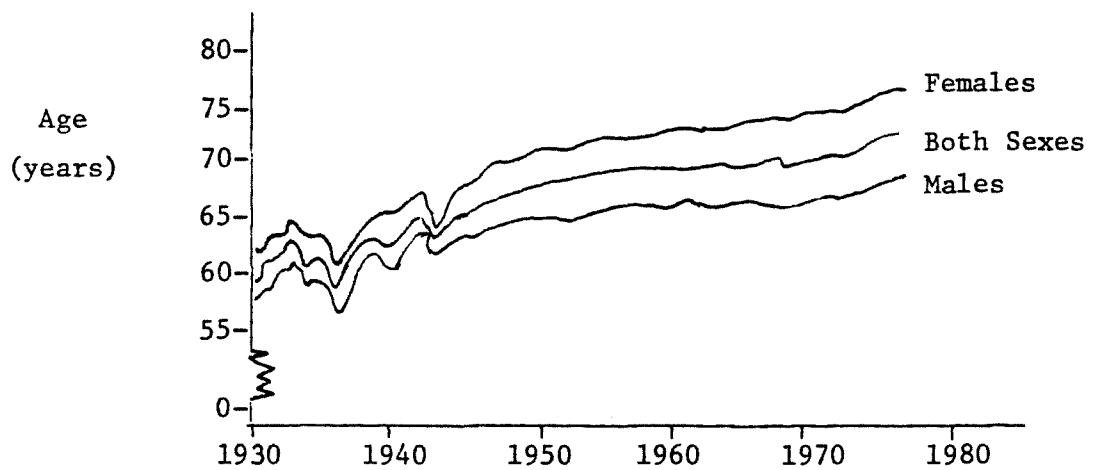

Figure 1. Life expectancy by sex from 1930-1977 (Kreulter, 1980, p. 560).

Natural Changes with Aging

Old age is not an illness, it is a continuation of life with decreasing capacities for adaptation (Vander, Sherman & Luciano, 1980). This decreased adaptability relates to the total interaction with the environment, including the physical, social, psychological, emotional,

and economic aspects of life (Smith, 1981). No one interactive process in life can be totally separated from all other aspects, and each affects the other. An important reason for studying the aging process is to demonstrate the best way to maintain health and prevent premature aging, as well as to define the aging process itself.

What is the natural aging process, as opposed to the diseases of aging? The physiological manifestations of aging are a gradual deterioration in function and in the capacity to respond to environmental stresses (Vander et al., 1980). This decrement in physiologic competence occurs at various levels--molecular, cellular, and organizmic--throughout the life span; and this contributes to the progressively decreasing capacity of the organism to maintain its functional viability (Espenschade & Eckert, 1980). Figure 2 shows the decline in various human functional capacities and physiological measurements with age.

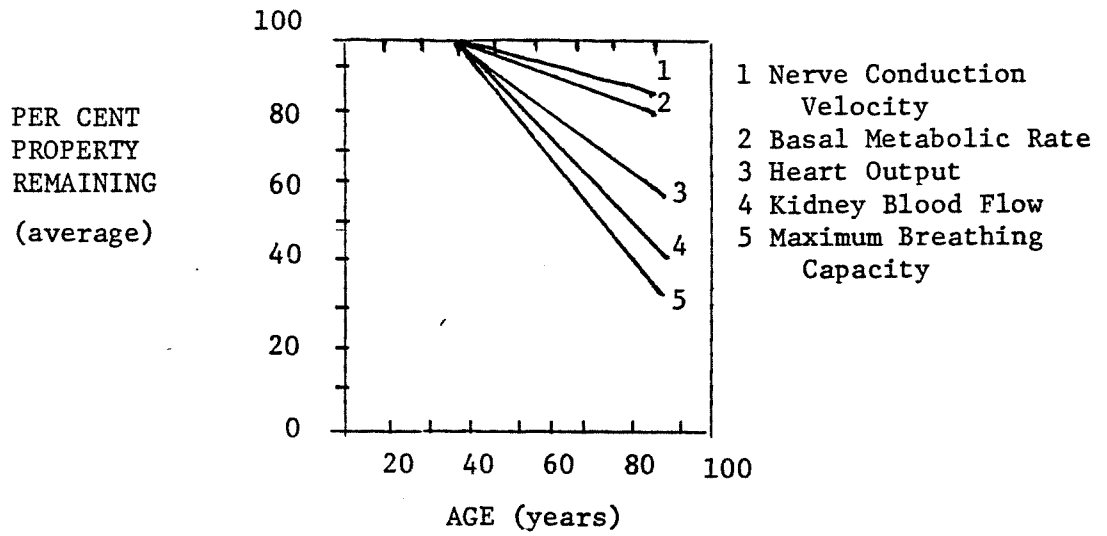

Figure 2. The linear decline of organ function with increasing age (Fries & Crapo, 1981, p. 33).

The decreased functional viability, or the decreased work capacity, is characterized by a reduced capability of the body to exercise and a failure to return to the normal levels of function as quickly as the young, thus indicating a decreased ability to adapt to a changing environment (Smith, 1981).

A decreased number of cells, and the decreased functioning of cells are two theories which attempt to explain the changes occurring at the cellular level with age. According to Vander et al. (1980), the manifestations of aging are related both to a decrease in the actual number of cells in the body, and to the disordered functioning of many of the cells which remain.

Vander et al. (1980) have reported that cells lose their ability to divide, and that the cessation of mitosis is a normal, genetically programmed event. This was determined via experiments in which cells were grown outside the body. The cessation of cell mitosis is an important occurrence because the balance between cell death and cell generation determines the ability of an organism to function, or to adapt to changes in the environment. Manipulation of the cellular environment, however, has produced interesting changes in the rate of cessation. The addition of large quantities of vitamin E resulted in the cells dividing 120 times as opposed to the fifty times usually observed (Vander et al., 1980). Therefore, it is likely that environmental factors may determine how many divisions take place, within the limits set by the genetic program.

According to Vander et al. (1980), the ultimate failure of cell mitosis may be due to an accumulation of copying errors in a cell's

DNA molecules, applying not only to cell dividion, but also to all aspects of cell function.

> Aging is expressed not only by a decrease in total number of cells but also by the deterioration of the functional capacity of those cells which remain. There is fairly general agreement that the immediate cause of this deterioration is an interference in the function of the cells' macromolecules - not just DNA, but RNA, cell proteins, and the flow of information between these macromolecules as well (Vander et al., 1980, p. 556).

Fries and Crapo (1981) have stated that the aging of humans more likely results from these functional changes within the cells, culminating in a loss of organ function, rather than from the inability of the cell to undergo mitosis. There are many theories of aging, and the macromolecular disturbances which lead to the loss of function with increased age, and the exact cause of the progressive failure of the body's adaptive capabilities is undetermined (Vander et al., 1980; Fries & Crapo, 1981).

Functional Losses with Aging

The changes which occur at the cellular level ultimately result in changes in functional capacity. These functional losses appear to be directly related to each individual's lifestyle. The three main areas which are integral to physical activity are maximum oxygen uptake changes, cardiovascular alterations, and changes in muscle mass.

Maximum oxygen uptake. As reported by Bassey (1978), in a summary of results from a cross-sectional study of untrained healthy males ranging from sixteen years old to eighty years old, Shephard (1966) demonstrated that those in their seventies could muster only half the oxygen uptake of those in their twenties and thirties.

Fischer, Parazkova, and Roth (1965) reported that the efficiency of converting oxygen into external work does not change with age, so therefore, this decline in oxygen uptake represents a fifty percent decrease in physical work capacity. Astrand (1956) and deVries (1979) have confirmed the decline in maximal oxygen uptake in their cross-sectional studies.

Cardiovascular parameters. There are many cardiovascular alterations which occur in the aging process, both in the peripheral and the myocardial regions. In the peripheral vasculature, an age-related decline in the elasticity of the major blood vessels has been recognized for many years (Shephard, 1981). This stiffening of the blood vessels causes an increased resistance to blood flow, which predisposes to an increase in blood pressure (Smith, 1981). In the myocardium, there is a progressive degeneration of cardiac structures, including a wasting of heart muscle, a loss of elasticity, and fibrotic changes in the valves (Shephard, 1981). These changes contribute to a decline of about 30 percent in maximum cardiac output between the ages of thirty and seventy years (Smith, 1981). It is difficult to separate the loss of lean tissue with aging from the consequences of decreased physical activity. For example, Kavanaugh and Shephard (1977) have found that heart volumes are fairly well maintained in active individuals.

Muscle mass parameters. A significant decrease in muscle mass occurs with old age which is more marked than body weight loss and appears to be due to decreases in both fiber number and size (Fitts, 1981). The decrease in muscle mass is associated with a decrease in total protein concentration, as well as an increase in connective

tissue and fat (Fitts, 1981). DeVries (1979) has determined that three to five percent of muscle tissue is lost in each decade, and muscle tone begins to decrease well before old age has been reached. These changes may be functionally significant because of the loss of muscular strength, a reduced speed of movement, and a decrease in muscular endurance. Grip strength has been determined to be highly correlated with total body strength (Johnson & Nelson, 1979). Figure 3 shows the changes which often occur with age in muscular strength and muscular endurance as demonstrated by grip strength.

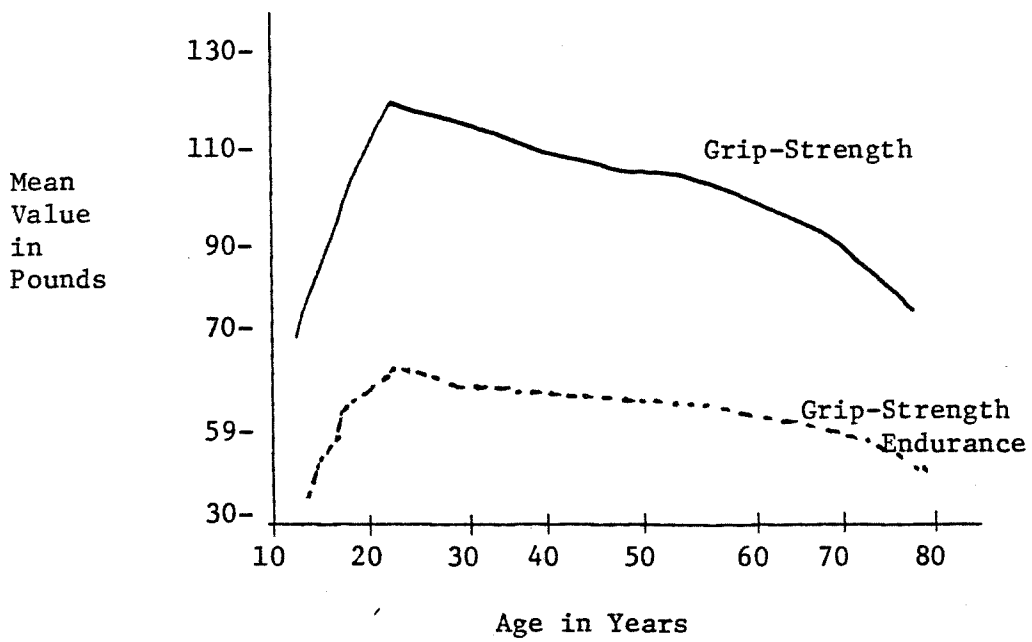

Figure 3. Changes with age in dominant hand grip and grip strength endurance in males

(Espenschade & Eckert, 1980, p. 292.)

Genetics play an important role in each individual's life expectancy; however, the rate of decline with aging may be more affected by the interaction with environmental factors. Current

research suggests that fifty per cent of the decline frequently attributed to physiological aging is actually disuse atrophy resulting from inactivity (Smith, 1981; Munns, 1981; Moritani, 1981; deVries, 1979; and Kraus, 1978). Fries and Crapo (1981) state that a faculty that is unused atrophies and functions poorly, and effort and practice are required to maintain a given function. Table 1 lists modifiable markers of aging (Fries & Crapo, 1981, p. 125).

Aging Marker	Personal Decision(s) Required
Cardiac reserve	Exercise, non-smoking
Dental decay	Prophylaxis, diet
Glucose tolerance	Weight control, exercise, diet
Intelligence tests	Training, practice
Memory	Training, practice
Osteoporosis	Weight-bearing exercise, diet
Physical endurance	Exercise, weight control
Physical strength	Exercise
Pulmonary reserve	Exercise, non-smoking
Reaction time	Training, practice
Serum cholesterol	Diet, weight control, exercise
Social ability	Practice
Skin aging	Sun avoidance
Systolic blood pressure	Salt limitation, weight control, exercise

Table 1. Modifiable aspects of aging

(Fries & Crapo, 1981, p. 125).

These aging markers, which often predispose to and increase the probability of developing chronic disease, can be deterred or reversed by personal choices. The lifestyle modifications which are listed have been well established in retarding the aging markers (Fries & Crapo, 1981). The maintenance or restoration of a healthy lifestyle can significantly affect the overall quality of the later years of an individual's life (Smith & Serfass, 1981).

The Physiological Effects of Physical Activity

Disabilities of the elderly result frequently from deconditioning caused by too much stress and too little exercise, which drastically increases the natural loss of muscular fitness (Smith & Serfass, 1981). An ongoing pattern of physical activity is essential for mental as well as physical health (Kaplan, 1979). DeCarlo (1974) has concluded from his study of the recreational patterns of older persons that individuals who engage in a high degree of activity with regularity will age with greater success than those whose whole engagement is of low degree and sporadic. It is not known what the exact relationship is between physical activity and aging, or to what extent the decline in muscular function in the elderly can be prevented or reduced by exercise (Serfacc, 1981). The benefits of exercise to cardiovascular health, however, are well established (Scheuer & Tipton, 1977).

In a summary of investigations reported by Timiras (1972), it was emphasized that physical activity is valuable in the prevention of aging symptoms in the cardiovascular system. "Not only does exercise seem to improve the strength and circulation of the cardiac mass, but it also seems to reduce the severity of atherosclerotic lesions and the incidence of thrombosis and embolism" (Timiras, 1972, p. 574). Emes (1979) found a significant decrease in both systolic and diastolic blood pressures following a twelve week program of regular light exercise with elderly subjects. There was also a slight decrease in the resting heart rate. Sidney, as cited in Smith and Serfass (1981), concluded that the programs of regular vigorous physical exercise

lasting six to eight weeks can elicit cardiovascular adaptations in the elderly. There is little doubt that elderly subjects, especially those in the lowest levels of fitness, can make significant gains in cardiovascular fitness (Smith & Serfass, 1981). Those gains come in the form of improvement of the maximum oxygen consumption, as physical performance is improved by gains of aerobic power and the appropriate adjustments of the cardiovascular system to muscular activity (Smith & Serfass, 1981). Even a moderate increase would enable an unfit individual to more efficiently carry out daily tasks, as well as help that individual to pursue leisure-time activities (Serfass, 1981).

In addition to the effects of exercise on the cardiovascular system and physical working capacity, there are other significant health benefits. A decrease in skinfold measurements, or percent body fat, occurs with physical training (Astrand & Rodahl, 1977). Related to the decrease in total body fat, training has been shown to increase muscular tone, which lends itself to good circulation of the peripheral blood vessels, and therefore more support is given to the heart (White, 1957). In a study by Chapman, deVries, and Swezev (1972), it was shown that through an exercise program, joint stiffness can be decreased, and muscular strength increased in both the young and old. Current research in the area of osteoporosis is extremely encouraging. Results have shown an increase or stabilization of bone mineral content with training (Smith & Serfass, 1981). The elderly can make improvements in their muscular strength which will substantially improve their functioning in everyday life (Smith & Serfass, 1981).

Goodrick (1980) studied the effects of exercise on the aging process with rats and found that long-term voluntary exercise acts to

retard the aging process. The exercise group had lower weights, the energy metabolism was higher, and this high level was maintained late in the life span. The mean longevity of the exercise rats was 15.2 percent greater than the mean longevity of the controls (Goodrick, 1980).

The Psychological Effects of Physical Activity

Exercise can be a satisfying treatment for nervous tension and strains, anxiety, and mental concentration. A pleasant fatigue of the skeletal muscles often gives mental repose, peaceful sleep, and a general sense of well-being (White, 1957). All individuals, both the young and the old, can be aided by the relaxation which comes from exercising to the right degree.

Various researchers, as reported in Elsayed, Ismail, and Young (1980), have found that physical training has an effect on the physiological and biochemical processes by which energy is produced and made available to different parts of the body, including the brain. These processes include the availability of oxygen and of circulating glucose, which is the essential nutrient of the central nervous system (Elsayed et al., 1980). When individuals become habitual exercisers as well as physically fit, they are likely to have an abundance of circulating glucose which can be transported efficiently to the brain for nourishment (Elsayed et al., 1980).

In a study performed by Massie and Shephard (1971), sedentary, middle-aged men participated in a twenty-eight week course of regular exercise. Psychological assessments were made at the beginning and

at the end of the study. The researchers found that there were two changes in the exercise group studied: an increase in extraversion, and a decrease in neuroticism. They also found a greater sense of well-being associated with increased activity (Massie & Shephard, 1971). In a one year study by Harris (1970), a regular exercise program positively changed the attitudes and behavior of sedentary middle-aged men. The changes observed were primarily related to the individual perceptions of the physical values of exercise and the reassurance the men received that they were capable of meeting the demands of vigorous activity. In DeCarlo's study (1974), a secondary analysis of the data from a twenty year study of elderly twins, found that there was a relationship between recreative involvement and successful aging. DeCarlo (1974) also reported that individuals who engage in a high degree of activity with regularity will age more successfully than those whose engagement is of low degree or sporadic.

In conclusion, the positive benefits of physical activity extend further than the possible gains achieved physiologically. After reviewing the past literature on the psychological effects of exercise, it was concluded that substantial gains, both physically and psychologically, can be obtained through physical activity (Smith & Serfass, 1981).

Life Quality

A major problem in determing life quality is defining the term. Quality of life is an attractive, appealing subject, bringing to mind personal images of pleasure and contentment as well as riches (George & Bearon, 1980). The term itself involves a value judgement, as the

lives of people may not only be different, but some may be more fulfilling than others. Therefore, the quality of life has to be examined as each individual perceives it. In the literature, life quality has been replacing such terms as well-being, life satisfaction, and happiness to describe how individuals assess their life situations (Ward, 1979). There is presently little concensus on the meaning of life quality (George & Bearon, 1980; and Pflaum, 1973). Dalkey, Rourke, Lewis, and Snyder (1972) have defined life quality as "the degree to which the environment is perceived as facilitating or retarding one's functioning." Other references in the literature offer definitions for the terms happiness, welfare, and life satisfaction (Seltzer, Corbett, & Atchley, 1978; Ward, 1979; and Atchley, 1977).

The global concept of life quality is best approached through separate assessments of the components which make up the concept (Flanagan, 1980). The quality of life notion seems to be a characterization of the factors which are relevant and important to the well-being of individuals (Morris & Husman, 1978). To investigate these factors, Dalkey et al. (1972) have examined the parameters influencing the quality of life using the Delphi procedure and factor analysis. Delphi is a technique used by decision makers who are faced with the necessity of identifying and measuring goals and objectives, and it involves systematic group judgement (Dalkey et al., 1972). Through these methods, the investigators compiled the following components of life quality: novelty, health, dominance, self-respect, challenge, freedom, comfort, affection, security, achievement, status, and involvement (Dalkey et al., 1972). Pflaum (1973) further refined these factors into four

major components. The four components and their specific characteristics are defined as follows (Pflaum, 1973, pp. 41-43):

1. The Biophysical Component

   The degree to which the individual perceives the environment as facilitating or retarding the satisfaction of biological needs.

   a. absence of threat toward one's physical person

   b. physical comfort and well-being

   c. adequacy of food, shelter, and clothing

   d. adequacy of physical exercise

   e. good physical health

   f. sexual satisfaction

   g. absence of physical suffering and pain

2. The Self Component

   The degree to which the individual perceives the environment as facilitating or retarding self-development and personal growth.

   a. self-development and growth

   b. self-acceptance

   c. sense of humor

   d. sense of individualism

   e. feeling of accomplishment

   f. self-confidence

   g. capacity for openness and honesty

   h. ability to be spontaneous

3. The Primary Social Component

   The degree to which the individual perceives the environment as facilitating or retarding face-to-face, intimate social interactions.

a. being needed and wanted by relations and friends

b. involvement in close interpersonal relationships

c. communication and understanding with relations and friends

d. absense of loneliness

e. absence of interpersonal violence and hostility as regards to friends and relations

f. concern for persons with whom one has close interpersonal relationships

g. openness and honesty with friends and relations

h. opportunity for privacy from friends and relations

4. The Secondary Social Component

The degree to which the individual perceives the environment as facilitating or retarding relationships within and with institutions.

a. opportunity for advancement in employment

b. acceptance by others (e.g., employers)

c. popularity with others at work and in the community

d. success in one's vocation

e. opportunity for constructive competition in one's vocational activities

f. recognition, prestige, and favorable reputation in one's career and in the community

g. influence in determining community affairs

h. opportunity to cooperate with others in accomplishing a task (at work and in the community)

i. involvement in community improvement.

Successful Aging

Life quality has been examined extensively under the theory of successful aging (Ward, 1979). Implied in the concept of successful

aging is a value judgement to the effect that some adjustments are successful, and some are unsuccessful. As with life quality, one person's success is not the same as another person's success. There seem to be as many ways to age successfully as there are types of people (Ward, 1979). Social gerontology contains many definitions of successful aging. Three such approaches to defining successful aging are: 1) the activity approach; 2) the disengagement theory; and 3) the personality theory.

Riley and Foner (1968) have theorized that activity is the key to successful aging. This suggests that to age successfully, one must maintain in old age the activity patterns and values of middle age, retaining a large number of roles and substituting activities for those roles lost. According to Riley and Foner (1968), for most people the level of activity they have developed over a lifetime persists into their later years.

Somewhat contrary to the activity approach is the disengagement theory of successful aging. This theory sees old age as a developmental stage very different from middle age. Old age is seen as a period during which the individual gradually and voluntarily disengages from positions and roles, and the decrease in activity is welcomed by the older individual and by society, and should be considered normal (Atchley, 1977).

The personality theory states that people have aged successfully if they maintain a mature and integrated personality while going through the aging process (Atchley, 1980). The basic personality characteristics of the adult as established early in life will

account for the style or manner of adapting or coping with late-life changes (Birren, 1960). Individuals must make their past experiences and their current experiences live well with each other. At present, there is no clear-cut answer as to how aging affects personality or how personality affects aging, as personality is a complex phenomenon with a large part of personality not directly observable (Atchley, 1980).

Perhaps the most crucial subjective assessment of life quality that individuals can report is their relative satisfaction with life in general (George & Bearon, 1980). Life satisfaction defines successful aging in terms of inner satisfaction rather than external adjustment. There are five components of a positive life satisfaction (Havighurst, Neugarten, & Tobin, 1973, p. 168). The satisfied person:

1. takes pleasure from whatever the round of activities that constitutes everyday life;
2. regards life as meaningful and accepts resolutely that which life has been;
3. feels successful in achieving major goals;
4. holds a positive self-image; and
5. maintains happy and optimistic attitudes and moods.

In conclusion, any determinant of the success of aging should first consider the personal history of the individual. The individual's self-rating of health seems to be one of the most important determinants of life satisfaction, as well as income, family satisfaction, and organized activities (Ward, 1979). Palmore and Kivett (1977) conducted a four year longitudinal study of life satisfaction in persons aged forty-six to seventy years, and found no significant change with age. Thus, the best predictor of satisfaction at the

end of the four years was satisfaction at the beginning of the study.

It is hoped that people today will direct their energies toward obtaining a higher quality of life. It is important to know whether older people are satisfied with the way their lives have progressed, the situations they find themselves in now, their future prospects, and whether they are generally happy and have a sense of well-being (George & Bearon, 1980). Studies attempting to identify the factors which contribute to a greater quality of life will help to make life quality a more concrete concept.

Senior Citizen Centers

Maintaining and improving the quality of life for older people involves a wide array of services. These range from basic life support and treatment to deal with incapacities, to provisions of facilities and resources to promote interaction, high morale, and continued levels of function (Kahana, Felton, & Fairchild, 1976).

Most large communities have senior centers (Atchley, 1977). These centers are usually non-profit organizations which are self-supporting or are underwritten by United Way money. According to Atchley (1977) and others, only one to five percent of the elderly population use senior centers frequently. Although some individuals cannot attend due to transportation difficulties, disability, poor health, and other reasons, many people classified as senior citizens remain vocationally and socially active, and feel that they do not need the services of a senior center (Kahana et al., 1976). Even in those communities where there has been an effort to bring people in, usually less than fifteen percent of the elderly population have

taken an active part in the programs (Seltzer et al., 1978). Senior centers mainly attract the energetic, outgoing older individuals who enjoy a group association (Kahana et al., 1976).

The elderly have needs for certain basic programs, facilities, and services which promote customary life styles and standards of living; and also improve the quality of life (Kahana et al., 1976). Kahana et al. (1976) stated these basic needs as being such essentials as: transportation, shopping, and the provision of safety; as well as those activities which promote social interaction and well-being such as: recreational and educational programs. Services such as these are especially important for those of greater impairment and limited resources (Kahana et al., 1976).

Some of the basic social services that enhance the ability of the elderly to retain independence should be available in the multipurpose senior center. According to the Proceedings of the White House Conference on Aging (1971), these services of senior centers include:

1. Supportive services - to aid the older person to remain in a familiar environment or retain a regular living arrangement when this is no longer possible through the individual's own efforts. This includes: home-maker and house-keeper services, home-meal services, and escort services.

2. Preventative services - to prevent the breakdown of the capacity of the older person to function physiologically, psychologically, or socially through detention and intervention prior to old age or prior to a crisis.

3. Protective services - to protect the civil rights and personal welfare of older persons from neglect and exploitation by relatives, friends, the community, and the aged themselves. This is focused on the inability to manage their own affairs in such areas as providing for personal and physical needs, planning and decision-making, and the handling of finances.

The average multipurpose senior center tends to adapt a flexible program, offering informal companionship, community services, self-government within the center, educational opportunities, leisure events, and transportation as well as a variety of other possible features (Atchley, 1977). Senior centers appear to be a valuable resource center for the elderly, enabling them to maintain their customary lifestyle.

CHAPTER III

METHODS

Overview

The elderly are a much neglected population with regard to physical activity and the consequent benefits. In order to determine whether the experts in the exercise sciences should implement programs for the elderly, the effects of exercise, both physiological and psychological, must be evaluated. The purpose of this study was to determine the relationship between the level of physical activity and the life quality in the elderly.

Three different senior citizen day centers in the following cities were used to obtain data: Stoughton, Wisconsin; La Crosse, Wisconsin; and Minneapolis, Minnesota. The sample considered were men and women sixty years and older. Approximately forty subjects from each setting were tested. Pflaum's (1973) Life Quality Inventory was used to determine the life quality in the elderly. The physical activity level of the elderly was determined by a questionnaire which was developed for this study.

Instrumentation

Life Quality Inventory

In order to categorize and evaluate the quality of people's lives, and to compare the differences in their living patterns, whether actual or perceived, it was necessary to find a tool which would assess

life quality in various situations. The inventory must be reliable and valid for individuals of different backgrounds and of different life experiences.

Pflaum (1973) developed a Life Quality Inventory measuring the perceived life quality of adults. The inventory items, involving social-psychological aspects, were chosen in order to reflect the concept of life quality and encompassed the four major dimensional components of perceived life quality: (1) biological functioning; (2) self-development and personal growth; (3) primary social functioning (in face-to-face relationships); and (4) secondary social functioning (within a group or institutional context) (Dalkey et al., 1972).

In his study to validate the Life Quality Inventory, Pflaum (1973) tested the appropriateness of each subscale by having a panel of experts in each particular subscale evaluate that component. At least two-thirds of the panel had to approve an item before it was included in the subscale. He then contrasted two groups of subjects for each subscale. One group, due to their life experiences, were expected to score lower on the subscale than the other group.

The results of Pflaum's (1973) study supported the validity of the Life Quality Inventory. Two-thirds or more of the experts agreed with the investigator regarding items for the subscales; and the contrasting groups did in fact differ in their scores (Pflaum, 1973).

In order to evaluate the reliability of the inventory, the odd items were correlated with the even items. The split-half correlation coefficient of reliability of the total inventory estimated by the Spearman-Brown Correction Formula was .86 (Pflaum, 1973, p. 63). The

biophysical subscale reliability was .77, the self subscale was .78, the primary social subscale was .67, and the secondary social subscale reliability was .79 (Pflaum, 1973, p. 63). The total score in the forty item abbreviated inventory correlated .91 with the total score of the one hundred item inventory (Pflaum, 1973, p. 107).

Morris and Husman (1978) utilized Pflaum's Life Quality Inventory to estimate the life quality changes following an endurance conditioning program. The subjects consisted of student volunteers (N = 51) from the University of Maryland. The short form of the inventory was administered before and after the fifteen week conditioning program. The investigators found that the increase in life quality scores for the conditioning group were in the direction hypothesized (Morris & Husman, 1978). Larger significant increases in life quality were manifested along with vast improvements in physiological changes (Morris & Husman, 1978). They concluded that the new found self-esteem, self-confidence, and self-respect which was gained as a result of the vigorous endurance conditioning program seemed able to transfer to other aspects of the subjects' lives (Morris & Husman, 1978).

In another study examining the life quality characteristics of national class women masters long distance runners, it was found that the scores in Pflaum's Life Quality Inventory for the ten women runners was significantly higher than adult controls and college students (Morris, Lussier, Vaccaro, & Clarke, 1982). This study's results indicated that a single administration of the inventory accurately represents an individual's perceived life quality at a particular time (Morris et al., 1982).

For the purposes of this study, the short form of the Life Quality Inventory was utilized (Pflaum, 1973). The forty item, Likert-type questionnaire was a self-administering test (see Appendix A).

Activity Inventory

Assessing the level of physical activity in the elderly is a difficult task. Before attempting to evaluate an individual's level of physical activity, one must determine that person's perception of activity. People may not respond accurately to questions measuring physical activity because they fail to perceive those measures as being related to what they consider good health. Problems involving the assessment of physical activity are numerous, and instruments to measure the psychological and social benefits of participation are practically non-existent (Harris, 1970). Many of the activity assessments are based upon the energy demands of occupational roles. In general, most of the methods attempt to classify physical activity by job title. As this study deals with elderly individuals who are, for the most part, retired, a scale dealing with job descriptions would be inappropriate.

Yasin (1964) has suggested using a recall record technique to estimate the physical activity during the previous two days of a subject. The activity information was recorded in descriptive phrases every five minutes, and a numerical scoring system was used to estimate the subject's exercise level. This method may be possible for use with the elderly, but the return of the questionnaire may be quite small due to the length and the time involved. This

misinterpretation of the questionnaire is also a possibility.

Reiff, Montoye, Remington, Napier, Metzner, & Epstein (1964) have incorporated an interview with the questionnaire in their physical activity inventory. Their method involved two sessions with each individual, one to deliver the questionnaire, and the next to interview the subject. This method of assessment would be a possibility for use with the elderly. However, the format followed in this questionnaire is for a younger population and would have to be modified to be used with the elderly.

In a study performed by Wessel, Montoye, and Mitchell (1965), a self-administered questionnaire was used to estimate the physical activity involved in occupation and leisure time. This inventory used judges to divide the subjects into activity groups. Because the inventory was aimed toward a younger age group, and because it mandated the use of judges, this was not an appropriate tool for this study.

In conclusion, through an examination of the past literature regarding the assessment of physical activity, the methods which were found were inadequate and inappropriate for use with the elderly. A physical activity assessment tool aimed specifically at the elderly population was, therefore, developed for this study.

The questionnaire developed for the study consisted of scaled-response answers regarding activity type and frequency (see Appendix B). Past physical activity and present physical activity were the two categories that were listed, in order to evaluate both aspects of each subject's life.

Preceding the life quality inventory and the physical activity inventory, a cover letter and general information survey were provided. The cover letter (see Appendix C), introduced the study and explained the general purpose of the research. The survey following the letter (see Appendix D) provided information for the researcher with regard to the life of each subject.

Sample

This study involved eighty-four subjects from three senior citizen day centers. The participants of the study were chosen randomly, every third person who entered the senior center was asked to fill out the questionnaire. Each individual was given the opportunity to decline. The three settings and a description of each are listed below.

The Stoughton Area Senior Citizen Center

The senior center in Stoughton, Wisconsin, was located at 213 South Division Street, one block off the downtown area. Stoughton is a rural community of approximately 7500 people. The senior center serves the six townships in the surrounding area as well as the town of Stoughton.

The center is a multipurpose center designed to be of service to all senior citizens. The senior center is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, and 8:30 a.m. to 12:00 p.m. on Saturday. At the time of the study, the following services were offered at the center: transportation, life-long learning, nutrition, outreach, and employment.

A Stoughton Senior Citizen Center car offered transportation

within the city. Medical trips were provided as often as necessary, and shopping trips were provided once a week. The elderly in Stoughton are able to travel on the city cabs at one-half the normal fare. Also available to the elderly was a commuter service for transport to the center for the daily meal.

The center provided space for creative events and leisure activities, to enable life-long learning. These events included crafts and exercise classes, and were led by volunteers.

Provided daily at the center was a noon meal, available to the elderly for two dollars per meal. Meals on Wheels were offered to those elderly who were shut-ins and unable to attend the meal site. The center also provided nutritional information, and classes on food preparation.

The Outreach Program was a program which linked people to services that were designed to meet the needs and interests of the elderly. It provided a connection between the community and older people.

A free placement service for people over the age of fifty-five years was offered by the center.

The Stoughton Area Senior Citizen Center was funded at the time of the study by the following: the City of Stoughton, the Dane County Commission on Aging, the United Way of Dane County, Independent Living of Dane County, and donations.

The Harry J. Olson Senior Citizen Center

This senior center was located at 1607 North Street in La Crosse, Wisconsin. At the time of the study, the population of La Crosse was approximately 48,500 people, and primarily an industrial city.

At the time of the study, the Harry J. Olson Center served all of La Crosse, as well as the surrounding communities of Bangor, Holmen, Stoddard, and La Crescent. There were approximately six hundred members of the center, with three hundred of these members actively participating. Approximately seventy-five percent of the members were women. The age range was sixty to ninety years old, with the average being eighty-one years old.

The senior center's hours at the time of the study were 10:00 a.m. to 4:00 p.m., Monday through Friday. Regular activities were offered each week, such as: crafts, exercise classes, and card tournaments. Monthly special events were also organized, including: dances, concerts, trips, clinics, and special dinners.

The Harry J. Olson Senior Center was a self-sustained organization at the time of the study. Memberships were suggested to individuals attending the center, though the memberships were not mandatory. The two dollar membership fee was applied toward heating and lighting the facility. Various projects were carried out over the course of the year to support the center. A few examples of such projects were: bake sales, craft sales, and paper drives.

A nutrition program was offered in conjunction with the senior center, and was housed in the same facility. This program was run independently of the center, and was funded by the County of La Crosse.

A mini-bus transportation service provided transportation to the facility for the participants and members of the center.

The Edina Senior Citizen Community Center

This facility was located at 7151 York Avenue South in Edina,

Minnesota, which is a suburb of Minneapolis. The population of this urban area at the time of the study was 43,000 with the population of the greater Minneapolis area being approximately one million people.

At the time of the study, the Edina Senior Community Center served the entire Minneapolis area, as well as Edina. There were 898 members, ranging in age from fifty-five years to ninety-six years, with the average age being seventy-two years. Approximately eighty percent of the members were women.

When the study was performed, the Edina Senior Community Center was open from 9:00 a.m. to 5:00 p.m., Monday through Friday. During the course of the week, various activities were regularly offered, such as: physical fitness classes, wood carving classes, bridge groups, and bowling. Special activities were offered each month, including such events as: films, concerts, and expositions, as well as blood pressure clinics and income tax assistance. The center included a noon meal service, which was available to all senior citizens each weekday at a cost of one dollar per meal. The City of Edina had donated a bus to the senior center, and this service was offered to all senior citizens in the community of Edina. The drivers of the vehicle consisted of volunteers. Special transportation service was offered on Mondays, which involved visits to any medical appointments in the morning and shopping trips in the afternoon.

The Edina Senior Community Center was a self-sustained facility at the time of the study. The participants were encouraged to pay a yearly membership fee of two dollars which covered the overhead cost of operating the center. The building of the facility, as well as the

salary of the director, was funded by the City of Edina.

Summary

The three sample populations which had been studied possessed many similarities, including the types of activities which are offered to the participants. The major difference between the three settings was the demographic area in which each was located.

Procedures

Prior to the actual administration of the questionnaire, several visits were made to each of the testing sites to obtain information regarding each center and to determine the best possible day for administering the questionnaire. During this time, permission was obtained from each of the directors of the centers to carry out the testing. Testing days were chosen as those days which large numbers of participants were attending the facility, thus increasing the possibility of obtaining a large number of subjects.

The researcher arrived prior to the beginning of the activities to be held on the day of testing. This enabled the researcher to identify every third subject entering the facility as a method of random selection. Every third participant was asked to complete the survey. Each individual was given the opportunity to not participate. Instructions were carefully given, and questions regarding the test were answered, when all the subjects were prepared to take their test. Completion of all questions was stressed, and anonymity was assured. The subjects were then instructed to begin responding to the questionnaire.

Upon completion of the inventory, each subject returned the questionnaire to the researcher.

Pilot Study

A pilot study was conducted to establish whether the questionnaire measured what it was intended to measure, and also to determine any problems which may have developed during the actual testing. Members of the La Crosse Cardiac Rehabilitation Program (N = 7), of the target age group being considered, served as subjects. Six of the subjects were in the sixty to seventy-four years age group, and one subject was in the seventy-five years and older age category. All the subjects were males.

To assess the appropriateness of the inventory, the researcher interviewed the subjects after they had taken the test. Each subject indicated that the questionnaire was easy to read and understand. They also indicated that the inventory was representative of their activity level.

Scoring Procedures of the Physical Activity Inventory

To obtain an estimation of the amount of physical activity each subject regularly engaged in, a physical activity inventory was administered.

In order to score this inventory, point values had to be assigned to each category of response to the frequency of participation. The following point values were assigned:

Frequency of Participation

Once or Never	0 Points
Seldom	1 Point
Weekly	2 Points
Two to Three Times per Week	3 Points
Daily (four to seven times per week)	4 Points

To estimate the relative difficulty of each of the activities listed on the inventory, a metabolic cost value was assigned to each (Fox, Naughton, & Gorman, 1972). See Appendix D for the approximate metabolic cost of those activities considered.

The score of the physical activity inventory was obtained by multiplying the estimated metabolic cost of each activity by the point value which was assigned to each category of frequency of participation. These values were then added to obtain a total score for the inventory.

Scoring Procedures of the Life Quality Inventory

The life quality inventory was scored according to the instructions devised for the short form of Pflaum's Life Quality Inventory (1973). The scoring instructions were as follows:

Circle item numbers: 7, 10, 11, 14, 18, 23, 27, 28, 30, 31, 32, 34, 36, 37, and 40.

1. For the above items: DY = 5, Y = 4, P = 3, N = 2, and DN = 1.
2. For all items other than above: DY = 1, Y = 2, P = 3, N = 4, and DN = 5.

To obtain the total, add the number of points received.

Statistical Treatment of the Data

To analyze the data obtained from the questionnaire, the Spearman Rank-Order Correlation Coefficient (Rho) was utilized (Downie & Heath, 1974). Each subject's score was determined for the following categories: life quality, past physical activity, and present physical activity. The scores were then correlated to determine if there was relationship between life quality and past physical activity, life quality and present physical activity. Correlations were performed on the total sample, and separate correlations were also calculated for the young-old (sixty to seventy-four years old), and the old-old (seventy-five years and older), as well as for males and females. The level of significance was set at .05.

To obtain the Spearman correlation coefficient, a digital computer system was utilized, with the SPSS for the VAX/VMS, a version M, release 9.1 computer program.

CHAPTER IV

RESULTS AND DISCUSSION

Introduction

A descriptive study was undertaken to determine if there was a relationship between physical activity and life quality in an elderly population. A questionnaire was utilized to assess these parameters. Quality of life was measured using Pflaum's (1973) forty-item short form life quality inventory. The activity questionnaire developed for the study consisted of scaled-response answers regarding activity type and frequency of participation. The three samples, chosen to provide a representative view of the population of independently living elderly, were the Stoughton Area Senior Center (Stoughton, Wisconsin), the Harry J. Olson Senior Center (La Crosse, Wisconsin), and the Edina Senior Community Center (Edina, Minnesota).

Demographic Data

Represented in this section is information and important factors which are related to this study. Table 2 gives a composite view of these factors (see page 43).

Findings

The data were subjected to analysis using the Spearman correlation coefficient to identify if there were significant relationships ($\geq .05$) between the variables examined. The results of the present study will be discussed in the order of the hypotheses as they were presented in

Table 2. Demographic data. The relationship between life quality and physical activity in the elderly.

Factor	N
Total sample	84
Males	26
Females	58
Young-Old	44
Old-Old	40
City 1. (Stoughton, WI)	30
Males	9
Females	21
Young-Old	19
Old-Old	11
City 2. (La Crosse, WI)	24
Males	8
Females	16
Young-Old	13
Old-Old	11
City 3. (Edina, MN)	30
Males	9
Females	21
Young-Old	12
Old-Old	18

Chapter 1. The results will be presented first with a discussion of reasons for these results following each hypothesis.

Hypothesis I

The first hypothesis stated in this study was that the level of life quality in the elderly would not be related to the present level of physical activity. This hypothesis was treated within the following three subgroups: sex, age, and city size.

When the data were examined by the sex of the respondent, there was no significant correlation found, and therefore the null hypothesis was supported (Table 3). Neither the men nor the women of this study reported a significant relationship between their present physical activity levels and their life quality.

Table 3. The relationship between life quality and present physical activity in the elderly as characterized by sex. Spearman correlation coefficients.

Sex	N	Coefficient	Significance*
Males	26	- 0.0193	.463
Females	58	0.1831	.084

*No significance found.

When the data was characterized by age of the subject, both the young-old (60-74 years of age) and the old-old (72 years and older) reported no significant relationship between life quality and present physical activity (Table 4). This finding also supports the null hypothesis.

Table 4. The relationship between life quality and present physical activity in the elderly as characterized by age. Spearman correlation coefficients.

Age	N	Coefficient	Significance*
Young-Olds (60-74)	44	0.2325	.064
Old-Olds (75+)	40	- 0.0124	.470

*No significance found.

Upon analyzing the data from the size of the city, no significant correlation between life quality and present physical activity was found. The total sample, when examined as a whole, indicated no relationship between life quality and present physical activity. Table 5 demonstrates these findings.

Table 5. The relationship between life quality and present physical activity in the elderly as characterized by size of city and as a total sample. Spearman correlation coefficients.

City	N	Coefficient	Significance*
Stoughton, WI (City 1)	30	0.0544	.388
La Crosse, WI (City 2)	24	0.0158	.471
Edina, MN (City 3)	30	0.1904	.157
Total Sample	84	0.1438	.096

*No significance found.

The results of the present study contradict the findings of previous studies (Massie & Shephard, 1971; DeCarlo, 1974; Morris & Husman, 1978; Smith & Serfass, 1981; Morris et al., 1982). To evaluate the physical activity of the subjects, these researchers employed longitudinal studies, placing the subjects on training programs. Therefore, by testing the training group and the control group for life quality, they were able to obtain significant results. The discrepancy in the results of the present study may reflect the insensitivity of the tool used to measure the physical activity of elderly. The activities listed on the questionnaire may not have represented the realm of activities in which the elderly participate. Implementing personal interviews with elderly subjects would better enable the researcher to devise a questionnaire which could more accurately estimate the physical activity of older individuals.

The fact that this research supports the null hypothesis has ramifications relative to planning activities with the elderly. If the quality of life is presently high, and has no correlation to the types of activities suggested on the activity inventory, perhaps other activities (i.e., social, volunteer, or occupational activities) played a more important role in life satisfaction than regular physical activity in the sample studied. Froelicher et al. (1980) have stated that regular physical activity may improve the quality of life by the maintenance of good health, but the quality of life is definitely improved in the individuals for whom physical performance is important. If the quality of life in this present study is low, and has no correlation between life quality and present physical activity, it becomes important to

discover the activities which the elderly deem important and provide those activities.

Hypothesis II

The second hypothesis stated that there was no relationship between life quality and the level of past physical activity (young adulthood) in the elderly sample measured. As reported by the sample as a whole (n = 84), life quality was found to be significantly correlated with the level of past physical activity (Table 6).

Table 6. Life quality and past physical activity in the elderly. Spearman correlation coefficients.

Variable Pair	N	Coefficient	Significance
Life quality and past physical activity	84	0.2481	.011*

*Significant at the .05 level.

A significant relationship ($\geq .05$) was also found in the subgroup of the females. Table 7 demonstrates this finding.

Table 7. The relationship between life quality and past physical activity in the elderly as characterized by sex. Spearman correlation coefficients.

Sex	N	Coefficient	Significance
Males	26	0.1460	.238
Females	58	0.28.9	.016*

*Significant at the .05 level.

The relationship was also found to be significant ($\geq .05$) in the sample studied at the senior day center in La Crosse, Wisconsin (City 2). Table 8 shows the relationship between life quality and past physical activity as characterized by size of city.

Table 8. The relationship between life quality and past physical activity in the elderly as characterized by city of residence. Spearman correlation coefficients.

City	N	Coefficients	Significance
Stoughton, WI (City 1)	30	0.0950	.309
La Crosse, WI (City 2)	24	0.5423	.003*
Edina, MN (City 3)	30	0.0466	.404

*Significant at the .01 level.

On the basis of this information, the null hypothesis was rejected. The positive correlation between life quality and past physical activity indicates that the higher the level of physical activity maintained in young adulthood, the greater the life quality in old age. This illustrates that the psychological covariates obtained with the level of physical activity when younger may persist throughout old age, despite the fact that the level of activity may diminish. Individuals who perceive themselves as leading active lives when they are younger feel better about themselves when older. Therefore the success of programming obtained in later years may be very dependent upon the programming obtained in earlier years. Since this study shows that those who were

active young adults carry a high quality of life into old age, it appears important to stress a good program of regular physical activity for young adults. True fitness habits are those learned early and continued throughout life (Domenici, 1981).

Hypothesis III

The third hypothesis stated that there was no difference in life quality between males and females in the elderly sample studied. The sex of the respondent was not found to be related to the life quality, therefore the null hypothesis was supported (Table 9).

Table 9. Life quality and the sex of the respondent. Spearman correlation coefficients.

Variable Pair	N	Coefficients	Significance*
Sex with life quality	84	0.0292	.396
Males: life quality with present physical activity	26	- 0.0193	.463
Females: life quality with present physical activity	58	0.1831	.084

*No significance found.

As demonstrated in Table 9, both sexes indicated that the present physical activity level was not related to life quality. Although not statistically significant, a trend is noted in the above data. For the males, the correlation between life quality and present physical activity is a negative one. This may indicate that these men, who were possibly much more active during young adulthood, may now feel that

their present levels of physical activity are incomparable. No matter what level of physical activity the males are presently involved in, they could possibly feel that it is relatively inadequate. Men who participated in team sports such as football and basketball are not likely to continue in these activities. The women, on the other hand, reported a positive relationship between life quality and present physical activity. This may be indicative of the fact that due to society's expectations while growing up, women substituted other activities (non-physical activities), which are carried over into their older years.

Hypothesis IV

The fourth hypothesis stated that there would be no significant difference in the level of past physical activity (during young adulthood) between males and females in the elderly sample studied. The results of the study indicate a significant positive relationship between sex and past physical activity level (Table 10).

Table 10. Physical activity in the elderly as characterized by the sex of the respondent. Spearman correlation coefficient.

Variable Pair	N	Coefficient	Significance
Sex with past activity	84	0.1891	.043*
Sex with present activity	84	0.1609	.072

*Significant at the .05 level.

The males studied appeared to be significantly more active in young adulthood than the females. Today's elderly grew up in a time

when there were restrictions placed upon women by society. Women of past generations had been expected to limit themselves with regard to their activities. Physical exertion of any kind, especially when obtained as a result of participating in physical activities, was considered harmful and undesirable for women. Therefore, the activities which were listed on the questionnaire may have been activities in which women were not given appropriate instruction nor encouraged to participate, due to limitations placed upon them by society. Females may have acquired other activities which contributed to their life quality.

Improving life quality in today's elderly may require different sorts of activities for the men than for the women. The quality of life in old age may be improved in the males by reinstating those activities in which they have reported to be active in young adulthood. Women, on the other hand, may obtain an increased life quality by gaining some proficiency in those activities which may have been denied them in young adulthood. Both sexes must be convinced that it is still possible to achieve a high level of physical fitness in old age, through careful programming of selected activities. For the men as well as the women, now is the time for re-education of the elderly who have never been given the opportunity to participate in lifetime recreational activities (Domenici, 1981).

Hypothesis V

The fifth hypothesis stated that there was no significant difference in the present level of physical activity between males and females. This hypothesis was supported by the findings of the study

(see Table 10). The discrepancy between males and females with regard to physical activity in young adulthood appears to be eliminated in old age. Both sexes indicated a decrease in physical activity; however, the males reported a greater decrease from young adulthood to the present time than the females. The finding of no significant difference in present physical activity between males and females despite the significant difference in young adulthood, may be due to a number of factors. Either the drastic decrease in the physical activity levels of men or the fact that women continue to participate in those activities they were involved in during young adulthood, or a combination of the two, would eliminate the discrepancy. Although the males reported to be more active at the present than the females, the size of the difference has decreased and therefore is not statistically significant.

Hypothesis VI

The sixth hypothesis of this study stated that there was no significant difference in either life quality or physical activity levels between the age groups of sixty to seventy-four years (young-old), and seventy-five years and older (old-old). The results of this study have indicated no significant relationship between age of the respondent and life quality or physical activity (Table 11, see page 53).

Age does not appear to be an important factor in determining the relationship between life quality and physical activity in the elderly. In a study examining the activity patterns of the elderly, Nystrom (1974) also found no difference in activity in relation to age. The physical activity level of one of the age categories apparently was influenced by the other to cause their homogeny. Upon attending senior day centers,

Table 11. Life quality and physical activity in the elderly as characterized by age. Spearman correlation coefficients.

Variable Pair	N	Coefficient	Significance*
Age with sex	84	0.0319	.387
Age with life quality	84	- 0.0989	.185
Age with past activity	84	- 0.0300	.393
Age with present activity	84	- 0.1618	.071

*No significance found.

individuals may conform to or only participate in those physical activities in which their generation and society deems appropriate. If exercise is stressed at a given senior center, the members will be more motivated to become physically active. If any trend is to occur in regard to increased physical activity in the elderly, the change must come from within the organization. Regardless of their present activity level, the elderly must be shown that physical activity is still an important part of life.

Hypothesis VII

The seventh hypothesis was that there would be no significant relationship between past physical activity and present physical activity in the elderly sample studied. The results of this study have demonstrated a consistent positive relationship between past physical activity and present physical activity (Table 12).

Table 12. Life quality and physical activity in the elderly: past physical activity and present physical activity. Spearman correlation coefficients.

Variable Pair	N	Coefficient	Significance
Life quality with past activity	84	0.2481	.011*
Life quality with present activity	84	0.1438	.096
Past activity with present activity	84	0.5086	.001**

*Significant at the .05 level.

**Significant at the .01 level.

Table 13. The relationship between past physical activity and present physical activity in the elderly as characterized by sex. Spearman correlation coefficients.

Sex	N	Coefficient	Significance
Males	26	0.5546	.002
Females	58	0.4762	.001

*Significant at the .01 level.

Examining the data for age of the respondents, a significant correlation ($\geq .05$) was found between past physical activity and present physical activity, rejecting the null hypothesis. The young-old (60-74 years) respondents, as well as the old-old (75 years and older) respondents indicated a relationship between the two factors. Table 14 demonstrates this relationship.

Table 14. The relationship between past physical activity and present physical activity in the elderly as characterized by age. Spearman correlation coefficients.

Age	N	Coefficents	Significance*
Young-Olds (60-74)	44	0.5907	.001
Old-Olds (75+)	40	0.4047	.005

*Significant at the .01 level.

When treating the data for city of residence, the results show findings identical to the previous two subgroups. There was a significant correlation ($\geq .05$) between past physical activity and present physical activity in the elderly sample studied in each of the cities. Table 15 represents these results as well as for the sample as a whole.

Table 15. The relationship between past physical activity and present physical activity in the elderly as characterized by size of city and as a total sample. Spearman correlation coefficients.

City	N	Coefficient	Significance
Stoughton, WI (City 1)	30	0.5248	.001*
La Crosse, WI (City 2)	24	0.3614	.041**
Edina, MN (City 3)	30	0.5774	.001*
Total Sample	84	0.5056	.001*

*Significant at the .01 level.

**Significant at the .05 level.

These findings demonstrate that those individuals who were extremely active in young adulthood also reported a high activity level in old age. The subjects who demonstrated a low level of physical activity in young adulthood similarly reported low levels of physical activity at the present time. These results were significantly correlated at the .05 level. This illustrates the importance of initiating and maintaining appropriate levels of physical activity when younger which will carry over into old age. A person who was active as a youth tends to remain active throughout the remainder of the lifespan (Zborowski, 1962). Although a decrease in the level of physical activity often occurs with age, relatively speaking, those individuals who were active when young, maintain a similar level of fitness when old.

Hypothesis VIII

The final hypothesis of the present study stated that there was no significant relationship between the city of residence and either life quality or the physical activity level of the elderly sample which was examined. The results of the study rejected the null hypothesis by demonstrating a significant negative correlation ($\geq .05$) between the size of the city and both past physical activity and present physical activity (see Table 16).

As reported by the subjects in the present study, the level of physical activity, both past and present, decreased as the size of the city increased. There are many factors which could contribute to this finding. Public transportation is nearly non-existent in rural America (Buchanan, 1981). This mandates that the rural elderly turn to more

Table 16. Life quality and physical activity in the elderly as characterized by city. Spearman correlation coefficients.

Variable Pair	N	Coefficient	Significance
City with life quality	84	- 0.1131	.153
City with past activity	84	- 0.2603	.008**
City with present activity	84	- 0.2917	.004**

*Significant at the .05 level
**Significant at the .01 level

independent modes of traveling to their needed services. Transportation systems are more abundant in large cities, therefore, eliminating the need to walk to destinations. In the case of the present study, the Edina Senior Community Center in Edina, Minnesota, was provided with their own bus for transportation. In Stoughton, Wisconsin, the elderly had to rely upon volunteer drivers and the town's cab system for transportation.

In large cities the elderly may be discouraged from walking for exercise or transportation due to personal safety. Pedestrian elders are three times as likely to have a pedestrian accident as a younger adult (Somiani-Dayer, 1981). Crime is also an important consideration in the mobility of the elderly in large cities. Whether or not this age group is indeed more victimized than other age groups, they feel unsafe, resulting in self-imposed restrictions (Somiani-Dyer, 1981).

The possibility of participating in outdoor activities such as gardening decreases with an increase in city size due to a decrease in outdoor facilities and recreational areas. The fact that these recreational areas are not located conveniently nearby may discourage

possible participants. Rural settings provide more space for outdoor activities.

Another finding of the present study which is associated with the size of the city concerns the age of the respondent. The city size was found to be significantly correlated ($\geq .05$) with the age of the subject. Table 17 demonstrates this finding.

Table 17. Life quality and physical activity in the elderly as characterized by city and age. Spearman correlation coefficients.

Variable Pair	N	Coefficient	Significance*
City with age	84	0.1974	.036

*Significant at the .05 level.

The relationship between city size and age indicates that as the size of the city becomes larger, the number of individuals in the old-old age category (seventy-five years and older) increases. Of the sample studied, the Stoughton Area Senior Citizen Center members were found to be younger than the members of the Edina Senior Community Center. This discrepancy in age may be due to a number of factors. The lack of adequate transportation in rural areas greatly affects the ability of older persons to get needed services, or to receive proper and timely medical care. Rural residents possess uniquely different health service problems, conditions, and service delivery requirements (Buchanan, 1981). Through increased social interactions, the urban elderly are better educated regarding health care. Large cities also offer better health care facilities to their inhabitants.

Summary

The summary highlights the key findings of the present study. Life quality was positively correlated with the level of past physical activity. Past physical activity was found to be significantly correlated in a positive manner to present physical activity. The city of residence was negatively correlated with the level of past physical activity, as well as the level of present physical activity. The city of residence was also found to be positively correlated with the age of the subject. All findings were statistically significant at the .05 level.

This study has produced interesting results which may benefit those individuals who are concerned with the necessity or value of implementing exercise programs for the elderly. Chapter 5 will discuss the implications of these findings.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The variables of life quality and physical activity were measured in a sample of independently living elderly. Questionnaires were utilized to obtain information from the sample. The sample consisted of males and females, sixty years and older, who attended senior day centers. The data were treated using the Spearman correlation coefficient to determine the relationships between the variables measured.

Conclusions

The results of this study have led to the following conclusions:

1) There is no significant relationship between life quality and the present physical activity level in the elderly sample studied.

2) Life quality was found to be significantly correlated at the .05 level with the level of physical activity attained in young adulthood.

3) There was a significantly higher correlation between sex of the respondent and the physical activity level in young adulthood, with the males reporting a higher level of past physical activity.

4) The difference in the present physical activity levels between the males and the females was not found to be statistically significant.

5) There was not a significant correlation between life quality or physical activity levels and the young-old and old-old age categories

6) Past physical activity was found to be positively correlated with the present physical activity.

7) The city of residence was positively correlated with age of the respondent, or there were more individuals in the old-old age category found in the larger city (Edina, Minnesota), than in the smaller town (Stoughton, Wisconsin).

8) The city of residence was negatively correlated with the level of past physical activity and also the level of present physical activity.

9) Individuals living in the smaller community tended to be more active in young adulthood as well as at the present time.

Recommendations

In light of the above conclusions and as a result of the findings, the following recommendations were made:

1) In order to effectively evaluate the level of physical activity in the elderly, an evaluation tool must be developed which is specific to this population for eliciting information relative to activity levels. The activities presented on the questionnaire must be those which are representative and significant to older persons. Such a tool could be designed after interviews with the elderly to determine what activities they participated in in the past, and also their present activities. The sensitivity of the inventory is also an important consideration. It may be necessary to incorporate a personal interview with the respondent when administering the inventory to become completely aware of the actual level of physical activity.

2) The results of this study have indicated that there is no

relationship between life quality and the present level of physical activity in the elderly. The physiological benefits of regular physical exercise have been documented by numerous investigators (Leake, 1966; Adams & deVries, 1973; Shephard & Sidney, 1978; MacKinnon, 1980; Fox, 1981; and Smith & Serfass, 1981). The psychological importance of physical activity to the elderly, however, is more uncertain (Hammet, 1967; Harris, 1970; Morgan et al., 1970; Shephard & Sidney, 1978; and MacKinnon, 1980). Further research appears to be necessary to identify not only the effectiveness of physical activity, but also the methods and modes of exercise which will reap the greatest benefits for this population. The findings of this study demonstrated the importance of evaluating this specific group to determine the need for a program of regular exercise. Interview assessments could be utilized in this evaluation.

3) The method of presenting activities to the elderly also becomes an important factor in exercise participation. The program director must be aware of the limitations and fears of this population, and choose the activities and exercise intensity accordingly. The older adult should be educated regarding the potential benefits and risks of participation in an exercise program. A study undertaken to evaluate the possible use of television and radio as a tool of introducing participatory activities to the elderly may be helpful in motivating this population. Exercise programs designed mainly for the young appear to be too fast-paced for most elderly individuals. Exercise instructors who do not understand the aging process may only discourage the older adult.

4) The researcher recommends that specific physical activity programs aimed at the elderly population be developed and evaluated. These programs should reflect the needs and desires of the older adult, and incorporate health education to enable the participant to better understand the reasons for, and the potential benefits and risks of becoming involved in an exercise program. These programs should be monitored and evaluated on a regular basis to determine their strengths and weaknesses.

5) The relationship of past physical activity to the present physical activity level was a very significant finding in this study. If activity in the young adult years stimulates a relatively similar, although decreased level of activity in old age, as the results of this research indicated, initiating activity in young adulthood becomes very important. A study to determine what types of individuals continue to be active, and also which activities are continued into old age is recommended to find the relevance of physical activity to the elderly. Young adults should be instructed in activities which will carry over into old age, and be encouraged to continue to maintain physical fitness. Unfortunately, the elderly in today's society are generally perceived as being less active (Butler, 1981). Those older adults living sedentary lifestyles may be doing so because we have failed to educate and motivate this population in the past as well as at the present time.

Conclusion

An active and resourceful mind is best served by an equally vital body that can turn thought into substance and maintain a fruitful,

contributing lifestyle (Ferguson, 1981). Therefore, it is critical that information be developed and shared which encourages productive longevity and motivates the elderly to continue to be physically active.

While there are some differences in the exact nature of the responses of the elderly to the challenge of exercise conditioning, there is no longer any doubt that the health benefits to be derived by them are entirely similar to the benefits derived by the young and the middle-aged (deVries, 1981). The active life is for everyone, not just the young.

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APPENDIX A

PART 3.

LIFE QUALITY INVENTORY

PLEASE READ EACH OF THE FORTY QUESTIONS CAREFULLY. RESPOND TO EACH STATEMENT FROM YOUR OWN PERSONAL POINT OF VIEW. THERE ARE NO RIGHT OR WRONG ANSWERS, ONLY WHAT ARE GENERALLY YOUR PERCEPTIONS AND EXPERIENCES. THE RESPONSE CATEGORIES ARE AS FOLLOWS:

DY	Y	P	N	DN
DEFINITELY YES	YES	PERHAPS IN PART	NO	DEFINITELY NO

IN THE SPACE PROVIDED BEFORE EACH OF THE FORTY QUESTIONS, WRITE IN A DY, OR Y, OR P, OR N, OR DN DEPENDING UPON THE DEGREE TO WHICH THE STATEMENT APPLIES TO YOUR LIVING CIRCUMSTANCES.

EXAMPLE:

DY 26. WHERE I LIVE IT IS TOO HOT IN THE SUMMER.

IF, FROM YOUR OWN PERSONAL VIEWPOINT, THE RESPONSE IS DEFINITELY YES, THEN YOU WILL WRITE THE LETTERS DY (DEFINITELY YES) IN THE SPACE PROVIDED BEFORE THE ITEM NUMBER. IF, ON THE OTHER HAND, ONE OF THE OTHER ALTERNATIVES SEEMS MORE APPROPRIATE, THEN WRITE IN THE LETTER OR LETTERS FOR THAT ALTERNATIVE: EITHER A DY (DEFINITELY YES), Y (YES), P (PERHAPS), N (NO), OR DN (DEFINITELY NO) WILL BE WRITTEN IN THE SPACE BEFORE EACH ITEM NUMBER.

YOU MUST PROVIDE AN ANSWER FOR EACH OF THE QUESTIONS.

PLEASE ANSWER ALL QUESTIONS

DY	Y	P	N	DN
DEFINITELY YES	YES	PERHAPS IN PART	NO	DEFINITELY NO

_____ 1. I have more headaches than most people I know.

_____ 2. In my work situation I am afraid to say what I think.

_____ 3. I am frequently at odds with those close to me (e. g. spouse, relatives, friends).

_____ 4. I am badly treated by my employer.

_____ 5. I work only because I must work to survive.

_____ 6. I am dependent upon alcohol or upon another drug.

_____ 7. I am made to feel a part of the "team" at work.

_____ 8. My physical health is poor.

_____ 9. My boss makes my work more difficult than it should be.

_____ 10. If I have a serious problem I seek help from my family.

_____ 11. My mother is a person worthy of admiration.

_____ 12. I find the world a hostile place in which to live.

_____ 13. I am a physically awkward person.

_____ 14. I am free to make my own personal decisions.

PLEASE ANSWER ALL QUESTIONS

DY	Y	P	N	DN
DEFINITELY YES	YES	PERHAPS IN PART	NO	DEFINITELY NO

_____ 15. There is an excessively high noise level where I work.

_____ 16. I am often made miserable by those close to me.

_____ 17. I expect to fail in the things which I do.

_____ 18. I receive adequate medical care.

_____ 19. Parents such as I had should be discouraged from having children.

_____ 20. I have a problem with my hearing.

_____ 21. I am held back from developing my creative talents.

_____ 22. Two years from now I would like to be doing almost anything but what I am doing now.

_____ 23. Most people say that I am a success in my carreer.

_____ 24. I am tied down by my responsibilities.

_____ 25. I am a victim of unfair criticism.

_____ 26. I am out of step with my times.

_____ 27. In my kind of work one has many opportunities to meet new and different people.

PLEASE ANSWER ALL QUESTIONS

DY	Y	P	N	DN
DEFINITELY YES	YES	PERHAPS IN PART	NO	DEFINITELY NO

_____ 28. People in my line of work can make decisions as to how they do their own jobs.

_____ 29. There are many good reasons for disliking the kind of work I do.

_____ 30. My job entails considerable responsibility.

_____ 31. I get all the exercise I feel that I need.

_____ 32. I had a good relationship with my mother while growing up.

_____ 33. I would like to move out of where I am now living.

_____ 34. At work I have an opportunity to use my talents in constructive endeavors.

_____ 35. I feel tired when I get up in the morning.

_____ 36. I am in love.

_____ 37. I have many interests and activities to occupy my spare time.

_____ 38. For me work and leisure are as different as night and day.

_____ 39. I have difficulty falling asleep.

_____ 40. I feel that I have grown as a person in my job.

APPENDIX B

PART 2.

PHYSICAL ACTIVITY INVENTORY

PLEASE CHECK THE FREQUENCY OF PARTICIPATION OF THOSE ACTIVITIES YOU HAVE ENGAGED IN, EITHER COMPETITIVELY OR RECREATIONALLY, DURING YOUNG ADULTHOOD AND AT THE PRESENT TIME. INDICATE THE AMOUNT OF TIME NORMALLY SPENT AT EACH ACTIVITY.

ACTIVITIES	FREQUENCY OF PARTICIPATION									
	Young Adulthood					Present Time				
	Daily (4-7x per week)	2 - 3x per week	Weekly	Seldom	Never or Once	Daily (4-7x per week)	2 - 3x per week	Weekly	Seldom	Never or Once
Archery										
Badminton										
Baseball										
Basketball										

ACTIVITIES	FREQUENCY OF PARTICIPATION									
	Young Adulthood					Present Time				
	Daily (4-7x per week)	2 - 3x per week	Week-ly	Sel-dom	Never or Once	Daily (4-7x per week)	2 - 3x per week	Week-ly	Sel-dom	Never or Once
Bicycling										
Bowling										
Calisthenics										
Croquet										
Dancing										
Fishing										
Football										
Gardening										
Golf										
Handball										

ACTIVITIES	FREQUENCY OF PARTICIPATION									
	Young Adulthood					Present Time				
	Daily (4-7x per week)	2 - 3x per week	Week-ly	Sel-dom	Never or Once	Daily (4-7x per week)	2 - 3x per week	Week-ly	Sel-dom	Never or Once
Horseshoes										
Hunting										
Jogging										
Racquetball										
Rowing										
Running										
Shuffleboard										
Skiing (cross country)										
Skiing (downhill)										

ACTIVITIES	FREQUENCY OF PARTICIPATION									
	Young Adulthood					Present Time				
	Daily (4-7x per week)	2 - 3x per week	Week-ly	Sel-dom	Never or Once	Daily (4-7x per week)	2 - 3x per week	Week-ly	Sel-dom	Never or Once
Skiing (water)										
Soccer										
Softball										
Squash										
Swimming										
Tennis										
Volleyball										
Walking										
Weightlifting										
Other: _____										

APPENDIX C

SENIOR CITIZEN QUESTIONNAIRE

Dear Older Adult:

I am attempting to accumulate information with regard to the physical activities which older people are involved in. This study is an effort to understand how people feel about growing older and what kinds of activities they are involved in.

There are three parts to the questionnaire, and the total time involved should not be longer than one hour.

The information obtained from this questionnaire will be treated as priveledged and confidential and will not be released or revealed to any person. The information obtained will be used for statistical or scientific purposes with your right to privacy retained.

If you have any questions or comments, I would appreciate hearing from you. If you would like a summary of this study, please leave your name and address.

Thank you very much for your participation.

Sincerely,

Mary A. Zuehlke

maz

APPENDIX D

PART I.

PLEASE CHECK THE APPROPRIATE RESPONSE.

Age Category: 60 - 74 _____ 75 + _____

Sex: Male ____ Female ____

Marital Status: Married ____ Widowed ____ Divorced ____
Separated ____ Never Married ____

Education: 8th Grade or Less ____ 9 - 11 ____ 12 ____
Some College ____ College Graduate ____ Graduate Degree ____

Work Status: Working ____ Retired ____ Never Worked ____

Number of Children: _____

Health Status: Excellent ____ Good ____ Fair ____ Poor ____
Very Poor ____

General Activity Level: Very High ____ High ____ Average ____
Low ____ Very Low ____

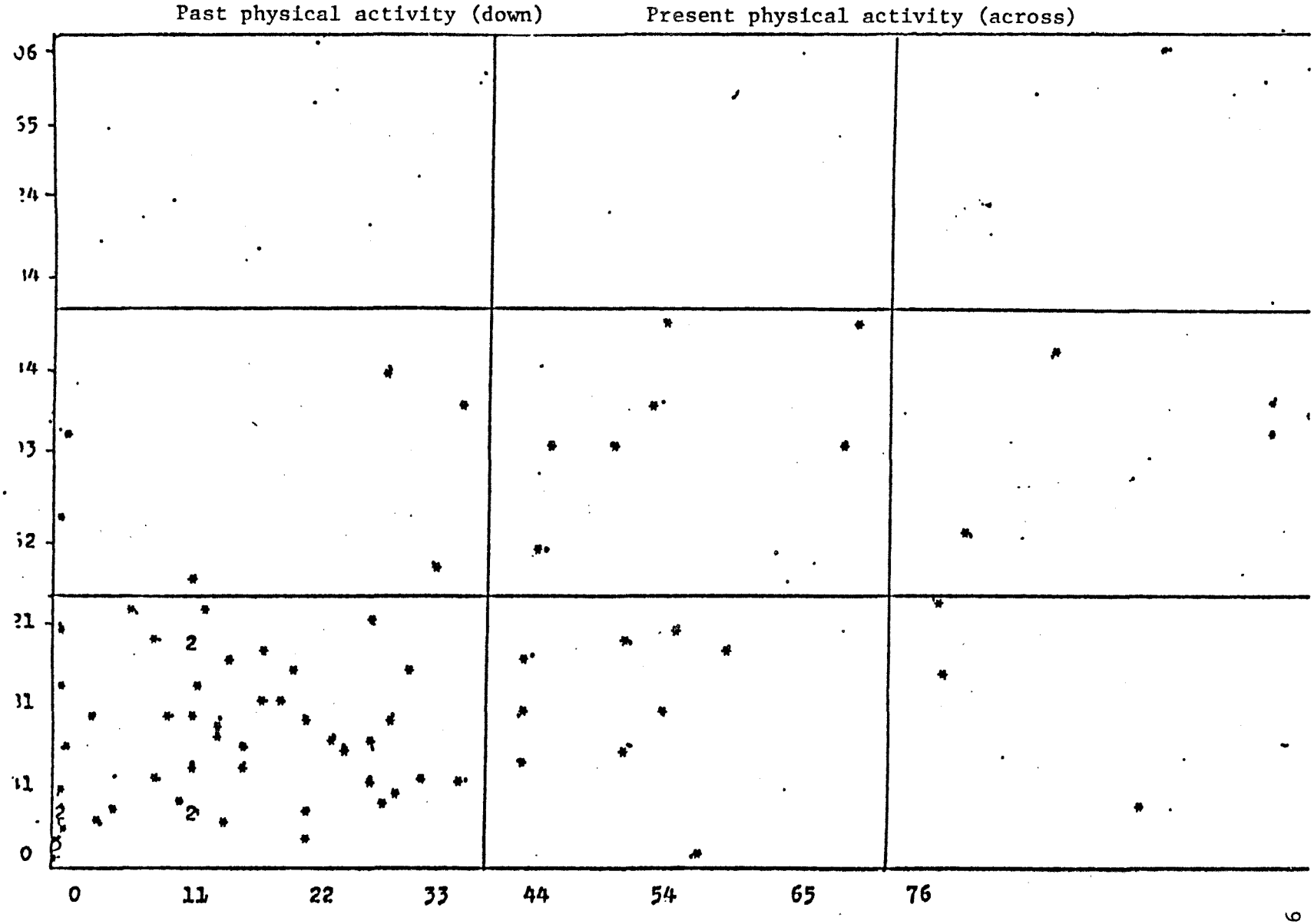
APPENDIX E

APPROXIMATE METABOLIC COST OF ACTIVITIES

ACTIVITY	METABOLIC COST
Archery	3
Badminton	4
Baseball	3
Basketball	7
Bicycling	5
Bowling	2
Calisthenics	4
Croquet	3
Dancing	4
Fishing	2
Football	7
Gardening	4
Golf	5
Handball	9
Horseshoes	3
Hunting	5
Jogging	8
Racquetball	9
Rowing	5
Running	9
Shuffleboard	2
Skiing (cross-country)	7
Skiing (downhill)	6
Skiing (water)	6
Soccer	8
Softball	3
Squash	8
Swimming	9
Tennis	5
Volleyball	3
Walking	3
Weightlifting	7

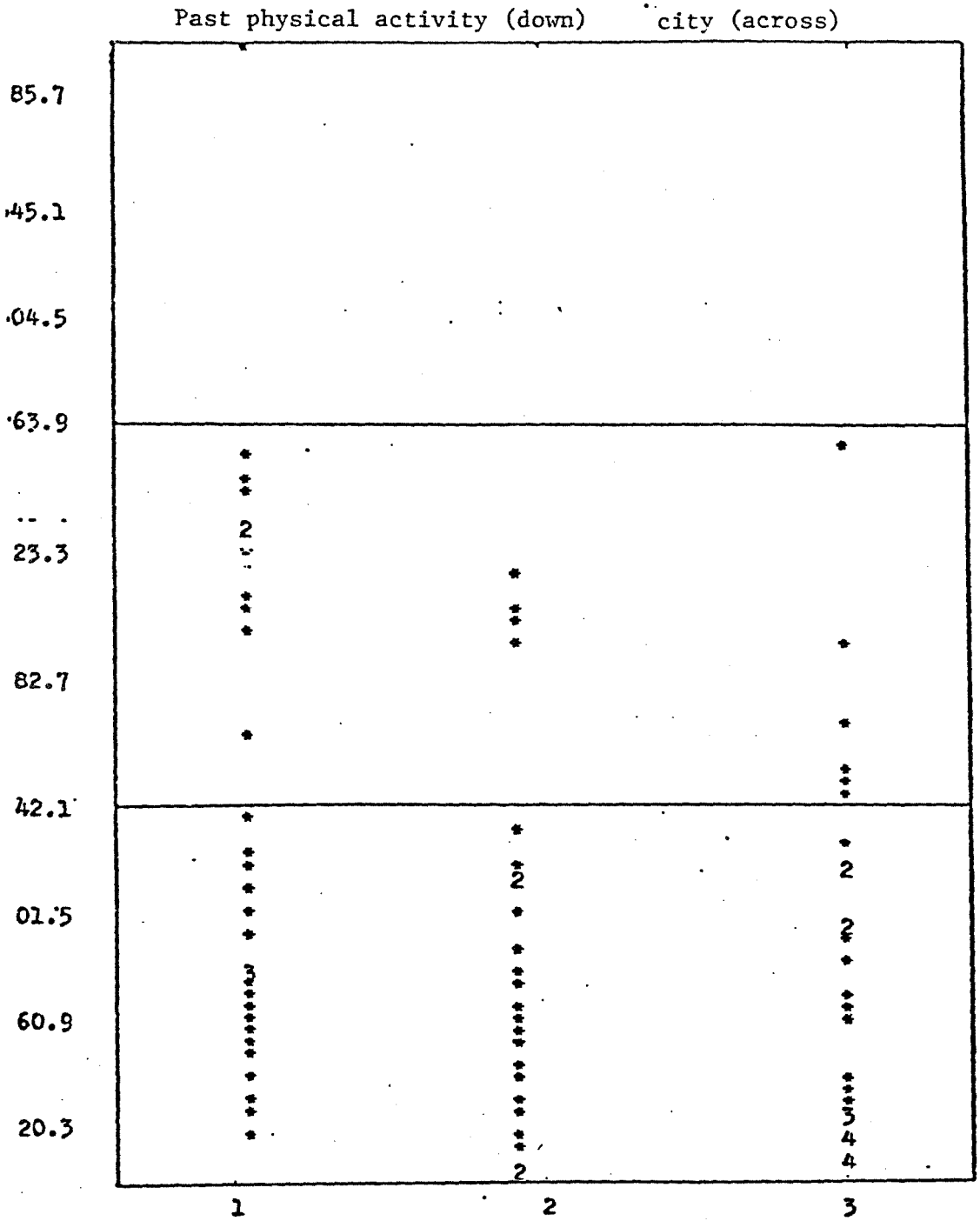
(Fox, S., Naughton, J., & Gorman, P. Physical Activity and cardiovascular health, III. The exercise prescription; frequency and type of activity. Modern Concepts of Cardiovascular Disease, 41:6, June, 1972.

APPENDIX F

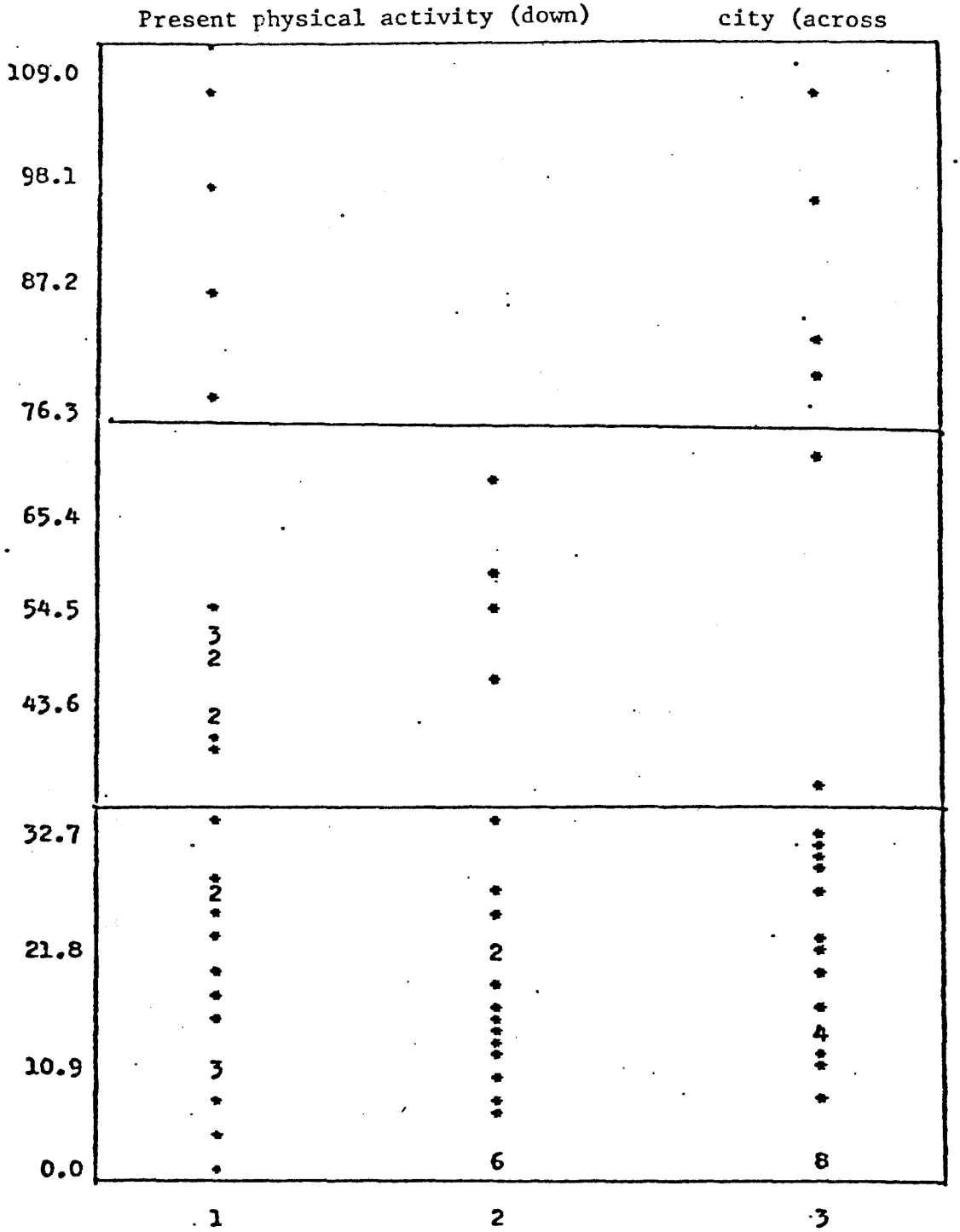


Scattergram 1. The relationship between past physical activity and present physical activity in the elderly.

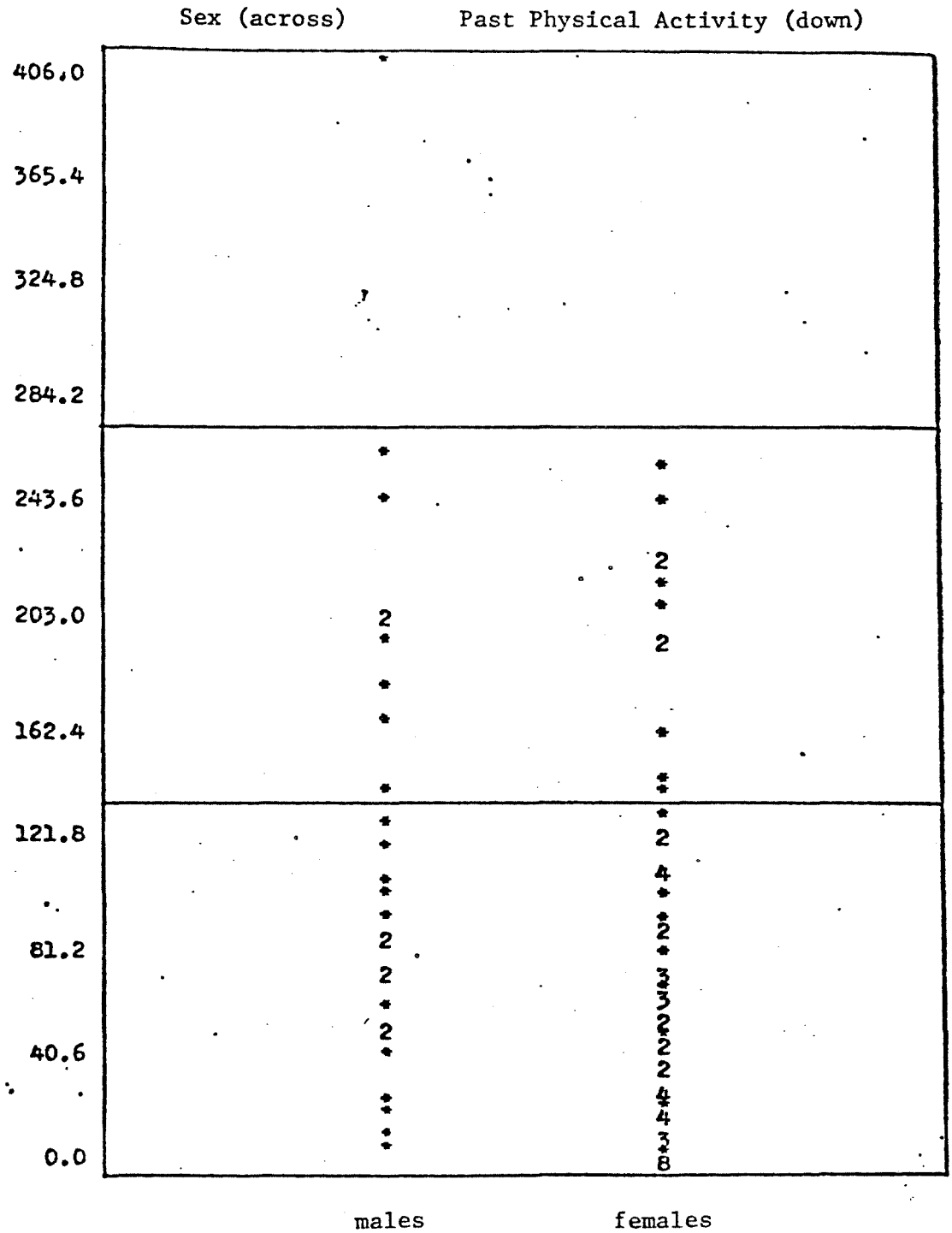
APPENDIX G



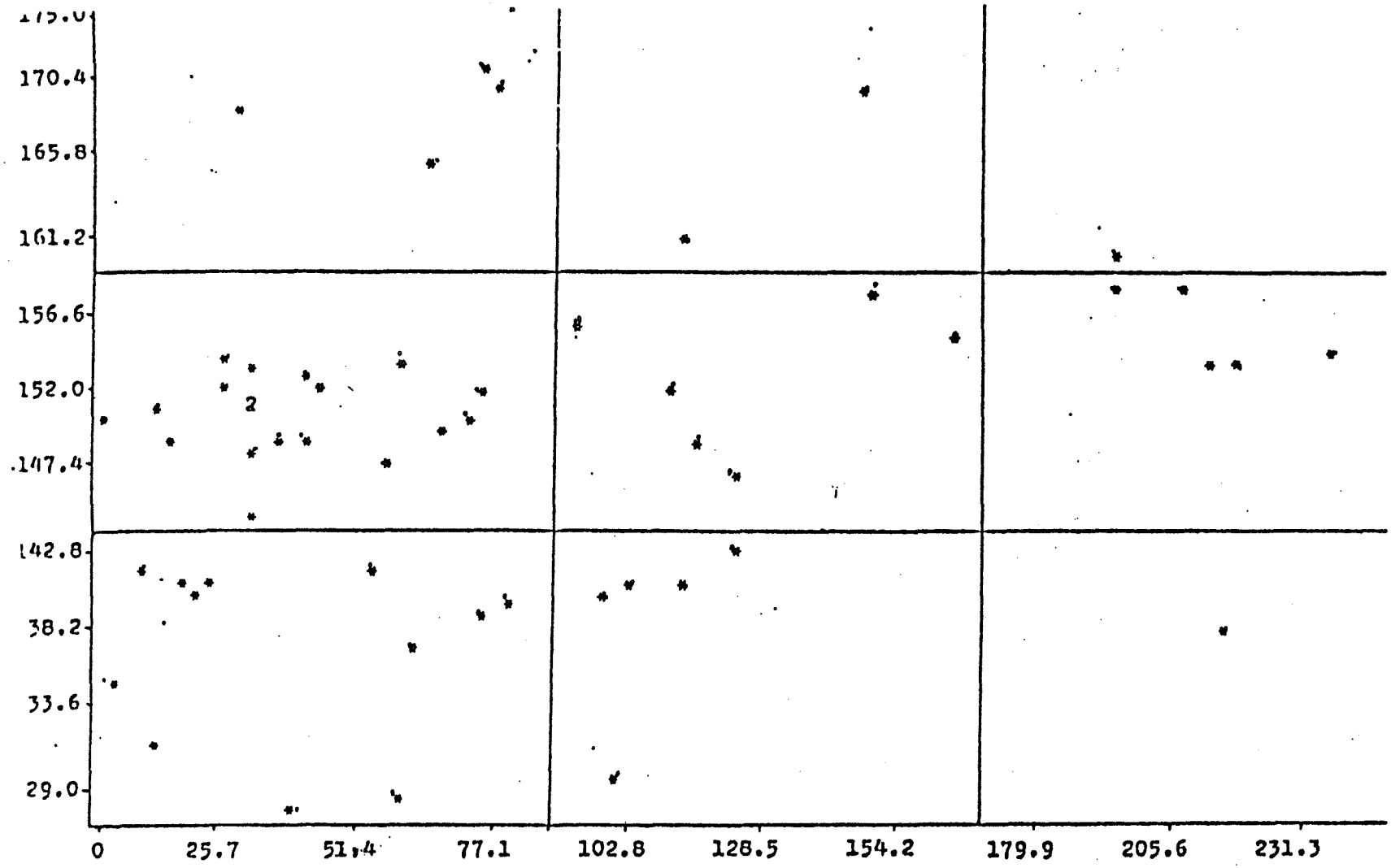
Scattergram 2. The relationship between the city of residence and past physical activity in the elderly.



Scattergram 3. The relationship between the city of residence and physical activity in the elderly.



Scattergram 4. The relationship between sex and past physical activity in the elderly.



Scattergram 5. The relationship between life quality and past physical activity in the elderly